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Technopolitics Of Conflict: Unpacking The Role Of Drones In Sudan's War

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Abstract

Over the past twenty years, Unmanned Aerial Vehicles (UAVs), widely known as drones, have become a critical innovation in global security. In Africa, more than 20 countries have adopted UAV technology within the last five years, with notable developments in North Africa, West Africa, and increasingly in the Sahel region, especially amid the ongoing conflict in Sudan. This research examined the deployment of drone technology and its broader impact within Sudan's conflict from 2023 to 2025. Using a qualitative case study framework and thematic analysis, the study offers a nuanced understanding of how drone operations have reshaped warfare, affected civilian protection, and reconfigured power relations. Primary data were gathered through semi-structured interviews with key informants (n=5), including security experts, a policy analyst, a humanitarian officer, and an academic researcher, complemented by online media coverage and specialized sources. Findings reveal paradoxical outcomes: while drones have enabled tactical disruption, enhanced surveillance, and precision strikes, particularly via loitering munitions and foreign-supplied UAVs, they have also contributed to civilian casualties, eroded trust, and intensified ethical scrutiny. In Sudan, drone technologies are not merely tools of military efficiency but instruments that recalibrate battlefield asymmetries and challenge aerial sovereignty in a fragmented security landscape. The study recommends multi-level reforms, including national oversight protocols, regional ethical frameworks, and international tracking mechanisms to regulate drone transfers, safeguard civilian zones, and build technopolitical literacy within Sudan's transitional governance.

Keywords: drone warfare, Sudan conflict, technopolitics, aerial sovereignty, civilian protection, Sudanese Armed Forces (SAF), Rapid Support Forces (RSF), UAVs

Introduction

The expanding use of drone technology in contemporary conflict zones is reshaping global strategies for warfare, surveillance, and state security. Once reserved for technologically advanced militaries, Unmanned Aerial Vehicles (UAVs) are now increasingly deployed across the Global South, including in fragile and conflict-affected regions. In Africa, this shift is transforming both conventional and asymmetric combat, sparking urgent debates around sovereignty, accountability, and the ethics of remote-controlled operations.

Sudan, long defined by political volatility, armed insurgencies, and humanitarian crises, provides a critical case for examining how drone technologies are reconfiguring conflict dynamics on the ground. As a site of sustained international mediation and regional peacekeeping, Sudan's adoption of UAVs and autonomous weapons systems (AWS) marks a significant turn in its security architecture, one that intensifies surveillance capacities and precision targeting. This evolution raises pressing concerns about the governance of emerging military technologies and their impact on fragile state sovereignty and civilian protection.

Existing scholarship has extensively explored the influence of drone technology on Africa's shifting security landscape. This body of work typically clusters into three thematic strands: first, empirical studies detailing the nature and operational scope of drone deployments;[1] second, analyses examining the strategic and political implications of drone use;[2] and third, forward-looking assessments of how drones may shape the future contours of

[1] Craig Whitlock and Greg Miller, "U.S. Drone Bases in Africa," *The Washington Post*, (December 2, 2011); Obi Anyadike, "The Rise of Drone Warfare in Africa," *IRIN News*, (March 14, 2017); Ty McCormick, "The Drone War in Africa," *Foreign Policy*, June 10, 2015; Nick Turse, "America's Secret Drone War in Africa," *The Intercept*, (February 12, 2020); Nick Turse, "Drone Bases and U.S. Military Expansion," *The Intercept*, (July 8, 2023).

[2] Daryl Donnenfeld, "The Expansion of U.S. Drone Bases in Africa," *African Affairs* 118, no. 472 (2019): 589–612; Tricontinental: Institute for Social Research, Drones and Imperial Power in Africa (São Paulo: Tricontinental Press, 2021); Lucia Balbon, "Drone Bases and Civilian Risk in the Horn of Africa," *Conflict Studies Quarterly* 40 (2022): 33–52.

warfare on the continent.[3] Yet, these studies have overlooked the distinct dynamics surrounding the deployment of drones and autonomous weapons systems (AWS) within the context of the Sudan conflict, highlighting a continuing void in localized, conflict-sensitive research.

Accordingly, this study addresses a key gap by examining drone operations in Sudan's conflict, their impact on humanitarian access and displaced populations, and how they reshape power asymmetries, offering localized insights to inform scholarship and policy on drone governance, civilian protection, and conflict dynamics. Specific objectives included: (1) examining the operational roles of drone technology in the tactical strategies employed by the Rapid Support Forces (RSF) and the Sudanese Armed Forces (SAF), (2) analysing the impact of drone warfare on the protection of civilian populations within the Sudanese conflict, (3) investigating how drone technology reshapes power asymmetries between state and non-state actors in Sudan's evolving security landscape. These objectives yielded insights that reveal the dual-edged nature of drone deployments in Sudan's conflict, as outlined below.

Preliminary findings indicate that drone deployments in Sudan have produced a complex interplay of strategic advantage and civilian risk. While UAVs have strengthened the tactical reach of armed actors, enhancing surveillance, precision strikes, and territorial control through loitering munitions and foreign-sourced platforms, they have simultaneously intensified threats to human security and civil protection. Their use has contributed to civilian casualties, eroded trust between communities and governing forces, and sparked ethical concerns around remote warfare. In this context, drones are not merely instruments of military efficiency; they are reshaping conflict dynamics by amplifying asymmetries, obstructing

[3] Michael Jacobsen, "Weaponized Drones and Non-State Actors," *Defense Technology Review* 5, no. 2 (2017): 33–49; Henrik Haugstvedt, "Terrorist Drone Use: Emerging Threats in Africa," *Journal of Counterterrorism and Homeland Security* 8, no. 3 (2020): 77–95; Ifeanyi Olumba, "Localizing Drone Technology in African Security Frameworks," *African Technopolitical Review* 1, no. 2 (2022): 45–61.

protective access for vulnerable populations, and destabilizing contested claims to aerial sovereignty in an already fragmented security landscape.

This research engages with the overlapping domains of security scholarship, conflict dynamics, and the strategic deployment of advanced military technologies. By foregrounding Sudan's conflict, the research engages underexplored geographies and critically explores how drone warfare intersects with fragile governance structures and acute humanitarian vulnerabilities. It contributes to broader debates on the ethics of remote violence, the transnational diffusion of military innovation, and the risks posed by technological asymmetry in low-capacity and politically volatile states.

The paper proceeds by first reviewing foundational literature on drone technology, with attention to both global trends and African-specific developments. It then outlines the methodological framework, including the data sources and analytical tools employed in the study. The findings examine how drones are being deployed in operational contexts, assess their influence on safeguarding civilian communities, and analyse their role in reconfiguring power relations. The discussion contextualizes the findings within wider academic and policy debates, linking them to existing scholarship and underscoring their relevance. The paper closes by distilling key insights and presenting actionable policy recommendations.

LITERATURE REVIEW

This literature review critically interrogates the theoretical foundations and emerging scholarship on drone warfare in Sudan, foregrounding historical trajectories and contextual dynamics. It situates the study within broader discourses on militarized technology, regional power contestations, and the shifting architecture of conflict across Sudan's war-affected zones.

Foundational Theories

Technopolitics

Technopolitics disrupts conventional, instrumentalist understandings of technology by asserting that technological systems are not neutral tools, but deeply political artifacts embedded within, and productive of, power relations, governance logics, and socio-historical contexts.[4] Rather than treating technology as a passive means to achieve policy goals, technopolitics foregrounds how technological design, deployment, and discourse actively structure political possibilities, exclusions, and hierarchies. It interrogates who designs technology, for what purposes, and with what consequences, challenging dominant narratives that obscure the entanglement of technological systems with regimes of control, surveillance, and inequality.[5]

In the context of drone warfare, technopolitics reveals how drones function not merely as aerial platforms but as technopolitical assemblages, material and symbolic infrastructures that encode strategic priorities, ethical assumptions, and geopolitical imaginaries. As Grégoire Chamayou argues, the drone's capacity for remote sensing and precision targeting reconfigures the spatial and moral boundaries of warfare, enabling algorithmic decision-making and "pattern-of-life" surveillance that depersonalize violence while intensifying its reach.[6] This logic renders drone strikes both plausible and palatable, masking their human costs behind a veneer of technological sophistication and operational efficiency.

[4] Langdon Winner, "Do Artifacts Have Politics?" Daedalus 109, no. 1 (1980): 121–136; Gabrielle Hecht, The Radiance of France: Nuclear Power and National Identity after World War II (Cambridge, MA: MIT Press, 1998).

[5] Andrew Feenberg, Transforming Technology: A Critical Theory Revisited (Oxford: Oxford University Press, 2002).

[6] Grégoire Chamayou, A Theory of the Drone, trans. Janet Lloyd (New York: The New Press, 2015).

Hecht's (2011) concept of "technopolitical regimes" is particularly instructive, illuminating how drone infrastructures are embedded within broader systems of militarized governance, transnational alliances, and extractive logics.[7] These regimes do not simply use drones, they are constituted through them, as drones become nodes in a network of border securitization, resource control, and authoritarian resilience. Technopolitics thus enables a critical reading of how technological rationality legitimizes violence, reconfigures sovereignty, and reproduces global hierarchies under the guise of innovation and security.

Technopolitics serves as the principal theoretical framework for this study, where the convergence of technology and violence demands a deeper analysis of how power is exercised, contested, and obscured through technopolitical means.

Critical Security Studies

Critical Security Studies (CSS) disrupts conventional, state-centered understandings of security by asserting that security is not a fixed or objective reality, but a construct shaped by discourse, power relations, and social practices.[8] Rather than prioritizing the protection of the state, CSS redirects attention toward safeguarding individuals and marginalized groups, raising critical questions about who is being secured, against what threats, and by whom. It challenges dominant security discourses that justify violence and surveillance under the guise of national interest, advocating instead for emancipatory frameworks grounded in human dignity and social justice.[9]

[7]Gabrielle Hecht, "Introduction: More than State and Market," in Entangled Geographies: Empire and Technopolitics in the Global South, ed. Gabrielle Hecht (Cambridge, MA: MIT Press, 2011), 1–14.

[8] Ken Booth, Theory of World Security (Cambridge: Cambridge University Press, 2007); Barry Buzan and Lene Hansen, The Evolution of International Security Studies (Cambridge: Cambridge University Press, 2009).

[9] Ken Booth, Theory of World Security (Cambridge: Cambridge University Press, 2007).

In the context of drone warfare, CSS interrogates the political and ethical implications of drones as instruments of securitization. Far from being neutral technologies, drones actively shape threat perceptions and legitimize the use of force, often in spaces beyond conventional battlefields. Grondin (2012) conceptualizes drones as "objects of security" that both reflect and reproduce hegemonic power dynamics, facilitating remote violence and targeted killings with limited oversight.[10] This critique resonates with CSS's broader concern about how technological rationality obscures the political nature of violence, rendering it seemingly precise, humane, and necessary.

Sudan's Turmoil: A Historical Lens

Sudan, strategically located in the Horn of Africa, has grappled with a deeply entrenched legacy of conflict rooted in its colonial past.[11] For decades, political and economic power has been concentrated in Khartoum, systematically excluding and disenfranchising peripheral regions.[12] Following its colonization by Egypt and Britain, Sudan attained independence in 1956 but faced chronic instability, marked by successive coups and prolonged civil strife.[13]

Between 1983 and 2005, the country endured its most protracted and devastating war, pitting the central government against the Sudan People's Liberation Army (SPLA), which

[10] David Grondin, "The Politics of Drones: On the Construction of Aerial Threats and the Targeted Killing of Non-combatants," Security Dialogue 43, no. 6 (2012): 485–501.

[11] Christopher Zambakari, "Sudan's Path to Peace: A Critical Analysis," *The Journal of North African Studies* 17, no. 3 (2012): 455–472.

[12] X-Border Project, "Sudan's Peripheral Conflicts," *X-Border Data Portal*, (2023).

[13] Alex de Waal, *Sudan: A Political Marketplace* (London: Hurst & Co., 2021).

sought autonomy for the South and control over vital oil reserves.[14] This brutal conflict claimed over 2.5 million lives and concluded with a peace accord in 2005.[15]

However, violence continued in Darfur, where marginalized ethnic and religious communities revolted against systemic exclusion.[16] In retaliation, President Omar Al-Bashir mobilized the Janjaweed militia, which was later institutionalized as the Rapid Support Forces (RSF) under the National Intelligence and Security Services. Bashir appointed Mohamed Hamdan Dagalo (Hemedti) to lead the RSF in 2013, and the force gained constitutional recognition the following year.[17]

Mass protests erupted in 2018 over soaring food and fuel prices, culminating in Bashir's removal in April 2019 through a fragile alliance between the Sudan Armed Forces (SAF) and RSF.[18] A Transitional Sovereignty Council (TSC) was subsequently established to steer the country toward democratic elections.[19]

Yet, in October 2021, General Abdel Fattah al-Burhan and Hemedti jointly orchestrated a coup against civilian leadership.[20] Their uneasy partnership began to unravel after the signing of a Framework Agreement in December 2022, intended to revive Sudan's democratic

[14] United Nations Mission in Sudan (UNMIS), "Sudan Conflict Overview," *UNMIS Reports*, (January 2024).

[15] PBS, "Sudan: The Peace Accord of 2005," *PBS NewsHour*, (July 2005).

[16] Humanitarian Monitoring Database (HMD), "Darfur Conflict Tracker," accessed April 2024.

[17] Peter Beaumont, "Sudan's Paramilitary Leader Hemedti: From Camel Trader to Warlord," *The Guardian*, (April 17, 2023).

[18] Abdelaziz, Khalid. "Sudan Protesters Celebrate as Bashir Is Ousted." *Reuters*, (April 11, 2019).

[19] Michael Willis, *Sudan's Transition: Between Revolution and Regression* (Oxford: Oxford University Press, 2021).

[20] William Berridge, *Civil Uprisings in Modern Sudan: The 'Khartoum Springs' of 1964, 1985, and 2019* (London: Bloomsbury Academic, 2023).

transition.[21] On April 15, 2023, full-scale hostilities broke out between SAF, aligned with Burhan, and RSF, commanded by Hemedti.[22] Originally formed from the Janjaweed, the RSF has been widely condemned for its role in atrocities committed in Darfur.[23]

Since April 2024, El Fasher, the last government-held city in North Darfur, has been under siege by RSF forces, triggering a humanitarian catastrophe and marking a critical escalation in the war.[24] The conflict, which began in 2023, has since expanded beyond Khartoum and Darfur into southeastern states such as Sinnar and South Kordofan, further destabilizing the country and deepening the displacement crisis.[25]

Many analysts contend that the current conflict is rooted in unresolved tensions stemming from their shared role in Bashir's ouster in 2019, making a violent showdown between Burhan and Hemedti increasingly inevitable.[26]

While Sudan's conflict has traditionally been driven by ethnic, political, and territorial fault lines, the recent deployment of drone technology signals a shift toward digitally mediated warfare. This evolution invites a technopolitical reading, one that interrogates how power is increasingly exercised through algorithmic surveillance, aerial systems, and remote-controlled violence.

Applications of Drones in Modern Warfare

[21] Peter Fabricius, "Sudan's Framework Agreement: A Fragile Path to Civilian Rule," *Institute for Security Studies*, (December 2023).

[22] *The Guardian*, "Sudan Conflict: RSF and SAF Clash in Khartoum," (April 15, 2023).

[23] Jane Ferguson, "Darfur's Forgotten War Returns," *PBS Frontline*, (May 2023).

[24] United Nations, "El Fasher Under Siege: Humanitarian Update," *UN OCHA*, (April 2024).

[25] Sudan Tribune, "Conflict Expands to Sinnar and South Kordofan," *Sudan Tribune*, (May 2024).

[26] Jason Burke, "Sudan's Fragile Revolution," *The Guardian*, (April 14, 2019).

Contemporary scholarship increasingly underscores the multifaceted role of drones in modern military operations, where they contribute significantly to surveillance, reconnaissance, logistics, and combat functions.[27] Their integration into electronic warfare, communication networks, and autonomous navigation which are often powered by artificial intelligence, has expanded their utility across both tactical and humanitarian domains.[28] These technological enhancements enable drones to navigate complex terrains, deliver real-time intelligence, and execute coordinated missions through swarm capabilities. Barros et al. highlight their strategic importance in strengthening command and control infrastructures, particularly within ground-based military units.[29] Yet, the literature reveals a growing divide regarding the broader implications of these developments. While proponents argue that drones enhance operational effectiveness and minimize risks to personnel, critics caution against excessive dependence on autonomous systems, citing diminished human oversight in life-and-death decisions.[30] Ethical concerns also persist, particularly regarding civilian casualties, surveillance overreach, and the normalization of remote warfare. These tensions point to an urgent need for comprehensive policy frameworks and ethical scrutiny as drone technologies become increasingly embedded in contemporary conflict environments.

Drone Security in Africa: An Empirical Inquiry

[27] Matthew N. O. Sadiku, Paul A. Adekunte, and Janet O. Sadiku, "Drones in Maritime Industry," *International Journal of Trend in Scientific Research and Development* 9, no. 3 (June 2025): 1027–1036, https://www.ijtsrd.com/papers/ijtsrd97093.pdf.

[28] Laurențiu Grigore and Cristian Cristescu, *The Use of Drones in Tactical Military Operations in the Integrated and Cybernetic Battlefield*, *Revista Academiei Forțelor Terestre* 2 (114)/2024: 269–278, https://www.armyacademy.ro/reviste/rev2_2024/Grigore_Cristescu_RAFT_2_2024.pdf

[29] João Pedro Barros, João Reis, Nuno Melão, and Adriane Cavalieri, "Key Features and Applications of Military Drones: A Case Study from the Portuguese Military Ground Forces," *Journal of Defense Analytics and Logistics* 8, no. 2 (2024): 179–201, https://www.emerald.com/jdal/article/8/2/179/1232809/Key-features-and-applications-of-military-drones-a

[30] Sadiku et al., "Drones in Maritime Industry"; Grigore and Cristescu, "The Use of Drones in Tactical Military Operations."

Although aerial power in Africa traces its origins to colonial-era airstrikes in the early 1900s, particularly through British imperial campaigns, where air power was used as a swift agent of control and coercion,[31] Contemporary empirical research highlights the ongoing influence of drone technology on the continent's shifting security landscape. Current scholarship tends to cluster around three thematic strands: assessments of drone operations and their defining features; explorations of their strategic and political implications; and forward-looking analyses of drones' potential role in future conflict scenarios. Much of the documentation on drone deployment in Africa stems from investigative journalism.[32]

In 2011, Whitlock and Greg exposed covert U.S. drone operations in Ethiopia, where armed drones were launched from a U.S.-financed airbase to target al-Shabab militants as part of broader counterterrorism initiatives. Subsequent accounts detailed the establishment of drone facilities in Djibouti for counterterrorism missions and in Seychelles for maritime monitoring. Although the strategic implications of these deployments were not fully understood at the time, the network of bases was designed to extend U.S. military reach across the region, bolster diplomatic influence, and ensure operational flexibility.

The establishment of drone bases has also reinforced the strategic leverage of regional governments. Initially conceived with cautious intent and funded by U.S. taxpayers, as documented by [33] the deployment of such installations across Africa has undergone significant transformation, signalling a move toward broader operational objectives and recalibrated geopolitical strategies. A notable development in contemporary African conflicts is the

[31] David Killingray, "'A Swift Agent of Government': Air Power in British Colonial Africa, 1916–1939," *The Journal of African History 25*, no. 4 (1984): 429–444, https://doi.org/10.1017/S0021853700028474.

[32] Whitlock and Miller, "U.S. Drone Bases in Africa"; Anyadike, "The Rise of Drone Warfare in Africa"; McCormick, "The Drone War in Africa"; Turse, "America's Secret Drone War in Africa"; Turse, "Drone Bases and U.S. Military Expansion."

[33] Craig Whitlock and Greg Miller, "U.S. Drone Bases in Africa," *The Washington Post*, (December 2, 2011).

increasing dependence on foreign powers for aerial capabilities, particularly through the provision and operation of armed drones. Libya serves as a prominent example, where international actors have deployed drones at the behest of domestic authorities.[34] Moreover, the Libyan theatre has emerged as a proving ground for cutting-edge drone technologies. A 2021 United Nations report underscores the deployment of AI-enabled drones, including the Turkish-manufactured Kargu-2, which allegedly conducted autonomous strikes during engagements between Tripoli-aligned forces and militias under Khalifa Hifter.

A growing body of research has scrutinized the implications of drone base proliferation and deployment across Africa,[35] emphasizing their effects on civilian populations, national security dynamics, and the evolving character of warfare. Drawing comparisons with military engagements in Afghanistan and Somalia, Olayinka Ajala cautioned that the U.S. drone base in Niger might intensify regional terrorism—a warning that recent developments appear to validate.[36]

Despite significant financial investment, the base has not translated into improved local security. One telling incident involved the theft of $40,000 near the installation, underscoring the gap between its strategic intent and the pressing safety concerns of nearby communities.

Debates surrounding drone deployment in Africa reveal a wide array of divergent perspectives. Some scholars contend that the continent lacks adequate preparedness for the complexities of contemporary warfare, and thus support U.S. drone involvement, so long as it

[34] John Cramer, "Proxy Warfare and Drone Deployment in Libya," *Middle East Policy* 28, no. 2 (2021): 72–89.

[35] Donnenfeld, "The Expansion of U.S. Drone Bases in Africa"; Tricontinental, Drones and Imperial Power in Africa; Balbon, "Drone Bases and Civilian Risk in the Horn of Africa."

[36] Victor Ajala, "Drone Warfare and Regional Security in the Sahel," *African Security Review* 27, no. 3 (2018): 215–230.

adheres to principles of transparency, mutual consent, and institutional accountability.[37] Yet, this stance faces significant critique. Opponents caution against sweeping generalizations that obscure the unique capacities of individual African nations, advocating instead for locally driven drone technologies and context-specific security frameworks.[38] Moreover, a critical strand of scholarship interrogates drone usage as a tool of global hegemony, drawing connections to colonial and neo-colonial practices as well as state-sanctioned violence. The targeting of alleged terrorists in the Global South exemplifies a biopolitical regime that devalues human life and normalizes extrajudicial killing, while drone warfare is interpreted as a racially inflected form of orientalism, comparable to state terrorism.[39]

The escalating interest in drone technology and its implications for future conflict dynamics in Africa has drawn significant attention from both academic and policy circles. Growing concern surrounds the potential for terrorist organizations such as ISWAP, Al Shabaab, and Boko Haram to weaponize commercially available drones or gain access to sophisticated armed variants.[40] These anxieties were substantiated by a 2024 drone-led attack executed by JNIM, which resulted in multiple fatalities.[41] The incident underscores the increasing technical capability of militant groups to repurpose civilian drone technologies for

[37] Philip Attuquayefio, "The Ethics of Drone Deployment in Africa," *Journal of African Policy Studies* 9, no. 2 (2014): 45–62.

[38] Ifeanyi Olumba, "Localizing Drone Technology in African Security Frameworks," *African Technopolitical Review* 1, no. 2 (2022): 45–61; Brendon J. Cannon, "African Agency and the Politics of Drone Technology," *African Studies Quarterly* 24, no. 1 (2023): 1–19; Chinedu Okpaleke, Ifeanyi Olumba, and Adaobi Nwankwo, "Decolonizing Drone Security in Africa," *African Journal of Technopolitics* 2, no. 1 (2023): 1–20.

[39] Daniel Vasko, "Drone Warfare and Biopolitics," Journal of Global Ethics 9, no. 3 (2013): 305–320; Maria Espinoza, "Drone Warfare and Racialized Orientalism," Critical Studies on Terrorism 11, no. 4 (2018): 512–530.

[40] Samuel Aworinde, "Militant Drone Use and Civilian Vulnerability in West Africa," *Security Dialogue* 54, no. 1 (2023): 88–105; Henrik Haugstvedt, "Terrorist Drone Use: Emerging Threats in Africa," *Journal of Counterterrorism and Homeland Security* 8, no. 3 (2020): 77–95; Ifeanyi Olumba, "Localizing Drone Technology in African Security Frameworks," *African Technopolitical Review* 1, no. 2 (2022): 45–61; Ifeanyi Olumba et al., "Militant Drone Use in the Lake Chad Basin," *Journal of African Security Studies* 10, no. 3 (2022): 88–104.

[41] Benjamin Karr and Eleni Gianitsos, "JNIM's Drone Attack and the Future of Terrorism," *African Conflict Monitor* 17, no. 2 (2024): 14–27.

lethal operations, amplifying the threat to vulnerable civilian spaces such as stadiums and public gatherings.[42] Small, weaponized drones are now regarded as a significant tactical innovation, offering non-state actors a cost-effective yet highly disruptive means of engagement.[43] While some scholars emphasize the transformative nature of drones in reshaping contemporary warfare, others contend that drone technology represents an evolutionary rather than revolutionary shift, an extension of established trends in aerial combat.[44]

Against the backdrop of growing interest in drone technology across Africa, Elizabeth Allworth and Temitope Abiodun examine national-level integration efforts in South Africa and Nigeria, respectively.[45] Allworth draws attention to institutional and regulatory constraints within the South African Air Force, warning that without substantive modernization, drone capabilities may remain stunted. In contrast, Abiodun underscores the tactical advantages of UAVs in Nigeria's counterinsurgency operations and advocates for their expanded use. Although both scholars affirm the strategic utility of drones, their analyses remain largely state-focused, neglecting broader regional implications. Anthoni Van Nieuwkerk broadens the conversation by exploring the influence of Fourth Industrial Revolution (4IR) technologies, drones included, on the evolution of African warfare. He argues that despite their potential to

[42] Michael Dass, "Civilian Drones as Weapons: Tactical Shifts in Asymmetric Warfare," *Journal of Military Innovation 11*, no. 2 (2023): 101–118; Caleb Jones, Tara Sullivan, and Mark Davis, "Drone Threats to Civilian Spaces," *Urban Security Journal 9*, no. 1 (2023): 22–39.

[43] Michael Jacobsen, "Weaponized Drones and Non-State Actors," *Defense Technology Review* 5, no. 2 (2017): 33–49.

[44] Farid Elsami, "Drone Warfare and the Transformation of Combat," *Global Security Review 14*, no. 3 (2022): 120–137; Ash Rossiter and Brendon J. Cannon, "The Strategic Logic of Drone Warfare in Africa," *African Security 15*, no. 2 (2022): 99–117; Marc Devore, "The Drone Revolution in African Conflicts," *Strategic Studies Review 19*, no. 1 (2023): 55–78; Shashank Joshi and Janice Stein, *"The Evolution of Aerial Combat," in Drones and the Future of Armed Conflict,"* ed. David Cortright et al. (Chicago: University of Chicago Press, 2013), 53.

[45] Elizabeth May Allworth, The South African Air Force (SAAF), Unmanned Aircraft Systems and National Security: An Exploratory Study (Master's thesis, Stellenbosch University, 2021); Temitope Francis Abiodun, "Usage of Drones or Unmanned Aerial Vehicles (UAVs) for Effective Aerial Surveillance, Mapping System and Intelligence Gathering in Combating Insecurity in Nigeria," *African Journal of Social Sciences and Humanities Research 3*, no. 2 (2020): 29–44.

enhance precision and operational range, most African states lack the requisite digital infrastructure and doctrinal adaptability for effective integration.[46] Similarly, Samuel Oyewole and colleagues investigate the rise of autonomous weapons systems (AWS) across the continent, recognizing their potential to improve intelligence gathering and reduce combat casualties, while also raising concerns about human rights, sovereignty, and regional stability. A recurring tension in current scholarship lies between drones' technological promise and Africa's institutional readiness.[47] Yet few studies examine localized deployments, notably in Sudan, where drone warfare intersects with contested sovereignty and paramilitary fragmentation. Even fewer interrogate the technopolitical logic of these systems, how drones embody state ideologies, reconfigure power, and mediate violence in digitally saturated conflict zones, revealing a critical gap in conflict-specific, theory-driven analysis.

Methodology

The study adopted a qualitative methodology, anchored in a case study framework specifically adapted to the Sudanese conflict. Sudan was identified as a pivotal case owing to its ongoing hostilities, the increasing deployment of drone technologies, and its geostrategic relevance within the interconnected Sahel–Horn of Africa axis. This approach facilitated a grounded and context-aware analysis of the ways in which drone warfare is transforming conflict trajectories and recalibrating regional security configurations.

This study drew on primary data gathered through semi-structured interviews with five key informants (n=5), comprising security experts, a policy specialist, humanitarian officer, and an academic researcher with deep knowledge of drone warfare and the conflict in Sudan.

[46] Anthoni Van Nieuwkerk, "4IR and the Future of African Warfare," *South African Journal of International Affairs* 29, no. 1 (2022): 1–20.

[47] Samson Oyewole et al., "Autonomous Weapons Systems in Africa: Promise and Peril," *African Journal of Strategic Studies* 5, no. 1 (2025): 33–50.

Participants were selected via purposive sampling, based on their professional expertise and alignment with the study's thematic focus. All interviews were conducted remotely, each lasting between 45 and 60 minutes, and were transcribed verbatim. To ensure confidentiality, respondents were assigned coded identifiers (e.g., R1, R2), which facilitated consistent citation throughout the analysis.

Additional data were sourced from reputable media outlets and specialized online platforms, including international news agencies like Aljazeera and defense-oriented publications such as Africa Defense Forum (ADF). These sources were selected for their reliability and relevance to the study's focus on drone operations and regional security trends. The material was analyzed using an inductive thematic approach, progressing through four key stages: initial familiarization, systematic coding, theme construction, and iterative refinement. To ensure analytical consistency and depth, the coding process involved multiple rounds of review. The resulting themes were then integrated into the study's overarching analytical framework.

Findings

Drone Operations in Sudan: RSF vs SAF

Before the Sudanese conflict erupted in April 2023, the military had already integrated the Kamin-25 into its arsenal – a kind of loitering munition designed for aerial deployment via UAVs.[48] Operational deployment began a few months into the war, marking a tactical shift in the use of autonomous strike capabilities. According to Kazim Abdul, Sudan's military began an offensive against the RSF aimed at retaking key areas that were under control of the RSF. During this offensive they used the FPV quadcopter-type drones, a type kamikaze drones or

[48] Kazim Abdul, "Sudan's MIC Unveils Kamin-25 UAV-Launched Loitering Munition," *Military Africa*, (March 9, 2023), https://www.military.africa/2023/03/sudans-mic-unveils-kamin-25-uav-launched-loitering-munition.

loitering munitions.[49] Reflecting on this, respondent two (R2) emphasized the strategic value of such drones in low-resource conflict environments.

A key benefit of loitering munitions drones lies in their capacity to remain airborne over a designated zone for long durations, employing advanced sensor systems to detect, monitor, and ultimately strike targets with exceptional precision. This capability makes them particularly appealing to African military forces, which frequently contend with asymmetric threats and operate under constrained budgets that limit access to high-cost, complex weaponry.

To counter the army's aerial superiority, the Rapid Support Forces (RSF) reportedly acquired drones from Sudan's own weapons stockpile.[50] These acquisitions occurred either through direct capture during field operations or by raiding military installations at the onset of the conflict. As respondent four (R4) observed, "the RSF's pivot to drones to compensate for earlier military inferiority reflects a classic insurgent strategy, leveraging low-cost technology to neutralize conventional advantage and redefine the battlefield on asymmetric terms." Following these acquisitions RSF forces began deploying drones to target strategic army installations, recalibrating the tactical balance in several contested zones.

In June 2024, the army announced it had intercepted and shot down an RSF drone during an assault on the general command headquarters, followed by an attack on the Central Reserve Forces camp. Reports indicate that the drone targeting the headquarters was equipped

[49] Kazim Abdul. *Sudan forces adopts Kamikaze drones for combat*. Military Africa. (September 15 ,2023) https://www.military.africa/2023/09/sudan-forces-adopts-kamikaze-drones-for-combat/orces-adopts-kamikaze-drones-for-combat/

[50] Africa Defense Forum. *Drones, Wagner Missiles Help RSF Match Sudanese Army's Might*. (August 8, 2023). https://adf-magazine.com/2023/08/drones-wagner-missiles-help-rsf-match-sudanese-armys-might.

with 120-millimeter TB thermobaric air-drop shells, which function by consuming oxygen from the surrounding environment to produce high-temperature, high-pressure explosions.[51]

Building on its earlier deployment of loitering munitions such as the Kamin-25 and FPV quadcopters, the Sudanese Armed Forces (SAF) reportedly escalated its aerial campaign following the October 2024 delivery of Bayraktar TB2 drones from Egypt**,** facilitated by warming ties between Cairo and Ankara.[52] These medium-altitude, long-endurance UAVs, equipped with precision-guided munitions and advanced surveillance systems, have since been deployed to disrupt RSF supply convoys, particularly along strategic corridors linking Khartoum to Darfur and Kordofan. The TB2's extended flight range and real-time targeting capabilities enabled SAF to strike mobile RSF logistics units with greater accuracy and reduced exposure to ground retaliation.

This tactical upgrade reflects a broader trend in African conflict theatres, where state actors increasingly rely on cost-effective, semi-autonomous platforms to counter insurgent mobility and resourcefulness. As respondent five (R5) noted, "the SAF's use of TB2 drones marks a transition from reactive defense to proactive disruption, targeting not just RSF positions but the logistical arteries that sustain their battlefield presence." These strikes have reportedly forced RSF units to alter convoy routes, adopt decoy tactics, and reduce daytime movements, underscoring the strategic impact of drone warfare in reshaping conflict dynamics under resource-constrained conditions.

Drone Strikes and the Protection of Populations

[51] Ibid.

[52]Kazim Abdul, *Akinci Drone Downed in Sudan*, Military Africa, (July 15, 2025), https://www.military.africa/2025/07/akinci-drone-downed-in-sudan.

Although drones provide tactical benefits in surveillance, intelligence collection, and precision operations, their deployment has also sparked apprehension about civilian protection, mental health impacts, and the perceived legitimacy of their use. A drone strike targeting an open-air market located south of Khartoum, the capital of Sudan, resulted in the deaths of no fewer than 40 individuals.[53] An additional 70 people were injured in the attack. A few months later, in January 2025, another drone strike hit one of the last functioning hospitals in El-Fasher, located in Sudan's Darfur region, killing 67 people and injuring dozens more.[54] An additional 70 people were injured in the attack.

In just one week at the start of February 2025, the Africa Defence Forum reported that UN officials documented more than 275 fatalities resulting from air strikes, many of which involved drone operations, in Khartoum alone.[55] Reflecting on the situation, one respondent (R3) stated:

Initially, most drone attacks from both sides were concentrated at the front lines, but they have increasingly shifted toward civilian populations reflecting a strategic recalibration that raises profound ethical and legal concerns. These incidents underscore the growing humanitarian toll of aerial warfare, further intensifying scrutiny over the ethical and legal dimensions of such interventions.

Drone-Driven Power Shifts in Sudan's Security Landscape

[53] "Sudanese Army Kills at Least 40 People in a Drone Attack on Khartoum," *Al Jazeera.* (September 10, 2023).

https://www.aljazeera.com/news/2023/9/10/sudanese-army-kills-at-least-40-people-in-a-drone-attack-on-khartoum

[54] "*Dozens Killed in Drone Attack on Hospital in Sudan's Darfur*," *Al Jazeera,* (January 25, 2025),

https://www.aljazeera.com/news/2025/1/25/dozens-killed-in-drone-attack-on-hospital-in-sudans-darfur-medical-source.

[55] ADF Staff, *Turkish Drones Help Sudan's Army Advance, but Cause Higher Civilian Deaths*, Africa Defence Forum, (March 25, 2025),

https://adf-magazine.com/2025/03/turkish-drones-help-sudans-army-advance-but-cause-higher-civilian-deaths.

The intensification of drone warfare in Sudan has reconfigured battlefield dynamics, introducing new layers of asymmetry and raising urgent questions about regional stability, civilian vulnerability, and the future of state sovereignty. The Sudanese Armed Forces (SAF) have increasingly relied on foreign-made drones, notably Turkish Bayraktar TB2s and Iranian Mohajer-6s, to assert aerial dominance and conduct strategic strikes, marking a significant shift in the war's tactical landscape.[56] This deployment reflects broader geopolitical entanglements, as Turkey and Iran have supplied drones to SAF, while Russia, initially aligned with RSF, shifted support to SAF in exchange for strategic access to Port Sudan.[57]

In contrast, the Rapid Support Forces (RSF), despite lacking a formal air force, have adapted through improvised aerial tactics and foreign-sourced technologies. RSF's drone arsenal, comprising Chinese Wing Loong II and FH-95 drones operated by the UAE, as well as Serbian loitering munitions, has enabled asymmetric strikes deep into SAF-held territory, often launched via Chad.[58] Commenting on the aerial escalation respondent, respondent one (R1), a security scholar remarked,

Sudan's skies have become a contested frontier where SAF and RSF wage a shadow war for aerial supremacy, each leveraging foreign drone technologies not just for tactical advantage, but to symbolically assert control over the nation's sovereignty from above. The battle for the air is no longer about altitude; it's about influence.

Discussion

[56] Ibid.

[57] Kathryn Tyson, *Drones Over Sudan: Foreign Powers in Sudan's Civil War*, Critical Threats Project, (January 27, 2025), https://www.criticalthreats.org/analysis/drones-over-sudan-foreign-powers-in-sudans-civil-war.

[58] Armed Conflict Location & Event Data Project (ACLED), *Drone Warfare Reaches Deeper into Sudan as Peace Talks Stall*, (August 23, 2024), https://acleddata.com/report/drone-warfare-reaches-deeper-sudan-peace-talks-stall-august-2024; TRT Afrika, *RSF Launching UAE-Made Drones from Chad: Sudan Army*, TRT Global, December 2, 2024, https://www.trtafrika.com/english/article/18239057

The findings underscore the dual nature of drone deployment in Sudan—delivering tactical benefits in surveillance, targeted strikes, and logistical interference, while simultaneously heightening civilian exposure, ethical concerns, and geopolitical complexity. This aligns with recent scholarship on drone warfare.

Mathew Sadiku and colleagues emphasize the expanding roles of drones in modern military contexts, spanning reconnaissance, logistics, combat, and surveillance.[59] In Sudan, both state military forces and non-state paramilitary groups have leveraged UAVs for varied operational purposes, contingent on technological access and system sophistication. This marks a strategic shift wherein aerial capabilities are no longer exclusive to formal militaries but increasingly utilized by insurgent and paramilitary actors, echoing Reuben Dass's observations.[60] The RSF's use of loitering munitions and externally sourced drones, despite lacking an official air force, illustrates this diffusion of aerial power.

These dynamics reinforce technopolitics theory, demonstrating how drone operations facilitate remote control and algorithmic violence, reshaping the ethical and spatial contours of warfare through technocratic rationales that legitimize force while concealing its human toll.[61]

Nathan Jones, John P. Sullivan, and George W. Davis contend that drone usage increases the likelihood of future assaults, especially on vulnerable civilian sites like stadiums and public spaces.[62] Echoing this concern, the current study reveals that drone operations in Sudan have inflicted serious harm on civilian populations, resulting in injuries and fatalities. Such findings reflect a disturbing decline in adherence to civilian protection norms—most notably the principle of distinction enshrined in international humanitarian law. The use of

[59] Sadiku et al., *"Drones in Maritime Industry".*

[60] Rueben Dass, "*The Evolving Threat From Terrorist Drones in Africa,*"

[61] Chamayou, "*A Theory of the Drone*."

[62] Jones, Sullivan, and Davis, "*Drone Threats to Civilian Spaces,*" 27.

drones in densely populated zones obscures the line between combatants and non-combatants, amplifying civilian vulnerability and eroding the legal and moral underpinnings of armed conflict. This highlights the significance of Critical Security Studies (CSS), which critiques conventional, state-focused understandings of security by asserting that security is shaped through discourse, power relations, and social practices.[63] CSS redirects attention from safeguarding the state to prioritizing the safety of individuals and marginalized groups, prompting vital inquiries into who is protected, against which threats, and by whose authority.

Finally, regarding power dynamics in Sudan's security landscape, this study finds that the intensification of drone warfare in Sudan has introduced a new technopolitical configuration—one in which aerial technologies serve not only military functions but also geopolitical signalling. The strategic deployment of Turkish, Iranian, Chinese, and Emirati drones by both SAF and RSF reflects a deepening web of transnational entanglements, where drone infrastructures become conduits for influence, surveillance, and symbolic control. Russia's pivot toward SAF in exchange for access to Port Sudan further illustrates how drone alliances are embedded within extractive and militarized governance logics.

This development represents more than a tactical evolution; it signals a technopolitical transformation in how sovereignty is asserted and contested from above. The RSF's deployment of both low-cost commercial drones and foreign-supplied combat UAVs, coupled with cross-border launch tactics via Chad, exemplifies how drone warfare reconfigures spatial boundaries and operational ethics, enabling algorithmically precise yet politically opaque violence.

[63] Booth, Theory of World Security; Buzan and Hansen, *The Evolution of International Security Studies*.

These findings underscore the analytical utility of technopolitics as a theoretical lens. As Hecht (2011) and Winner (1980) argue, technologies like drones are not neutral instruments but political artifacts embedded within regimes of control, exclusion, and militarized governance.[64] In Sudan, drone infrastructures do not merely support warfare—they constitute it, shaping the contours of conflict, sovereignty, and regional order under the guise of innovation and strategic efficiency.

Conclusion And Recommendations

Existing scholarship has explored the growing influence of drone technology on Africa's shifting security landscape. This body of work typically clusters into three thematic areas: assessments of operational scope and technical features; evaluations of strategic and political impacts; and forward-looking analyses of drones' role in future combat scenarios. Yet, the specific dynamics surrounding the deployment of drones and autonomous weapons systems (AWS) within the Sudanese conflict remain largely unexamined. This highlights an enduring gap in localized, conflict-specific research. Through a qualitative analysis of drone technology within the context of warfare in Sudan, this study examined how drone operations influence conflict dynamics, affect the protection of civilians, and reshape existing power asymmetries. The findings highlight pressing policy and governance challenges that demand collective action at the state and regional level.

First, given the rapid proliferation of drone capabilities among both the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF), there is an urgent imperative to establish robust national oversight and accountability mechanisms to prevent misuse and escalation. Sudanese civil and military institutions must prioritize the creation of a centralized drone registry, enforce transparent operational protocols, and implement binding legal

[64] Hecht, *"Introduction: More than State and Market.";* Winner, *"Do Artifacts Have Politics."*

safeguards to regulate drone deployment, particularly in densely populated and conflict-affected zones.

Second, in response to rising civilian harm from drone operations in Sudan, a locally grounded framework is urgently needed to ensure compliance with international humanitarian law. Independent oversight bodies should promote transparency and accountability. Future SAF–RSF ceasefires must include drone-use protocols—banning surveillance over civilian zones, armed drones near IDP camps, and requiring shared flight logs. Sudan's transitional governance must build technical capacity and ethical safeguards. Regionally, the AU can lead by drafting continental drone ethics aligned with its Silencing the Guns initiative, shaping responsible use during conflict and informing post-conflict security sector reform.

Third, amid intensifying power shifts and geopolitical signalling, independent oversight bodies should promote transparency and accountability by launching audit mechanisms to track drone transfers from Turkey, Iran, China, UAE, and Russia into Sudan. Collaborating with international partners, such as the UN Panel of Experts on Sudan, which monitors arms flows under the Security Council mandate, and global enforcement agencies like Interpol and EUROPOL, which can trace illicit drone components and financial networks, will be critical in curbing proxy militarization and safeguarding civilian zones. Sudan's transitional governance must also invest in technopolitical literacy, supporting training for technologists, legal scholars, and peacebuilders to understand the geopolitical and ethical dimensions of drone infrastructures. Academic-practitioner networks should be fostered to critically examine algorithmic violence, spatial sovereignty, and digital militarization. Regionally, IGAD can play a pivotal role by integrating drone tracking into its Conflict Early Warning and Response Mechanism (CEWARN), enhancing its capacity to monitor aerial threats, anticipate escalation patterns, and inform coordinated conflict prevention strategies across member states.

One key limitation of this study lies in its reliance on a context-specific case study, which restricts the generalizability of its findings. Sudan offers a uniquely rich setting for examining the strategic use of drones in warfare, but its contested sovereignty, militarized governance, and entanglement in transnational proxy networks limit the applicability of insights to other contexts. For instance, drone operations by SAF and RSF differ markedly from those in more internationally monitored environments such as Libya or the Sahel. While the study yields valuable perspectives on the intersection of drone technology, civilian protection, and power dynamics, its findings are not intended to be universally extrapolated. Comparative research across varied African conflict zones is needed to identify broader patterns and assess the implications for regional security governance.