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FROM EARTH TO ORBIT: HOW AFRICAN NATIONS CAN LEVERAGE SPACE LAWS TO COMBAT TERRORISM AND STRENGTHEN SECURITY

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Abstract
The persistent threat of terrorism in Africa necessitates the use of advanced tools to strengthen national and regional security. Space-based technologies, particularly satellite reconnaissance and border surveillance, offer African nations powerful new means to enhance their counterterrorism strategies. However, the lack of comprehensive space law frameworks and regulatory mechanisms in many African countries limits the effective deployment of these technologies. This study examines how African nations can develop effective legal and policy frameworks for space governance to support security objectives and combat terrorism. It adopts a doctrinal research methodology, analyzing international space treaties, regional agreements, and national space policies from selected African countries. Through this approach, the study assesses how space governance has been integrated into national legal systems and identifies legislative gaps that hinder security operations. Primary sources such as treaties, national laws, and official policy documents were evaluated, alongside secondary sources including scholarly articles, legal commentaries, and policy papers. A comparative analysis was also conducted, drawing from best practices in jurisdictions with established space security laws. The study highlights the urgent need for harmonized and robust legal structures that support the responsible use of space technology in counterterrorism while ensuring compliance with international obligations. Ultimately, the study aims to offer legal and policy recommendations that enable African countries to strengthen domestic space regulation, enhance security, and promote sustainable space governance. It demonstrates the critical intersection between space law and security policy in Africa's ongoing fight against terrorism.

Keywords: Space, terrorism, space law, insecurity, Africa

1. Introduction

In the twenty-first century, national security strategy has expanded to include outer space as a critical operational domain, transcending its earlier association with purely scientific exploration. Space technologies particularly satellite systems now play a vital role in enhancing both global and regional security through intelligence collection, surveillance, reconnaissance, and secure communication systems. These advancements have revolutionized strategic decision-making and counterterrorism operations worldwide.[1]

For African countries, many of which are grappling with persistent terrorism and regional instability, space-based technologies offer unprecedented opportunities to strengthen security capabilities. However, despite the growing need for such tools, the continent faces significant limitations in leveraging them effectively. Chief among these is the absence of comprehensive legal and regulatory

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[1] United Nations, *The Outer Space Treaty* (1967) 610 UNTS 205; North Atlantic Treaty Organization, 'Topic: NATO's Approach to Space' (NATO, 2025) https://www.nato.int/cps/en/natolive/topics_175419.htm accessed 2 July 2025; Aerospace Defense Review, 'Space-Based Surveillance and Reconnaissance Leveraging Space Technology for Intelligence Gathering' (Aerospace Defense Review, 2025) https://www.aerospacedefensereview.com/news/spacebased-surveillance-and-reconnaissance-leveraging-space-technology-for-intelligence-gathering-nwid-2042.html accessed 2 July 2025; Scientia Tutorials, 'Space Technology's Pivotal Role in Global Security' (Scientia Tutorials, 2025) https://scientiatutorials.in/guardians-beyond-earth-space-technologys-pivotal-role-in-global-security/ accessed 2 July 2025; SpaceMesmerise, 'Satellites Revolutionizing Global Security: Understanding Their Impact' (SpaceMesmerise, 2025) https://spacemesmerise.com/en-us/blogs/space-technology/satellites-revolutionizing-global-security-understanding-their-impact accessed 2 July 2025

frameworks for space governance.[2] Without established and functional space laws, African nations risk underutilizing critical assets that could be instrumental in addressing security threats.

Space assets have proven invaluable in real-time border surveillance, monitoring of terrorist group movements, and coordination of military responses across jurisdictions.[3] These technologies are especially relevant in Africa, where porous borders, vast ungoverned spaces, and difficult terrain often render traditional security measures ineffective. Terrorist groups such as Boko Haram, al-Shabaab, and Islamic State affiliates exploit these geographic and institutional weaknesses to conduct transnational operations with growing complexity.[4] Satellite-enabled data sharing and surveillance can provide coordinated and effective countermeasures, but their application remains limited by weak legal structures and inadequate policy integration.

Although countries like Nigeria, South Africa, and Algeria have established national space agencies and achieved satellite launches, their legal systems have not kept pace with these technological advances.[5] Existing national space policies tend to focus primarily on scientific and commercial applications, with little emphasis on national security or defense. Moreover, the current frameworks lack detailed provisions on critical issues such as data sharing protocols, international cooperation mechanisms, or the protection of satellite infrastructure from hostile threats. This regulatory gap also discourages foreign partnerships and private investment, both of which are vital to developing sustainable space programs. This study investigates how improved legal frameworks and policy reforms can support counterterrorism initiatives through the secure and effective use of space technologies. It employs a doctrinal research methodology, analyzing key international instruments such as the Outer Space Treaty of 1967, the African Union Space Policy,[6] and national laws from selected African states. The research also draws comparative insights from countries with advanced space legal systems, such as the United States and India, to identify adaptable best practices.

By situating space law within the broader context of national and regional security strategies, this research bridges a critical gap in African counterterrorism discourse. It demonstrates that legal and policy alignment is essential for African countries to fully harness the benefits of space technology. Without such alignment, investments in satellite infrastructure and defense cooperation risk being inefficient or unsustainable. The study ultimately argues that a harmonized and forward-looking legal regime is essential for transforming outer space into a secure operational domain that enhances Africa's resilience and regional stability.

2. Definition of Key Terms

2.1 Space Law and Governance

The examination of space-based counterterrorism legal frameworks in Africa requires the definition of key terms. Activities in outer space are regulated by space law which includes international treaties, national laws and customary legal principles. Space law establishes international rules for satellite operations and orbital activities and defines responsibilities of both state and non-state participants.

[2] African Union, *African Space Strategy* (2019) https://au.int/sites/default/files/documents/37434-doc-au_space_strategy_isbn-electronic.pdf accessed 2 July 2025; Space Generation Advisory Council, *A Set of Best Practices for Developing Space Legislation in Africa* (2024) https://spacegeneration.org/a-set-of-best-practices-for-developing-space-legislation-in-africa accessed 2 July 2025; B Atkins, 'Is there enough space for Africa in outer space?' (2025) 119 South African Journal of Science https://sajs.co.za/article/view/18777/23663 accessed 2 July 2025.

[3] B Atkins, 'Is there enough space for Africa in outer space?' *ibid.*

[4] Space Generation Advisory Council, *A Set of Best Practices for Developing Space Legislation in Africa* (2024) https://spacegeneration.org/a-set-of-best-practices-for-developing-space-legislation-in-africa accessed 2 July 2025

[5] Space Generation Advisory Council, *Best Practices Framework for Developing Space Legislation in Africa* (2024) https://spacegeneration.org/wp-content/uploads/2024/02/Best-Practices-Framework-for-Developing-Space-Legislation-in-Africa-Space-Law-and-Policy-2023.pdf accessed 2 July 2025

[6] African Union, *African Union Space Policy* (2016), https://au.int/en/documents/20170118/african-union-space-policy accessed 23 April 2025.

Space governance relates to the institutional frameworks along with legal and regulatory structures that determine space activity operations. The governance frameworks cover aspects relating to registration procedures, liability issues, peaceful space use principles and international cooperation methods.[7] The foundational definitions that we utilize allow for an analysis of how space law relates to national security and continental collaboration across Africa.

2.2 Global Context

A sequence of United Nations-negotiated treaties has mainly guided the evolution of international space law. The Outer Space Treaty 1967 serves as the primary foundational document which establishes fundamental principles including the prohibition of state ownership of outer space and the requirement for peaceful space use while holding states accountable for both government and non-government space activities.[8]

The Rescue Agreement 1968[9] demands state assistance for astronauts in distress while the Liability Convention 1972[10] establishes international responsibilities for damage caused by space objects and the Registration Convention 1975 requires states to register their space objects with the UN.[11] The legal framework for international space activities relies on these instruments to ensure cooperative relationships and transparency between nations. The Moon Agreement 1979 builds upon the OST's principles by extending them to lunar and other celestial territories and establishes the Moon as mankind's "common heritage".[12]

International norms now encompass responsible space conduct which involves space debris reduction measures and transparent space operations. The security and defense planning sectors now include many space technologies that serve dual purposes because remote sensing and communication satellites are essential for these operations.[13] Counterterrorism operations utilize geospatial intelligence and satellite-based imagery to monitor secluded regions and track unlawful movements while maintaining real-time coordination capabilities in compliance with existing treaty obligations. The United Nations Office for Outer Space Affairs (UNOOSA) has advanced space governance and peaceful cooperation while assisting developing countries to integrate international space law into their domestic policies.[14]

2.3 African Context

African nations have progressively advanced their space capabilities by establishing national space programs and launching satellites with over twelve countries participating. Nigeria and South Africa stand out along with Egypt, Algeria, Ethiopia, and Ghana in the development of national space programs on the continent. Several African countries have channeled resources into satellite technology to enhance agriculture, telecommunications, disaster response, and national security sectors.[15]

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[7] R Jakhu and J Pelton, *Global Space Governance: An International Study* (Springer 2017)

[8] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty)

[9] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (adopted 22 April 1968, entered into force 3 December 1968) 672 UNTS 119

[10] Convention on International Liability for Damage Caused by Space Objects (adopted 29 March 1972, entered into force 1 September 1972) 961 UNTS 187

[11] Convention on Registration of Objects Launched into Outer Space (adopted 12 November 1974, entered into force 15 September 1976) 1023 UNTS 15

[12] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (adopted 18 December 1979, entered into force 11 July 1984) 1363 UNTS 3

[13] United Nations Office for Outer Space Affairs, *Guidelines for the Long-term Sustainability of Outer Space Activities* (UNOOSA 2019)

[14] United Nations Office for Outer Space Affairs, *Guidelines for the Long-term Sustainability of Outer Space Activities, ibid.*

[15] Reuters, 'MTN and Lynk Make Africa's First Satellite Voice Call Using Smartphone' (Reuters, 27 March 2025) <https://www.reuters.com/business/media-telecom/mtn-lynk-make-africas-first-satellite-voice-call-using-smartphone-2025-03-27/> accessed 2 July 2025; UNCTAD, 'Digital Divide Bridging Through NileSat' (United Nations Conference on Trade and Development, 2021) <https://unctad.org/system/files/official-document/dtlstict2021d1_en.pdf> accessed 2 July 2025; National Communications Authority of Somalia, 'Somalia Launches National Emergency Telecom Plan to Enhance Disaster Response' <https://nca.gov.so/somalia-launches-a-national-emergency-telecom-plan-to-enhance-disaster-response/> accessed 2 July 2025; Space in Africa, 'Democratic Republic of Congo Secures $20 Million for Earth Observation Satellite' (Space in Africa, 16 December 2024) <https://spaceinafrica.com/2024/12/16/dr-congo-secures-usd-20-million-for-earth-observation-

The African Union introduced the African Space Policy and Strategy in 2016 to establish a unified framework for the use of space science and technology across the continent. The establishment of the African Space Agency (AfSA) stems from this foundational work and began operating in 2023 from its Cairo headquarters.[16] The AU policy intends to merge Africa's space capabilities with its development and security strategies while establishing African nations as key contributors to the global space community. Several African countries have established laws that govern national space activities. For instance, the NASRDA Act 2010 serves as Nigeria's legal framework for space activities by establishing guidelines for international cooperation, satellite management, and scientific development.

Regional initiatives in Africa involve African states through programs like GMES and Africa and the Regional Centre for Mapping of Resources for Development (RCMRD).[17] The primary goal of these institutions is to expand capabilities while enabling the cross-border exchange of geospatial information. African nations participate in global discussions through platforms like the UN Committee on the Peaceful Uses of Outer Space (COPUOS) which helps them fulfill international treaty obligations while contributing to the development of new standards.[18]

3. Theoretical Framework

Three theoretical frameworks inform this study: This study draws upon three core theoretical frameworks: security studies alongside sovereignty theory and legal integration theory. Security studies establish a basis for investigating state reactions to traditional and nontraditional threats. The objective is to understand how legal systems can enable the secure application of space-based technologies while maintaining compliance with international obligations.[19]

Sovereignty theory examines how states maintain authority over their lands and manage the information collected within their borders. Current space law allows satellite surveillance yet sovereignty theory questions if foreign satellites gathering data over national territories infringe upon state autonomy concerning security and development decisions.[20]

Legal integration theory reveals why African nations could create unified legal systems to establish collective space management approaches.[21] The creation of the African Space Agency along with the establishment of a continental space strategy demonstrate adherence to this theoretical model and represent a purposeful effort toward regulatory alignment and collective legal frameworks. These theories combine to create a multidimensional framework which enables legal mechanisms to back space technology applications in counterterrorism across Africa while respecting national sovereignty and maintaining regional collaboration.

satellite-to-enhance-national-infrastructure/> accessed 2 July 2025; African Leadership Magazine, 'Military Innovation: Africa's Growing Satellite Network' <https://www.africanleadershipmagazine.co.uk/military-innovation-africas-growing-satellite-network/> accessed 2 July 2025; Space in Africa, 'Uganda's Integration of Satellite Data into Policymaking' (Space in Africa, 23 April 2025)< https://spaceinafrica.com/2025/04/23/excerpts-from-the-2025-newspace-africa-conference-day-two/> accessed 2 July 2025; Y Adu, F Ananidze and S Adu, 'African Union Outer Space Program: Chances and Challenges' in E G Popkova, B S Sergi, L Haabazoka and J V Ragulina (eds), *Supporting Inclusive Growth and Sustainable Development in Africa - Volume II* (Palgrave Macmillan 2020) <https://doi.org/10.1007/978-3-030-41983-7_11> accessed 2 July 2025

[16] African Space Agency, 'Inauguration of the African Space Agency: A Milestone for Africa's Space Development' (17 April 2025) https://africanspaceagency.org/inauguration-of-the-african-space-agency-a-milestone-for-africas-space-development/ accessed 3 July 2025

[17] African Union, 'GMES and Africa' <https://au.int/en/GMESAfrica> accessed 3 July 2025; Regional Centre for Mapping of Resources for Development (RCMRD), 'GMES and Africa' <https://rcmrd.org/en/projects/gmes-africa> accessed 3 July 2025

[18] UN COPUOS, 'Membership and Activities' <https://www.unoosa.org/oosa/en/ourwork/copuos/index.html> accessed 23 April 2025

[19] Barry Buzan, Ole Wæver and Jaap de Wilde, *Security: A New Framework for Analysis* (Lynne Rienner 1998)

[20] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205

[21] R Schütze, *European Constitutional Law* (2nd edn, Cambridge University Press 2015) ch 10

4. Legal and Policy Analysis

4.1 International Legal Obligations

Five foundational United Nations treaties establish the core international legal framework for outer space activities under the guidance of the Committee on the Peaceful Uses of Outer Space (COPUOS). The Outer Space Treaty established by the United Nations serves as the primary legal foundation for outer space activities by promoting peaceful utilization of space, banning nuclear weapons and other weapons of mass destruction in orbit and restricting military use of celestial bodies.[22] Article IV of the Treaty restricts military operations to non-aggressive actions which sets a foundational standard against the use of space for counterterrorism activities that involve armed force or infringe upon state sovereignty.

The 1979 Moon Agreement together with the 1968 Rescue Agreement expand on humanitarian duties and cooperative obligations in outer space but their relevance to counterterrorism is constrained by their scope and the low number of state ratifications especially in Africa.[23] The 1972 Liability Convention together with the 1975 Registration Convention establishes state accountability for space activities which covers misuse and damage from dual-use satellite technologies that can be used in counterterrorism or may unintentionally cause instability (United Nations 1972; United Nations 1975).[24]

All space treaties maintain a common theme of international cooperation which requires states to conduct their activities while respecting the interests of other states as specified in Article IX of the Outer Space Treaty. The principle requires states to prevent harmful contamination while also informing others about potential risks. The counterterrorism principle requires states to share satellite intelligence and surveillance data which could help prevent terrorism-related cross-border activities. Existing treaty provisions do not provide concrete enforceability of these obligations since they depend primarily on state goodwill and bilateral arrangements instead of international binding oversight.

None of the fundamental space treaties specifically tackle terrorism or asymmetric threats which results in legal uncertainty regarding the application of space law to counterterrorism efforts. The absence of clear definitions creates interpretive problems about the classification of surveillance and reconnaissance satellites that detect or disrupt terrorist networks as “peaceful purposes”. This ambiguity also brings up questions regarding the potential illegality of using space-based systems to target terrorist groups under the UN Charter.[25]

4.2 Regional Instruments in Africa

The African Centre for the Study and Research on Terrorism (ACSRT) in Algeria serves as the AU’s primary center for terrorism data collection and analysis and dissemination. The Centre is not required to use space-based data, but they have identified geospatial intelligence and satellite imagery as essential tools for early warning systems and tracking illicit arms or insurgent movements across borders.[26] Earth observation satellites offer potential advantages for monitoring high-risk regions which the African

[22] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205

[23] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (adopted 5 December 1979, entered into force 11 July 1984) 1363 UNTS 3 (Moon Agreement); Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (adopted 22 April 1968, entered into force 3 December 1968) 672 UNTS 119 (Rescue Agreement)

[24] Convention on International Liability for Damage Caused by Space Objects (adopted 29 March 1972, entered into force 1 September 1972) 961 UNTS 187 (Liability Convention); Convention on Registration of Objects Launched into Outer Space (adopted 14 January 1975, entered into force 15 September 1976) 1023 UNTS 15 (Registration Convention)

[25] Charter of the United Nations (adopted 26 June 1945, entered into force 24 October 1945) 1 UNTS XVI

[26] African Union Commission, *African Centre for the Study and Research on Terrorism (ACSRT): Overview and Activities* (AU Peace and Security Department 2020) <https://archives.au.int/handle/123456789/37> accessed 23 April 2025

Standby Force and the Continental Early Warning System (CEWS) could utilize theoretically but their practical application is still basic.[27]

The Lomé Declaration on Security, Stability, Development and Cooperation in Africa, 2000 together with the AU Peace and Security Architecture (APSA) demonstrate additional regional cooperation through their promotion of joint security strategies.[28] No existing instruments provide explicit guidelines or rules for employing space-based technologies within counterterrorism operations. The absence of formal integration demonstrates a policy discrepancy between technological aspirations and the preparedness of institutions.

The GMES & Africa program shows advancements in environmental monitoring while security applications stay marginal.[29] A legally binding regional framework does not exist to mandate African states' sharing of space-derived data for counterterrorism purposes and no standards exist for data protection, privacy, or agency interoperability.

5. Selected Case Studies

5.1 Nigeria

The National Space Research and Development Agency (NASRDA) has enabled Nigeria to become a major player in West Africa's space infrastructure sector through substantial investments.[30] The National Space Policy of Nigeria from 2001 lists national security as one of its main goals while also planning for satellite technology usage in surveillance and disaster management. The NigeriaSat-1 and NigeriaSat-X satellites generate Earth observation data with its main focus on environmental monitoring but also enable intelligence collection and border surveillance for counterterrorism operations. The absence of a strong regulatory framework for dual-use technologies and coordination between space intelligence and law enforcement hinders Nigeria's inter-agency cooperation.[31]

5.2 South Africa

The South African National Space Agency (SANSA) manages South Africa's national space activities which is considered the most sophisticated space governance system in sub-Saharan Africa.[32] The National Space Policy of South Africa and its associated legal frameworks focus on peaceful space applications while recognizing space technology's strategic potential for national security purposes. Defense Intelligence units in South Africa reportedly analyze satellite information to monitor both domestic threats and regional conflicts. The counterterrorism approach of South Africa continues to rely extensively on conventional intelligence methods while lacking clear legal guidelines surrounding the use of space-based tools in law enforcement operations. SANSA's collaboration with national security agencies continues to show significant gaps.[33]

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[27] D Fiott, *Rethinking the EU's Approach to Space: The Case of Security and Defence* (Istituto per gli Studi di Politica Internazionale 2022)< https://www.ispionline.it/it/pubblicazione/facing-war-rethinking-europes-security-and-defence-36652> accessed 3 July 2025

[28] African Union, *Lomé Declaration on Security, Stability, Development and Cooperation in Africa* (2000) <https://au.int/en/documents/20000101/lome-declaration> accessed 23 April 2025.

[29] International Climate Change Adaptation and Policy Centre, 'Advancing Africa's Future: GMES & Africa's Commitment to Earth Observation and Sustainable Development' https://www.icpac.net/news/advancing-africas-future-gmes-africas-commitment-to-earth-observation-and-sustainable-development/ accessed 3 July 2025.

[30] Federal Government of Nigeria, *National Space Policy and Programmes* (2001) https://cms.spacesecurityportal.org/uploads/nigeriaspacepolicy_51a5efeafe.pdf accessed 3 July 2025.

[31] B I Bakare, E V Odu and T Ngeri, 'Satellite Communication in Nigeria: Prospects and Challenges' (2016) 5(11) *American Journal of Engineering Research* 104< https://www.ajer.org/papers/v5(11)/O05110104109.pdf> accessed 3 July 2025.

[32] South African National Space Agency, *Revised Strategic Plan for 2020–2025* (2022) <https://www.sansa.org.za/wp-content/uploads/2022/04/SANSA-Strategic-Plan-2020-2025-Revised.pdf >accessed 3 July 2025

[33] Samuel Oyewole, 'Military Space Strategies and African Realism: Egypt, South Africa, and Nigeria', in Saadia M. Pekkanen and P.J. Blount (eds), *The Oxford Handbook of Space Security* (Oxford Handbooks 2024; online edn, Oxford Academic, 22 February 2024) <https://doi.org/10.1093/oxfordhb/9780197582671.013.25> accessed 3 July 2025

5.3 Kenya

Kenya is developing into a space actor focused on surveillance and national security despite being in its early stages. The Kenya Space Agency came into existence in 2017 and the formulation of the National Space Policy illustrates Kenya's expanding appreciation for space.[34] Kenya deployed its first nano-satellite 1KUNS-PF in 2018 but the space program remains at its initial phase.[35] The country has not fully examined national security applications and does not possess a detailed legal system to regulate satellite data usage for intelligence and counterterrorism activities. The significant function Kenya serves in East African counterterrorism operations against Al-Shabaab makes it essential to incorporate space-based technologies into national security strategies.[36]

6. Identified Legal Gaps

A major legal deficiency exists throughout African countries because they lack complete space laws that regulate satellite technology use for counterterrorism efforts. Space-aspiring African states maintain outdated or insufficient laws which lack provisions for modern threats and dual-use technology regulation. Without proper legislation there is confusion about jurisdictional authority and unclear directives for space agencies which leads to overlapping responsibilities between civilian and military organizations.[37]

Regulatory enforcement is another area of weakness. Science and technology ministries typically manage space assets while defense and intelligence agencies direct counterterrorism efforts. This organizational disconnect prevents efficient utilization of space-based information during critical security events. In numerous countries the coordination mechanisms between agencies lack formal establishment and rely on informal procedures or do not exist at all.[38]

Privacy and civil liberties issues are not adequately addressed within most legal systems. Domestic counterterrorism operations involving satellite surveillance present challenges related to regulatory oversight and the potential for power abuse and data storage issues.[39] Space-based intelligence faces the threat of misuse and political exploitation when independent regulatory bodies and judicial safeguards are absent.

African nations encounter barriers that prevent them from managing space technologies during their entire development phase including satellite construction through data analysis. Using foreign satellite data suppliers creates dependencies that national security policies currently fail to address. The existing legal frameworks leave unanswered questions about the conditions that permit the integration of foreign satellite data into national counterterrorism operations.

The strategic potential of space technology for counterterrorism remains untapped because African states lack the necessary legal and institutional frameworks. To address these deficiencies, nations need

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[34] Anglican Development Services Kenya, *Consolidated ADS 2020 Annual Report* (2021) <https://adskenya.org/wp-content/uploads/2021/06/Consolidated-ADS-2020-Annual-Report.pdf> accessed 3 July 2025

[35] Samuel Nyangi, 'Kenya's Space Legislation Journey: A Path to Space Regulation and Development' (Space in Africa, 5 November 2024) <https://spaceinafrica.com/2024/11/05/kenyas-space-legislation-journey-a-path-to-space-regulation-and-development/> accessed 3 July 2025

[36] Brian George, 'Kenya's Missed Satellite Technology Opportunity' (NTV Kenya, 6 February 2023) <https://www.ntvkenya.co.ke/business/kenyas-missed-satellite-technology-opportunity/> accessed 3 July 2025; Brian George, 'Kenya's Missed Satellite Technology Opportunity' *Business Daily Africa* (6 February 2023) <https://www.businessdailyafrica.com/bd/data-hub/kenya-s-missed-satellite-technology-opportunity--4113694> accessed 3 July 2025

[37] James Dunstan, *Regulating Outer Space: Of Gaps, Overlaps, and Stovepipes* (2023) https://www.thecgo.org/research/regulating-outer-space-of-gaps-overlaps-and-stovepipes/ accessed 3 July 2025; Christopher J. Borgen, 'Space Power, Space Force, and Space Law' (2020) https://lieber.westpoint.edu/space-power-space-force-space-law/ accessed 3 July 2025

[38] Aderoju Olaide, Hilda Onuoha, and Mustapha Ibrahim, 'Optimization of Nigerian Satellites and Geo-Spatial Intelligence on National Security' (2013) 7(4) IOSR Journal of Environmental Science, Toxicology and Food Technology 14–20 <https://www.researchgate.net/publication/282676536_Optimization_of_Nigerian_Satellites_and_Geo-Spatial_Intelligence_on_National_Security> accessed 3 July 2025

[39] Debasish Nandy, 'Human Rights in the Era of Surveillance: Balancing Security and Privacy Concerns' (2023) 1(1) *Journal of Current Social and Political Issues* 13–17 <https://www.researchgate.net/publication/375825016 Human Rights in the Era of Surveillance Balancing Security and Privacy Concerns Journal of Current Social and_Political_Issues> accessed 3 July 2025

domestic changes and regional strategies that integrate governance improvements with capacity building and legal standardization efforts.

7. Comparative Review of Best Practices

Particular jurisdictions within the space security field have shown advanced capabilities to establish thorough legal and institutional systems. The United States, Russia, China, and European Union member states have taken leadership roles in space regulation by implementing unified policies and investing in advanced technology through integrated civil-military organizations. The legal and governance strategies of these countries demonstrate effective ways to structure protective measures for national and international space interests.

The United States demonstrates an integrated civil-military model through Space Policy Directive-4 and the formation of the U.S. Space Force by combining national defense objectives with private sector technological advancements.[40] The United States maintains its space law structure through statutes like the National Aeronautics and Space Act of 1958[41] and the Commercial Space Launch Competitiveness Act of 2015[42] which provide clear operational boundaries for public and private space entities. The Federal Aviation Administration's Office of Commercial Space Transportation operates as one of the U.S. specialized agencies responsible for overseeing safety and licensing requirements.

The European Union uses a multi-state cooperative framework via the European Space Agency (ESA) which functions as an intergovernmental organization. The European Space Agency (ESA) governance structure manages national sovereignty together with shared space interests to promote collaborative missions, research partnerships and joint security tasks. The European Union directives together with space laws from member nations such as France and Germany establish a complex legal framework that supports innovation while maintaining alignment with international treaties like the Outer Space Treaty.[43]

The Chinese space governance system operates under centralized state control with CNSA and SSF leading both civil and military space operations.[44] China operates with an opaque legal structure which consists of internal regulatory codes and white papers that depict its national objectives. The state-centric system enables swift resource mobilization and strategic coordination while minimizing public and international oversight.

The Russian Federation continues the long held practice of controlling space operations through Roscosmos and affiliated military organisations. Roscosmos, the Russian space agency, implements state policy, legal regulation, international activity, and organisation of the rocket and space industry.[45] Roscosmos and the Ministry of Defense coordinate between military and civilian space activity. The country's legal structure remains anchored in Soviet-era principles while modern space regulations and bilateral agreements have been integrated. Russia shares with China a strategic focus on state sovereignty and military-security objectives within its space program.

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[40] The White House, *Space Policy Directive-4: Establishment of the United States Space Force* (19 February 2019) https://trumpwhitehouse.archives.gov/presidential-actions/text-space-policy-directive-4-establishment-united-states-space-force/ accessed 3 July 2025; United States Space Force, *Commercial Space Strategy* (April 2024) https://www.spaceforce.mil/Portals/2/Documents/Space%20Policy/USSF_Commercial_Space_Strategy.pdf accessed 3 July 2025

[41] National Aeronautics and Space Act 1958, Pub L No 85–568, 72 Stat 426

[42] Commercial Space Launch Competitiveness Act 2015, Pub L No 114–90, 129 Stat 704.

[43] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 610 UNTS 205 (Outer Space Treaty).

[44] State Council Information Office of the People's Republic of China, *China's Space Program: A 2021 Perspective* (28 January 2022) <https://english.www.gov.cn/archive/whitepaper/202201/28/content_WS61f35b3dc6d09c94e48a467a.html> accessed 3 July 2025

[45] Federal Law No. 215-FZ of 13 July 2015 on the State Corporation for Space Activities Roscosmos (Russia) https://www.unoosa.org/documents/pdf/spacelaw/sd/RF.pdf accessed 3 July 2025; Federal Law No. 5363-1 of 20 August 1993 on Space Activity (Russia) https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/russian_federation/decree_5663-1_E.html accessed 3 July 2025

8. Lessons for Africa

The early stages of Africa's space activities which mainly focus on developmental and scientific purposes can advance through comparative analysis of established jurisdictions. African states aiming to develop their space-security frameworks can draw from established legal systems which provide adaptable features that serve as foundational elements.

An essential takeaway shows how important it is to establish a national space agency or commission that operates with legislative support. The United States and EU member states have shown how national space agencies function as pivotal entities for policy coordination as well as compliance monitoring and public-private partnerships. Nigeria and South Africa through their respective agencies show meaningful advancement towards establishing space-security frameworks.[46] These agencies can achieve improved functionality and autonomy by obtaining clear statutory mandates along with independent budgetary control.

The creation of dual-use policy systems that integrate civil and security space activities within a single framework remains vital for achieving strategic relevance and resilience. The U.S. Space Policy Directive-4 along with China's military-civil fusion model show how space assets can fulfill both development and security roles.[47] African countries that integrate dual-use principles into their space policy frameworks will be better positioned to support sustained investments in space infrastructure.

African states may find value in regional cooperation structures similar to ESA to achieve their objectives. The continent's economic and geopolitical diversity makes a pan-African or sub-regional consortium for space governance an ideal platform to enable knowledge sharing along with resource pooling and coordinated security strategies.[48] The African Union Commission on Science and Technology (AUC-ST) and the African Space Policy and Strategy, 2016 provide starting points for creating collaborative partnerships.

Private sector involvement and legal predictability represent another transferable best practice in this context. Commercial enterprises participate in space ventures within US and EU jurisdictions under transparent licensing systems along with liability regulations and mechanisms for settling disputes.[49] African states can attract innovation and investment through the implementation of transparent and investor-friendly regulations.

9. Implementation Challenges and Contextual Constraints

Though these best practices appear beneficial they face multiple implementation hurdles and contextual constraints within African environments. The top challenge these best practices face involves resource constraints which span both financial and technical aspects. Establishing space programs demands significant investment along with specialized personnel and extensive planning which proves challenging for nations dealing with essential development issues like poverty, inadequate infrastructure, and political unrest.[50]

Moreover, institutional fragmentation remains a persistent obstacle. The existence of multiple legal systems including customary, civil, and common law in African countries creates significant difficulties

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[46] NASRDA Act 2010 (Nigeria); SANSA Act 2008 (South Africa); Dawn L. Zoldi, 'Bringing Space Law into the Commercial World: Property Rights and the Outer Space Treaty' (2019) 10(1) *Space Law Review* 1 https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1014&context=spacelaw accessed 3 July 2025

[47] The White House, *Space Policy Directive-4: Establishment of the United States Space Force, ibid.*

[48] Bleddyn E Bowen, *War in Space: Strategy, Spacepower, Geopolitics* (Edinburgh University Press 2020)

[49] European Union, *Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 Establishing the European Union Space Programme and the European Space Agency* https://practiceguides.chambers.com/practice-guides/comparison/1223/13637/21691-21692-21693-21694-21695-21696-21697 accessed 3 July 2025; European Union, 'European Small Claims Procedure' <https://europa.eu/youreurope/business/dealing-with-customers/solving-disputes/index_en.htm> accessed 3 July 2025

[50] Betty Ntlhe and Senelisiwe Magagula, 'Developing a Space Program in a Developing Country: Opportunities and Challenges' (2016) 6 *AIAA Aviation and Aeronautics Forum and Exposition* 2344 https://arc.aiaa.org/doi/10.2514/6.2016-2344 accessed 3 July 2025

for harmonization initiatives. The lack of detailed or adequate legal structures dedicated to outer space activities prevents effective coordinated action. Current telecommunications and aviation regulations appear inadequate for managing new space-security challenges including cyber threats to satellites and weaponization of space orbits.[51]

The viability of space-security policies is shaped by geopolitical factors. Foreign partnerships with China, the EU, and the United States shape African national space agendas through investments from donors and established bilateral agreements. Technological progress through partnerships may occur alongside potential threats to African autonomy when legal arrangements lack transparency and reciprocity.[52]

The success of space-security policies depends on public awareness and political commitment which are frequently insufficient. For many African policymakers and citizens space security remains an abstract concept which hinders both public discussion and legislative progress.[53] The implementation of advanced legal frameworks will only be effective with ongoing advocacy efforts combined with capacity development and educational initiatives.

10. Conclusion and Recommendations

The study's concluding remarks detail important discoveries and contributions about how space technology supports counterterrorism activities across Africa. Space-based technologies like satellite surveillance and geospatial intelligence face major legal barriers which prevent their complete application against terrorism. The primary legal deficiencies include obsolete national statutes alongside missing regional and international systems that control the dual-purpose use of space technology. The existing legal uncertainty hinders cooperation efforts and the exchange of data while also deterring investment in security-related space infrastructure. The study provided doctrinal understanding that reveals legal restrictions affecting space technology application in African counterterrorism missions. The policy direction outlined stresses the importance of creating legal frameworks that are unified and practical while looking ahead to future challenges. The essential frameworks should enable secure deployment of space assets while upholding national sovereignty and international regulations.

Research must develop strategies for putting legal reforms into practice that work together with technological advancements. Empirical impact assessments have become essential to measure how successful space-enabled counterterrorism interventions really are. Combining space governance protocols with cybersecurity guidelines will deliver comprehensive protection for space assets and data integrity as digital warfare continues to evolve. The outlined strategies will serve to strengthen Africa's strategic security capacity even more.

Hence, the following recommendations are proposed:

Legal Reforms: Several African countries still need to establish complete national space laws. Existing legal frameworks frequently show signs of obsolescence while failing to match current space operations and global commitments. Nations need to create new or revised space laws that address modern space domains including satellite data management, orbital debris control, dual-use technology oversight, and private sector engagement. States need to integrate the terms of international agreements such as the Outer Space Treaty 1967 and the Moon Agreement 1979 into their domestic laws to ensure compliance and accountability. Clear legal definitions regarding liability and jurisdiction together with established

[51] Jonas Kakule Sindani, 'Legal Traditions and the Fragmentation of Human Rights in Africa' (2025) *Human Rights in Context* https://www.humanrightsincontext.be/post/legal-traditions-and-the-fragmentation-of-human-rights-in-africa accessed 3 July 2025; Annelies Nachtergaele, 'Harmonization of Private International Law in the Southern African Development Community' (2016) *Yearbook of Private International Law* Vol XVI https://www.degruyterbrill.com/document/doi/10.9785/9783504384784-015/html?lang=en accessed 3 July 2025.

[52] Julie Michelle Klinger and Temidayo Isaiah Oniosun, 'China's Space Collaboration with Africa: Implications and Recommendations for the United States' (2023) United States Institute of Peace https://www.usip.org/publications/2023/09/chinas-space-collaboration-africa-implications-and-recommendations-united accessed 3 July 2025

[53] Space Generation Advisory Council (SGAC), *A Set of Best Practices for Developing Space Legislation in Africa* (2023) https://spacegeneration.org/a-set-of-best-practices-for-developing-space-legislation-in-africa accessed 3 July 2025

dispute resolution mechanisms will create a secure and appealing setting that promotes innovative activities and foreign investments.

Institutional Coordination: The lack of unified space governance frameworks in most African countries prevents successful policy application. Creating national space-security coordination bodies can connect military institutions with civil entities and commercial organizations. These organizations will manage threat assessments alongside risk mitigation and implement data-sharing protocols plus emergency response coordination. A central authority can monitor national assets in space while providing strategic guidance on space launches as well as the procurement of satellites and cybersecurity measures for space systems. The coordination bodies need to collaborate with the defense ministry along with science and technology, telecommunications, and foreign affairs ministries to establish unified national space policies.

Capacity Building: Space governance requires both human and infrastructural capacity development as essential foundational elements. African governments need to fund programs for developing local talent in space law as well as satellite engineering and data analytics. It would benefit universities to receive support for developing specialized space-related courses and collaborative programs. Technical institutions need the capability to both manage and operate satellite infrastructure at the same time. Through public-private partnerships technology transfer becomes faster while new African space professionals gain training opportunities. The creation of ground stations, launch facilities and data centers serves as part of capacity building to minimize reliance on foreign platforms while enhancing operational independence.

Continental Harmonization: Space activities extend beyond borders which makes it essential to adopt a unified continental strategy. The African Union (AU) must lead the development of an enforceable African Space Security Framework. This framework will enable collaborative efforts between states in surveillance activities as well as information distribution and joint responses to security threats. The framework would establish uniform legal and technical standards throughout member states which would boost regional defense capabilities while strengthening Africa's position in international space governance discussions.