

## Unmanned aerial systems (UAS) in modern peacekeeping operations: Applications, challenges, and future directions

Colonel (Dr) Kelly Otieno Opiyo<sup>1</sup>

<sup>1</sup>kellyismael26@gmail.com; tonyyonk@yahoo.com

<sup>1</sup>International Peace Support Training Centre (IPSTC), Masinde Muliro University of Science and Technology, The University of Nairobi, Kenya

<https://doi.org/10.51867/ajernet.6.4.57>

Submitted: 15<sup>th</sup> August 2025; Accepted: 25<sup>th</sup> August 2025; Published: 3<sup>rd</sup> November 2025

### ABSTRACT

The study examines how Unmanned Aerial Systems (UAS) can be integrated into modern peacekeeping missions and their strategic importance, paying special attention to the prospects of using UAS in African-based missions, including the United Nations Mission in South Sudan [UNMISS], the United Nations Organization Stabilisation Mission in the Democratic Republic of Congo [MONUSCO], the United Nations Multidimensional Integrated Stabilisation Mission in the Central African Republic [MINUSCA], and the African Support Stabilisation Mission in Somalia [AUSSOM]. It addresses the usefulness of UAS in intelligence, surveillance, and reconnaissance (ISR); humanitarian logistics; early warning systems; protection of civilians; and operational assistance in complex conflicts. The following three objectives informed the study: to review the uses of UAS in contemporary peacekeeping operations, to list and evaluate the issues involved in using such tools, and to understand the possibilities of the practical and ethical application of such tools in peace operations in the future. The basis of the study was technological determination and sociotechnical system theory. Both qualitative and quantitative case studies were implemented as a methodology, and the researcher has excluded the use of secondary missions where drones will be deployed. Data collection comprised document analysis, semi-structured interviews, and focused engagement with peacekeeping personnel, mission planners, and subject-matter experts. A lot of literature and mission reports were used to obtain secondary data. The data was analysed through thematic content analysis. Based on the evidence, although UAS has significantly improved situation awareness, responsiveness, and safeguarding of civilians, it is still constrained by the political opposition, legal evasiveness, regulation issues, and reluctant acceptance of the host state. The paper concludes that the future of UAS in peacekeeping lies in the development of transparent structures, inter-agency collaboration, investments in operations and the training of drone operators, and adherence to the use of UAS with ethical and trade laws to make the latter appear legitimate and trusted among the locals. The paper presents the necessity of developing uniformity in deploying UAS, the engagement strategy with the host nation, and the expansion of the technical infrastructure to allow for the enduring habits of drone integration during missions.

**Keywords:** Civilian Protection, Conflict Zones, Humanitarian Support, Peacekeeping Missions, Sociotechnical Systems Theory, Surveillance, Technological Determinism, Unmanned Aerial Systems (UAS)

### I. INTRODUCTION

The current use of Unmanned Aerial Systems (UASs) in conflict resolution and peacekeeping missions highlights the evolution of similar mandates in conflict zones (Ladsous, 2023). The diversity, wide range of applications, and enhanced capacities have given missions an advantage in acquiring and gathering intelligence, conducting logistics and supply, and distributing humanitarian aid by having significant monitoring mechanisms.

In the past, UASs were only used in surveillance systems. Nevertheless, their usage has been changed with a string of improvements over the years, which became possible due to technological advances (Military Knowledge Base, 2025). UAS can now offer services in many different domains, such as intelligence surveillance and reconnaissance (ISR), cargo, and disaster relief. UAS have also been used more frequently in support of military and humanitarian operations, where the increased effectiveness in operating within the complex environment can be attributed to both the autonomous functionality of the UAS and the capability to carry heavier loads. This paper will discuss the application of UAS in peacekeeping and their likely future use in this dimension, alongside the challenges that they present and contribute to peacekeeping activities and the success of the missions, in general.

The research documents the Unmanned Aerial Systems (UAS) as the independent factor, whereby their strategic use-application in surveillance, logistics, and humanitarian aid is examined in the context of Yakodyne peacekeeping situations. The dependent variable is the effectiveness and success of peacekeeping operations, which is assessed through improved situation awareness, effective functioning, and the attainment of missions. To develop evidence-based

frameworks that inform future interventions, understanding how UAS is linked to the effectiveness of any peacekeeping operation is essential.

The existing theoretical analyses have emphasized the potential use of UAS in conflict territories. However, most commonly lack a complete assessment of their consequences on state sovereignty, moral issues, and institutional assimilation (Finn & Wright, 2021). Although much literature exists regarding the strategic use of drones on the battlefield, peacekeeping missions- usually more multilateral, weak states, and humanitarian-conscious undertakings- present a distinct group of challenges. As such, this paper fills a significant gap in the literature by investigating the role of UAS in multinational peace operations, particularly concerning ethical and political aspects.

Furthermore, a more refined framework is needed on how these host countries feel about the utilization of drones, especially on surveillance and data collection issues, as it poses a threat to the sovereignty of the state and privacy (Williams & Smith, 2022). Also, poor standards of deployment, poor training of the peacekeepers, as well as unclear legal provisions have led to operational fragmentation. Such an interdisciplinary approach is expected to help fill these gaps through a non-exhaustive combination of technological, legal, political, and humanitarian angles, thereby introducing an interdisciplinary take on UAS integration into peacekeeping operations.

### 1.1 Statement of the Problem

UASs can efficiently contribute to intelligence gathering and supply chain management in peacekeeping missions. However, applications have been limited due to privacy issues, limited technology, privacy violations, and unaligned condonation among users (Small Wars Journal, 2023). Other, more recent missions, including UNMISS and MONUSCO, reflect the advantage of UAS and the political animosity that tends to thwart systematic application.

Although the purely technical capacity of UAS has gone through much investigation in military and humanitarian interventions (Boyle, 2020), there is little available research on the ethical and strategic value of UAS within multilateral peacekeeping operations. Articles like that by Finn and Wright (2021) has touched on drones in humanitarian applications, but has not elaborated on the consequences of political and coordination issues, and legal implications involved when deploying drones in peacekeeping operations. Because of this, the introduction of UAS in peace operations is rather unformatted and unassessed.

Lack of standardization of protocols, ethics, and institutional potential remains an obstacle to successful and wide-scale use of UAS in peacekeeping. Comparative research in varied mission contexts is necessary to comprehend the impacts of the political, cultural, and technological contexts on the UAS outcomes. Thus, this paper aims to address these gaps by exploring the social, political, technological, and operational obstacles to UAS usage and providing routes to maximize their tactical and ethical usage in contemporary peacekeeping operations

### 1.2 Research Objectives

- i. To examine the strategic applications of UAS in modern peacekeeping missions.
- ii. To identify the key operational, political, and ethical challenges associated with deploying UAS in missions.

## II. LITERATURE REVIEW

### 2.1 Theoretical Review

Two theories guide the ideology of this study:

#### 2.1.1 Technological Determinism Theory

The theory asserts that technological developments also cause changes in society and institutions. It explains that employing drones in peacekeeping is a logical extension of the technology, where the missions are updated. The proponents of this school of thought, such as Marshall McLuhan and Thorstein Veblen, argue that such technologies as UAS are never neutral, in the sense that they alter the fundamentals of the institutional behaviours, including protocols of engaging in military conflicts, and strategic decision-making (McLuhan, 1964).

This theory finds the main reasons why such adoption becomes the normal outcome of modern warfare patterns and the innovation cycle by elaborating the factors leading to the increased utilization of UAS in unstable war-torn areas (Williams & Smith, 2022). Due to the increasing complexity of the environment in which peacekeeping forces may work, the need for highly advanced surveillance and risk-mitigation technologies is also becoming undeniable.

Drones give the advantage of reviewing the engagement protocols, force protection approaches, and intelligence activities in reconstructing (Williams & Smith, 2022). Theorists, who confirmed their theories, e.g., Marshall McLuhan and Thorstein Veblen, emphasized that the implementation of new technologies often necessitates the subsequent advancement of the social structures, which is also observed in the way the UAS are transforming the principles of the execution of peacekeeping operations and modifying the approaches to those processes on the ground.

### 2.1.2 Sociotechnical Systems Theory (STS)

Scholars, Eric Trist and Susan Leigh Star, developed the theory that considers technology and society as interdependent. In peacekeeping circumstances, STS is invaluable since organizing UAS in complicated systems, such as cultural norms, legal, personnel training, and organizational systems, is required (Trist & Bamforth, 1951; Davis et al., 2014). It takes up the how of responsible deployment and sees that drone integration aligns with local sensitivities, quality-driven operations, and professional ethics.

Regarding influential contributions to the deployment of UAS, STS can be beneficial in showing us how drones can be deployed responsibly, effectively, and ethically for peacekeeping use. It motivates mission planners and policy formulators to consider interoperability with local and international players, the effects of surveillance on groups, and the possibility of its misuse or excessive use of technology (Trist, 1981). Systems scholars such as Erik Trist, Fred Emery, and Susan Leigh Star promote technologically and socially responsive systems. Within the UAS context, this constitutes the development of frameworks that ensure their utilization not only serves to improve but also does not compromise legitimacy, trust, and mission success.

## 2.2 Empirical Review

### 2.2.1 Strategic Importance of UAS in Peace Operations

UAS plays a strategic and significant role during peacekeeping. Peacekeepers can use their capabilities to control vast regions that are frequently inaccessible without jeopardizing human lives due to the possibility of their real-time surveillance and data collection abilities (Africa Intelligence, 2022; Dorn, 2023). UAS can enhance decision-making in volatile, unpredictable environments by equipping specific and timely intelligence (Dorn, 2023). They are also not likely to be present on the ground because of their ability to act in dangerous regions without automatic human interaction, enhancing the peacekeepers' security and safety.

*Case Studies: UAS in Conflict Zones:* UAS have proved helpful in the work of the United Nations Mission in South Sudan (UNMISS), United Nations Organization Stabilization Mission in the Democratic Republic of Congo (MONUSCO), United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic (MINUSCA), and African Transition Mission in Somalia (ATMIS), now known as African Support Stabilisation Mission in Somalia (AUSSOM) (Dorn, 2023).

*The Case of UNMISS:* Unmanned aerial systems (UAS) have also acquired a very high degree of criticality in United Nations peacekeeping deployment through their capacity to create situational awareness, follow ceasefire violations, meet humanitarian needs, and ensure the safe passage of people. In the United Nations Mission in South Sudan (UNMISS), such air technologies can be beneficial when a country is at war, when the supply infrastructure is collapsed, and the residents are dispersed (Human Rights Watch, 2020). According to Ban Ki-moon, former UN Secretary General, deploying more helicopters and unmanned aerial vehicles (UAVs) to beef up peacekeeping operations and protect civilians in South Sudan is urgently needed (UN, 2013).

The mission has had serious political and operational problems despite the Security Council's authorization in 2014 to increase the number of UAVs and helicopters deployed to enhance the capacity of UNMISS. There has been much opposition to the deployment of drones by the South Sudanese government, mainly because of the fear of national sovereignty, misuse of the surveillance capacity, and poor consultations by the UN in South Sudan (Human Rights Watch, 2020). Ambassador Francis Mading Deng warned that such unilateral actions risked fostering mistrust and hostility towards peacekeepers, complicating cooperation essential for mission success (Africa Intelligence, 2022).

Operationally, UAS have demonstrated their value in South Sudan by conducting aerial surveys, delivering essential supplies, and facilitating safe transport across hazardous and inaccessible areas. Their ability to maintain persistent monitoring over conflict-prone regions enables UNMISS to detect ceasefire violations early, prevent escalations, and assist humanitarian actors in delivering aid where it is most needed. (Human Rights Watch, 2020). Beyond surveillance, drones have been adapted for remote sensing and even extending communications infrastructure, helping overcome challenges presented by poor or non-existent ground networks

The peacekeeping leadership, including former UN peacekeeping chief Hervé Ladsous, has emphasized that UAVs are indispensable tools for monitoring fragile ceasefires, providing early warnings to protect civilians, and ensuring the safety of peacekeepers (Africa Intelligence, 2022; UN, 2013). The integration of drones supports new peacekeeping mandates that demand rapid, informed responses to evolving threats in a complex and volatile environment. Without such technologies, UNMISS would struggle to effectively monitor dispersed armed groups and enforce peace agreements (Human Rights Watch, 2020).

Despite the clear operational benefits, using UAS in UNMISS remains a source of tension between the UN and South Sudan's government. The latter has frequently resisted drone deployments, citing sovereignty infringements and fears of technology misuse by both state and non-state actors. These concerns reflect broader political sensitivities and underscore the importance of transparent dialogue, host nation consent and clearly defined operational boundaries to maintain legitimacy and trust (Duggan & Sauer, 2020).

The United Nations has endeavored to stress that the drones will only be used in surveillance, civilian protection, and humanitarian missions, but not in offensive operations. According to this distinction, mitigating fears that drone technology can be misused or weaponized is essential. Still, the productive collaborations with Juba are also essential to ensure a longstanding drone use because the UNMISS relies on the permission of the host government regarding access to the airspace above the country and clearance to move freely in the operating space (UN, 2013).

Moreover, UAS use in South Sudan can be attributed to the other UN operations, including the Democratic Republic of Congo (MONUSCO), which also observed that drones, to a great extent, improve intelligence gathering activities and the protection of civilians (International Organization for Migration [IOM], 2025). The comparative cases indicate the vast potential of drone technology in enhancing the effectiveness of peacekeeping as long as political, ethical, and operational complexities can be addressed and kept within the context of a local environment.

The future of UAS at UNMISS will depend on reaffirming the existing collaboration with relevant authorities and local communities to gain their trust and commitment to peacekeeping technologies (UN, 2025). Further spending on training, operational openness, and explicit rules will be crucial to make the most out of drones without taking risks. With the proliferation of unmanned technologies in UN peacekeeping missions worldwide, the example of South Sudan provides an urgent study of the challenging relationship between innovation, sovereignty, and peacebuilding.

*The case of MONUSCO:* In recent years, UAS have become a transformative asset in United Nations peacekeeping operations, particularly in the Democratic Republic of Congo (DRC), where MONUSCO has pioneered their use since 2013. These unarmed drones, designed for surveillance rather than combat, offer a significant advantage in monitoring complex and high-risk environments (IOM, 2025). In regions where terrain is rugged and ground operations pose significant security risks, UAS provides real-time aerial intelligence that enhances situational awareness, supports the protection of civilians, and informs more strategic deployment of peacekeeping forces.

The deployment of drones in MONUSCO was a long-sought capability. Although the mission had requested aerial surveillance tools as early as 2008, concerns within the Security Council and among member states—particularly over intelligence-sharing and host-state sovereignty—delayed their approval until 2013. These objections reflect longstanding debates within the UN about intelligence gathering in peacekeeping, where access and consent from the host government are essential (UN, 2025). However, escalating conflict in the eastern DRC and a growing need for precision monitoring ultimately highlighted the urgency of adopting modern technological solutions to fulfill the mission's civilian protection mandate more effectively.

MONUSCO's drones, equipped with infrared and high-resolution imaging systems, have proven particularly useful in volatile areas such as North and South Kivu. During the 2025 M23 offensive that displaced over half a million people and briefly led to the fall of Goma, drones played a critical role in identifying armed group movements, tracking humanitarian impacts, and supporting early-warning systems. (IOM, 2025). By mapping population displacements and insurgent routes in real time, UAS enabled peacekeepers to prioritize vulnerable areas and coordinate responses more efficiently. Additionally, drones have enhanced MONUSCO's ability to monitor the implementation of ceasefires and verify compliance with peace agreements, a key aspect of stabilization efforts in the DRC.

Border surveillance has also emerged as a vital application of drone technology. Along the porous frontiers with Rwanda and Uganda—regions where accusations of cross-border support to rebel groups are frequent—drone-collected intelligence has helped clarify movement patterns and deter illicit activity (UN, 2025; IOM, 2025). For example, during the 2025 crisis, drone footage was instrumental in countering misinformation and establishing credible accounts of external support to armed actors. The presence of drones in these sensitive zones has thus added a layer of deterrence and transparency to what had long been murky geopolitical dynamics.

MONUSCO has expanded its drone program through training initiatives to strengthen local capabilities and promote sustainability. In October 2024, Kenyan Signals Company personnel received practical instruction on operating micro-UAS platforms, such as the Mavic series, at the mission's C4ISR facility in Goma. These efforts signal a shift toward developing mission expertise and regional technical autonomy, essential for long-term peacekeeping modernization (MONUSCO, 2024; UN, 2025).

Nevertheless, the use of drones in peacekeeping is not without controversy. Humanitarian organizations have raised ethical concerns about the potential blurring of lines between military surveillance and humanitarian assessment, warning that such dual-use technology could erode community trust. (UN, 2025; IOM, 2025). Moreover, dense rainforests and frequent inclement weather in parts of the DRC reduce the effectiveness and reliability of drone operations. Meanwhile, armed groups have begun to adopt similar technologies for reconnaissance and propaganda, prompting the need for counter-UAS measures and revised mission strategies.

As MONUSCO nears its planned transition and drawdown, its experience with drone operations offers valuable lessons for future peacekeeping missions. The success of UAS integration depends not only on technical performance but also on transparent governance, legal clarity, and the trust of local populations. (UN, 2025; IOM, 2025). The UN must ensure robust oversight mechanisms, clearly defined operational mandates, and meaningful engagement with host

governments and communities. Drone technology can only fulfil its promise as a force multiplier for peace through such a balanced approach.

*The case of AUSSOM:* The evolution of peacekeeping missions in response to asymmetric threats has led to the integration of advanced technologies such as UAS. The African Union Support and Stabilisation Mission in Somalia (AUSSOM)—which officially replaced ATMIS on 1 January 2025 following UN Security Council Resolution 2767—has adopted UAS as a core component of its operational toolkit (Sullivan & Baker, 2021). These systems are crucial in enhancing Intelligence, Surveillance, and Reconnaissance (ISR) capabilities, particularly in the fight against the insurgent group Al-Shabaab.

In Somalia, UAS have proven indispensable in both military and humanitarian operations, significantly enhancing the capabilities of the African Union Support and Stabilisation Mission in Somalia (AUSSOM) and the Somali National Army (SNA). In enabling real-time aerial surveillance, the drones have enhanced the security forces' capacity to analyze the enemy's movements, interfere with insurgent activities, and track down prearranged movements with the advantage of being timely. Their most significant contribution has been in finding and intercepting the deployment of improvised explosive devices (IEDs) that have remained a deadly threat to civilians and peacekeepers over time. Prevention of these threats is important. They have thwarted attacks and maintained the integrity of supply routes, saving lives in the process (Brown & Carlson, 2023).

Drones have also been significantly used when protecting convoys and routes, scoping out primary roads of ambush points, and leading ground forces through high-risk areas with much more confidence. UAS can be implemented in counterinsurgency programs to identify the accurate positioning of insurgents' hideouts and track them to cause fewer secondary impacts due to explosions. Such accuracy has been one of the key factors in ensuring continued support amongst the population when it comes to peacekeeping operations, especially in locales where a high number of casualties have been the bane of trust (Brachet & Vadrot, 2019).

In non-military operations, UAS have also been used in humanitarian causes to secure internally displaced persons (IDP) camps and safely deliver humanitarian aid to remote or conflict areas. Where ground intelligence is poor or available resources are insufficient in operations, drones present an invaluable level of situational awareness to plan missions and improve force protection. Due to their flexibility and versatility, UAS has become the stalwart of the AUSSOM operation process in Somalia (Okwara, 2025).

To harness the strategic importance of UAS, AUSSOM has ensured the enhancement of local capacity building. One such ISR training was conducted in Mogadishu in May 2022 and organized by the United Kingdom Mission Support Team (UKMST) and the UN Field Technology Services. The training granted ATMIS and SNA members' important competencies in drone management, intelligence analysis, and aerial surveillance (UN, 2025).

Such investment in local knowledge enables the Somali forces to operate on their own ISR and can help pave the way for national security ownership. Tactical drones supplied by the U.S. Department of State have already shown a measurable impact in joint ATMIS-SNA missions, contributing to neutralizing threats and safeguarding civilians (Tavares & Okeke, 2019).

Despite their proven tactical value, deploying UAS in peacekeeping operations presents various challenges. Notably, there are high concerns about the ethical and legal ramifications, especially the possible civilian casualties, privacy invasion, and national sovereignty breach. With the rising use of drones as a surveillance and targeting tool, there are concerns regarding accountability, transparency, and proportionality of the tool usage—particularly when used in highly populated or politically volatile places, where such mistakes always have long-term implications (Okwara, 2025).

Significantly, there is the threat of adversarial involvement of the use of drone technology by non-state actors, such as Al Shabaab. These groups have started to use drones to their advantage in terms of surveillance, spreading propaganda, and perhaps even conducting offensive actions, and the technological advantage used by peacekeeping measures has been neutralized, providing an added challenge to regional stability. Commercialized drone technology makes it harder to enjoy air superiority, especially in places with less counter-UAS infrastructure (UN, 2025).

Peace operations should be subjected to definite principles of operation, supported by international supervision means and mechanisms that will warrant adherence to humanitarian law to mitigate such risks. It is important to have robust counter-drone measures, intensified airspace control, and investment in defensive measures to safeguard peacekeepers and civilians. Moreover, trust can only be developed through effective interaction with local communities (Sheikh et al., 2024). This will help reduce suspicion and the perception of UAS as some form of surveillance of people and/or intimidation.

The use of UAS in the execution of the AUSSOM is a paradigm shift in the modus operandi used in the carrying out of peacekeeping missions, from reactive troop deployment to a proactive/intelligence-driven approach. In Somalia, UAS have allowed AUSSOM and Somali forces to anticipate threats, reduce operational risks, and conduct targeted interventions more accurately (Kalumba & Njoroge, 2020). This technological shift has allowed peacekeepers to

respond more effectively to the challenges of asymmetric warfare, particularly in environments with limited conventional intelligence gathering.

Long-term training, logistics, and maintenance investment are crucial to sustain and expand these gains. Building local expertise ensures that national forces can operate and maintain UAS systems independently, promoting operational autonomy as international support is gradually scaled down (Harris, 2023). At the same time, clear legal and regulatory frameworks are needed to govern the deployment of drones in line with international law and humanitarian principles. Such frameworks will help mitigate potential misuse and address ethical concerns related to civilian privacy and the risks of unintended harm.

Regional cooperation will be key to standardizing drone use across African peacekeeping theatres. Shared protocols, joint training exercises, and coordinated policy development can enhance interoperability and ensure best practices are adopted continent-wide (Duggan & Sauer, 2020). Ultimately, the successful integration of UAS into peace operations depends not only on technological adoption but also on strategic foresight, ethical governance, and regional solidarity.

Unmanned Aerial Systems are transforming modern peacekeeping by expanding the scope and effectiveness of ISR operations. In Somalia, under the AUSSOM mandate, drones have proven essential in countering insurgency, protecting civilians, and strengthening mission autonomy (Harris, 2023). As peacekeeping continues to adapt to the challenges of asymmetric warfare, UAS will remain a strategic enabler—provided that ethical considerations, operational discipline, and long-term capacity building guide their deployment.

*The Case of MINUSCA:* In the evolving landscape of modern peacekeeping, UAS have emerged as vital tools for enhancing operational efficiency, especially in conflict-affected regions where terrain, logistics, and security risks hinder traditional intelligence gathering. Within the United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic (MINUSCA), drones have played an increasingly important role in supporting core mission mandates such as the protection of civilians, situational awareness, and peacekeeper safety (UN, 2025). As armed groups grow more technologically adept and the threat environment shifts, UAS are becoming indispensable for both surveillance and response planning.

Drones provide MINUSCA real-time aerial imagery and data that enhance situational awareness in volatile and hard-to-reach areas. This enables the peacekeepers to identify the early warning signals of violence and troop movements and offers a faster response to emerging threats. The UN wants to solve the problem (UN, 2025). In a nation as large and physically complex and as limited in terms of infrastructure as the Central African Republic (CAR), drones provide essential information that only ground patrols or satellite imagery cannot cover, especially in times of high levels of insecurity or political instability.

### III. METHODOLOGY

The research design used in the study was mixed-method research to evaluate the uses, limitations, and prospects of a UAS in the contemporary peacekeeping missions. The strategy integrated qualitative and quantitative strategies, enabling the study of the statistical trends and background information concerning implementing UASs broadly (Creswell & Plano Clark, 2018; Saunders et al., 2019).

A study was undertaken in major African mission areas where UAS have been or will be deployed—South Sudan (UNMISS), DRC (MONUSCO), CAR (MINUSCA), and Somalia (AUSSOM) and Nairobi, Kenya, was included, considering it as a regional peacekeeping coordination center. The population of interest consisted of 667 people, including UN/AU officers, humanitarian workers, INGOs, diplomats, drone technicians, and local authorities. A sample size of 250 was calculated using Yamane's (1967) formula to ensure representativeness (Taherdoost, 2017).

Respondents were drawn from five main categories: peacekeeping mission personnel (UAS pilots, C2 technicians, intelligence officers), policy and administrative staff (mission planners, legal advisors), host country stakeholders (government officials, civil aviation authorities), humanitarian partners (UNHCR, WFP, MSF), and local community representatives (traditional leaders, civil society, conflict-affected civilians). This broad sampling captured diverse perspectives on technological integration, airspace governance, civilian protection, and operational ethics (Bryman, 2016; Flick, 2018).

Sampling involved purposive, cluster, stratified, and simple random techniques to ensure reliability. Primary data was collected through structured questionnaires, Key Informant Interviews (KIIs), and Focus Group Discussions (FGDs), while secondary data came from relevant academic literature, UN/AU mission documents, policy reports, and technical assessments (Kumar, 2019; Creswell & Creswell, 2018).

Quantitative data were analyzed using SPSS v28, while qualitative inputs were thematically examined using NVivo, with triangulation across methods and sources to strengthen validity (Silverman, 2020; Babbie, 2020). The procedures used to conduct the research, including the informed consent, confidentiality, and institutional clearance, were undertaken regarding international research standards, per the needed ethical protocol.



## IV. FINDINGS & DISCUSSION

### 4.1 Response Rate

In order to provide an in-depth study on the contribution of UAS in the new age of peacekeeping operations, the research team approached a sample size of 250 respondents, based on which a response rate of 83.2 percent was received, which is quite significant. It also involved 208 completed questionnaires complemented with Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs); therefore, the integrity and depth of the data collection exercise (Marshall & Rossman, 2016; Kvale & Brinkmann, 2015). Consistent with Mugenda and Mugenda (1999), a response rate greater than 72% would be deemed statistically acceptable, increasing the validity of findings.

**Table 1**

*Response Rate*

S/NO	Category	Sampled	responded	Response rate
	Surveys and Interview Schedules	250	208	83.2%

### 4.2 Key Challenges Identified by Respondents

**Table 2**

*Key Challenges Identified by Respondents*

Challenges	Population	Population	Percentage
Operational	Flight endurance limits, payload and lack of maintenance	61	30%
Political	Host government resistance, sovereignty concerns	44	21%
Ethical	Privacy infringement, data misuse, lack of accountability	57	27%
System Integration	Need for training and legal framework	46	22%
<b>Total</b>		<b>208</b>	<b>100</b>

#### 4.2.1 Operational Challenges

The study discovered that 30% of the respondents cited technical constraints, which include limited flight sustainability, low payload capabilities, and insufficient maintenance facilities, as the most burning bottlenecks to satisfactory UAS implementation (Duggan & Sauer, 2020). This finding illustrates how the current limitations of drone technology hinder their transformative potential in peacekeeping contexts

From the findings, it is also evident that these technical constraints cannot be evaluated in isolation; instead, they reflect insufficient institutional capacity, inadequate logistics support, and incomplete integration into command-and-control (C2) systems across missions. (Clarke & Knake, 2019). The analysis indicates that organizational readiness and infrastructure critically determine UAS utility beyond the machines. One UAS operator remarked that:

.....*We've faced repeated issues with drone malfunctions in the field—especially in rugged terrains and harsh weather.....*

The most cited operational challenge is technical malfunctions, suggesting that mechanical reliability and system errors remain a significant concern in field operations. This aligns with broader concerns in remote systems about maintenance, wear-and-tear, and component failures in hostile environments.



**Figure 1**  
*Operational Challenges of UAS in peacekeeping Missions*

Limited Endurance and Adverse Weather Limitations indicate practical constraints on drone deployment—particularly in extended missions or extreme weather conditions. These limitations reduce mission uptime and coverage capacity, hindering continuous surveillance or supply operations (Sullivan & Baker, 2021; Kalumba & Njoroge, 2020). One mission planner observed that:

*.....Battery life and range are still major limitations. You can't monitor large areas continuously with current endurance capabilities.....*

Training and Expertise Gaps and Integration with Ground Forces emphasize the need for harmonized operations and skilled personnel. Without proper interoperability and UAS-literate operators, peacekeeping missions risk miscommunication and ineffective deployment (Tavares & Okeke, 2019). One mission administrator observed that:

*.....There's a steep learning curve for peacekeepers unfamiliar with drone technology. More training is essential.....*

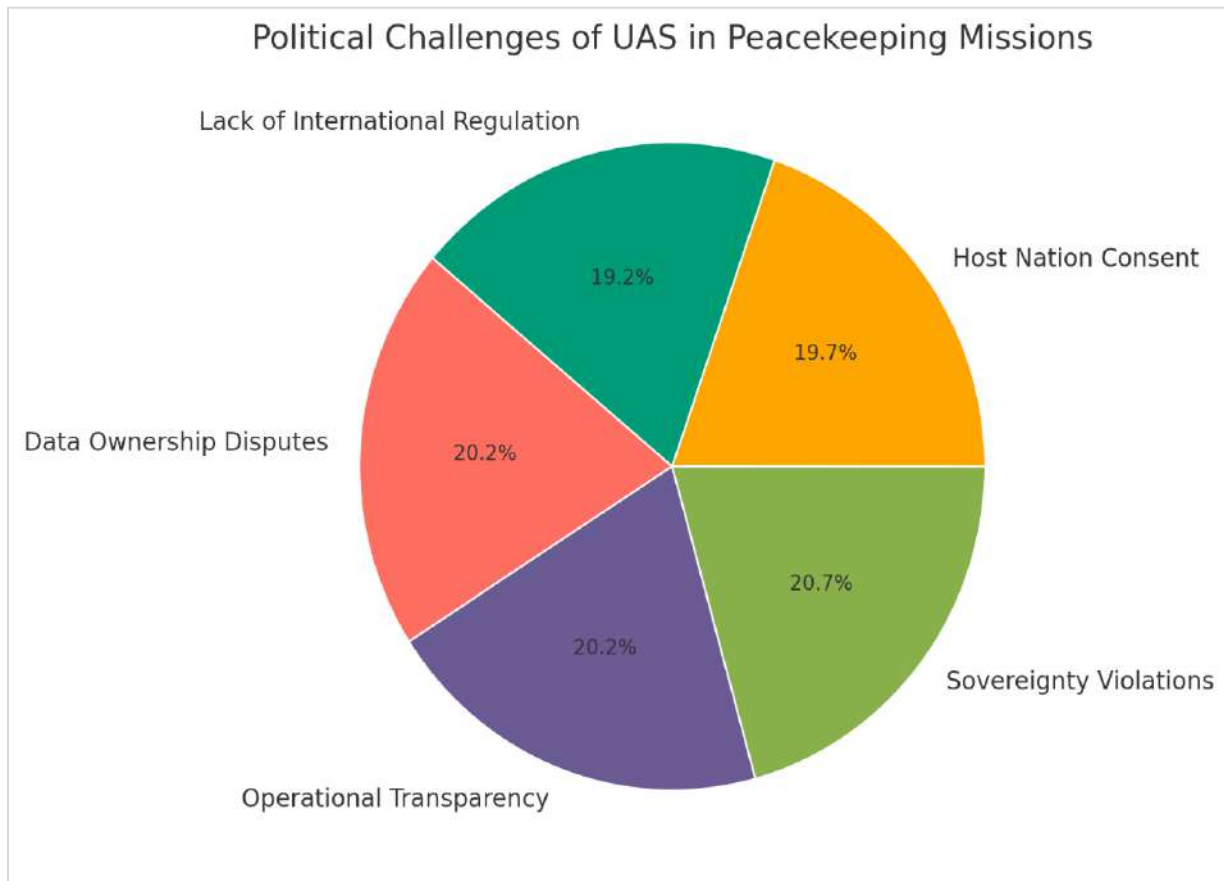
#### 4.2.2 Political Challenges

According to 21% of surveyed participants, political resistance—primarily from host governments concerned about sovereignty, airspace rights, and surveillance abuses—poses a substantial obstacle. The study revealed that drone operations in contexts like South Sudan and CAR were frequently delayed or restricted due to mistrust or outright refusal of flight clearances (Brachet & Vadrot, 2019).

From the lens of Technological Determinism, these dynamics show that technology alone cannot drive change when political structures resist. In contrast, STS emphasizes the necessity of stakeholder engagement, transparent protocols, and legally grounded frameworks to effectively integrate UAS operations within host state governance systems (Almeida & Santos, 2020; Karim & Ndiaye, 2023). According to a participant, a mission intelligence officer opined that:

*.... There is often a lack of clarity around who owns the data collected by drones—especially when missions involve multiple countries or agencies.....*

The top political issue violates sovereignty as it reflects fears that drone surveillance may become interpreted as a transgression of national independence. This issue highlights the fragile geopolitical context that peacekeeping operations have to reconcile.



**Figure 2**  
*Political Challenges of UAS in peacekeeping Missions*

The concerns of host nation consent and absence of international regulations indicate some uncertainty in both the legal and political systems governing the use of UAS in foreign countries (Mbaye & El Amin, 2024; Gregory & Sharland, 2023). These gaps complicate deployment authority, mission legitimacy, and international collaboration. One peacekeeper observed that:

*.....Without consistent global regulations, the deployment of UAS feels politically fragile and subject to sudden restrictions.....*

Data ownership and operational transparency concerns indicate rising demands for accountability in data collection, usage, and sharing (Lebow & Ngugi, 2022). Political sensitivities surrounding surveillance data are increasingly shaping acceptance and cooperation with UAS deployments. One peacekeeper observed that:

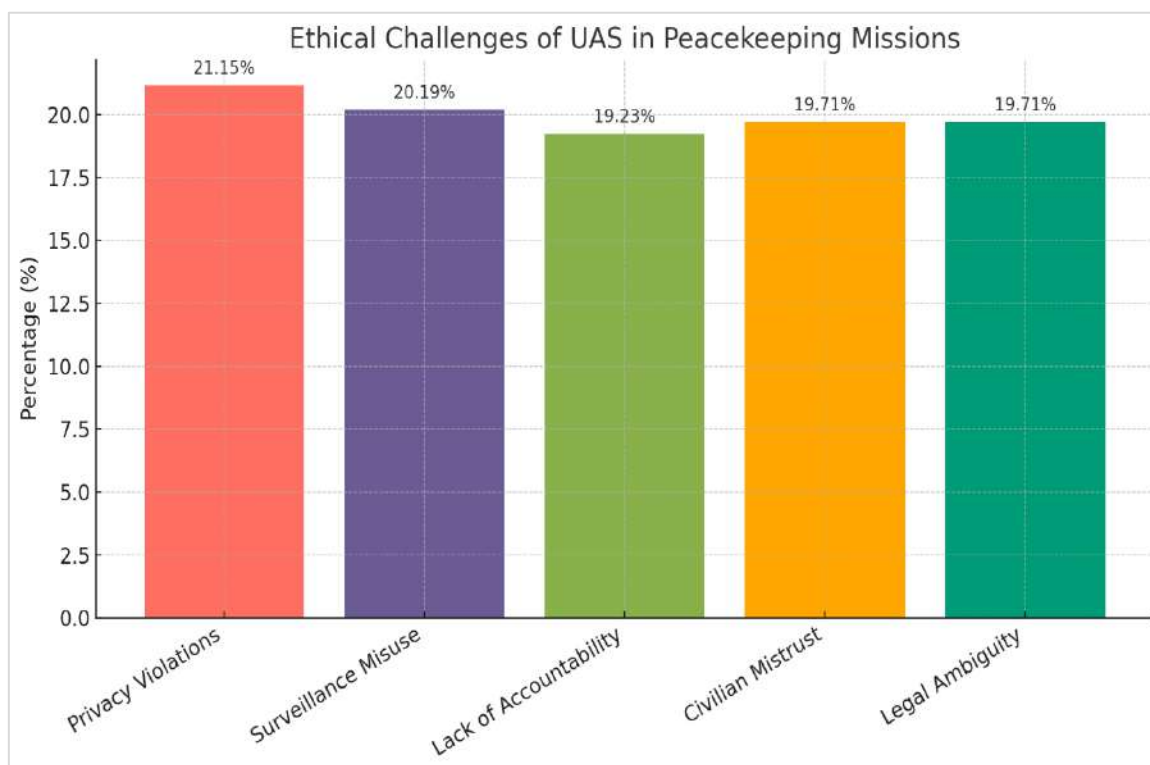
*.....Some host nations view drone surveillance as a breach of their sovereignty, even when international mandates authorize operations...*

#### 4.2.3. Ethical Challenges

The study revealed that 27 % of respondents raised ethical concerns regarding privacy infringement, civilian surveillance without consent, and blurred accountability in ISR missions. (Brown & Carlson, 2023). This finding illustrates that even where technology enables broad data collection, STS demands robust ethical governance—aligning technical capabilities with transparency, data protection, and community consent norms. One UN policy maker observed that:

*.....People on the ground do not always understand why drones fly overhead, creating mistrust and fear.....*

From a technological determinism perspective, the drive for technological innovation creates pressure to deploy UAS rapidly, sometimes at the expense of ethical safeguards. The analysis suggests that without integrating legal oversight and community sensitivities, UAS deployments risk delegitimizing peacekeeping efforts and undermining trust (Garcia & Thomas, 2022; Mbaye & El-Amin, 2024).



**Figure 3**  
*Ethical Challenges of UAS in Peacekeeping*

When combined with the privacy-breaking nature of the UAS utilization, it further instills the inevitable paranoia that drone activities could intrude into personal or civilian spheres with little to no protection ensured. One Mission ISR Operator noted the following:

*.....The line between surveillance for protection and invasion of privacy is thin—we need clearer ethical guidelines.....*

There was also an issue of concern about misuse of surveillance, which indicates a possible misuse of the surveillance information due to unwanted or unauthorized usage. This provokes serious discussions about oversight, use-of-force, and mission creep in peacekeeping missions. It dates back to (Harris, 2023). Accountability deficit, civilian distrust, and legal uncertainty point to a morally complex terrain where drones can break trust and work in grey areas of International Law (Atyabi et al., 2020). Such challenges need robust values, open pathways, and regular community interactions. According to one such drone operator, he said:

*.....There is little to no accountability when drone footage is misused or leaked—this is a serious ethical concern.....*

**4.2.4 Integrated Theory Application**

Combining these perspectives, the study revealed that 22% of respondents believed successful UAS integration depends on harmonizing technology capabilities with organizational and cultural systems. (Klein & Moore, 2022; Choudhury & Smith, 2021). This illustrates the complementarity of the two theories: technological determinism explains why institutions are compelled to adopt UAS—due to the momentum of innovation—while STS highlights how adoption must occur within socially informed systems design (Bijker & Pinch, 2020; Jørgensen et al., 2023).

Specifically, mission success is contingent not just on advanced drones but also on trained operators, host-state collaboration, legal frameworks, ethical oversight, and adaptive institutional culture. The result is that technical innovation must be embedded within systemic alignment to yield sustainable benefits (Carroll & van der Ploeg, 2022).

The findings illustrate that although impetus exists for UAS integration as driven by innovation, there is a need to provide a corrective by emphasizing the importance of organizational, ethical, and political systems in enabling effective and legitimate deployment. One peacekeeper remarked that:

*.....UAS can reshape peacekeeping only when the technology is embedded within a well-designed sociotechnical framework....*



### 4.3 Strategic Applications of UAS in Peacekeeping Missions

The study also sought to assess how UAS are strategically applied in peacekeeping missions across Africa. Drawing insights from 208 respondents—including mission personnel, technical experts, humanitarian officers, and policymakers—the research explored how UAS contribute to surveillance, logistics, intelligence gathering, and humanitarian support. The findings revealed diverse but converging perspectives on integrating and utilizing these technologies within complex, multidimensional operations.

**Table 3**  
*Strategic Applications of UAS in Peacekeeping Missions*

Strategic Application	Population	Percentage
Surveillance & Intelligence	46	22%
Humanitarian Aid & Logistics	40	19%
Ceasefire Monitoring & Civilian Protection	48	23%
Enhanced Command and Control (C2)	40	19%
Knowledge Gaps and Capacity Limitations	34	17%
<b>Total</b>	<b>208</b>	<b>100</b>

#### 4.3.1 Surveillance and Intelligence Gathering

The researchers found that 22% of the survey participants selected aerial surveillance and real-time intelligence as the most profound strategic uses of UAS. Such platforms also tremendously boosted early warning, force protection, and conflict zone mapping, particularly in volatile regions of eastern DRC and the Central African Republic.

This finding reflects that the UAS are force multipliers of technology, as seen within the context of technological determinism theory, or the notion that technological breakthroughs influence the course of society. Nevertheless, using the STS perspective, it was revealed that their effectiveness was determined by their technical abilities and the interaction between the analysts, command stations, and field operators (Bijker & Pinch, 2020; Jorgensen et al., 2023).

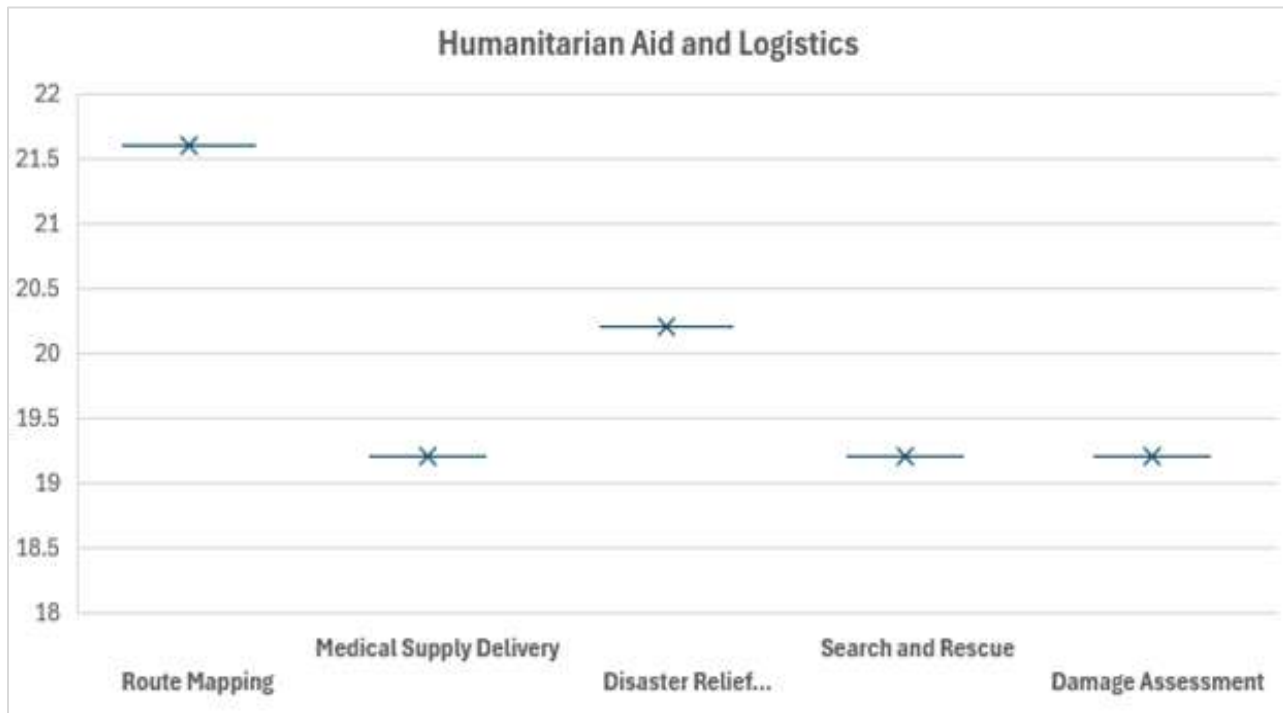
#### 4.3.2. Humanitarian Aid and Logistics

The research established that 19 per cent of the participants agreed on the increasing significance of UAS in humanitarian transport and especially on the distribution of medicines, foods, and sanitary support to the disaster area inaccessible locations. An example is the devastating floods in South Sudan, where drones made timely drops when roads were impassable. The researchers suggested that this would have been the case in 2023 and by 2024 (Carroll & van der Ploeg, 2022). This fact depicts that UAS is emerging as a vital component of resilience and speedy action processes across all missions.

Based on the findings, their adoption is an inevitable trend of automation in humanitarian logistics, and their strategic value is in an optimal integration with the ground-level planning, acquired local knowledge, and legislative systems. As one of the technical experts employed in the mission said:

*.....UAS are redefining humanitarian logistics by increasing speed, reach and efficiency—especially in hard-to-access or volatile regions.....*

The respondents picked supply route mapping as the pre-eminent UAS-related application in humanitarian relief and logistics. It evidences the necessity of drones in the evaluation of the terrain and the exploration of possible routes of movement at the location where the subsequent movement might be distorted due to destruction or military action (Carroll & van der Ploeg, 2022; Choudhury & Smith, 2021).



**Figure 4**  
*Humanitarian Aid and Logistic Applications of UAS*

A similar situation can be observed concerning Equally Search and Rescue Support and Disaster Relief Coordination, which indicates the crucial importance of UAS in supporting coordination among humanitarian actors. They are invaluable for time-sensitive disaster response organizations and emergency planning efforts as they allow covering vast distances within a short time and reporting decent real-time information (Lebow & Ngugi, 2022).

Medical delivery and damage assessment were also widely supported in the process, proving that UAS are exploited to reduce logistical obstacles and quickly evaluate disaster-stricken areas. These apps highlight the importance of drones in enhancing the velocity and proficiency of humanitarian response.

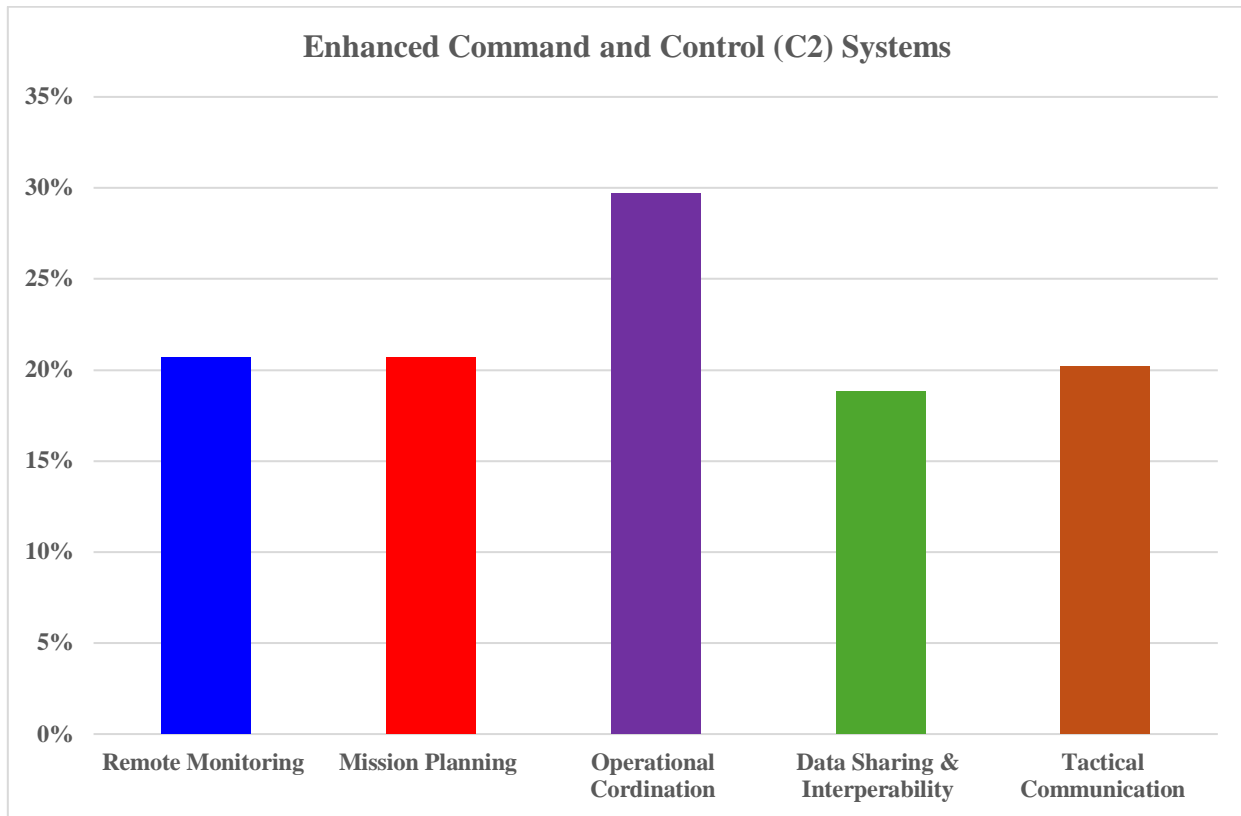
#### 4.3.3 Monitoring Ceasefires and Civilian Protection

In line with the opinions of 23% of the participants, UAS occupies the central role in surveillance of the ceasefire agreements and tracking people displacements, thereby strengthening the protection of civilians. Such things are seen in missions like MINUSCA and MONUSCO, where drone-based ISR (Intelligence, Surveillance, and Reconnaissance) feeds enable peacekeepers to pre-empt possible violations and deploy rapid-response teams (Carroll & van der Ploeg, 2022; Hassan & Becker, 2024).

This observation shows that UAS plays an important role in maintaining peace agreements, as it acts as a deterrence factor and a method of documentation. This emphasizes using UAS to increase transparency and eliminate human error. The STS framework insists that using UAS requires the engagement and ethical measures no longer at the regional level but on a local scale to follow credibility and legitimacy (Choudhury & Smith, 2021). One of the respondents noted that:

..... *UAS are increasingly becoming essential in conflict surveillance, shifting peacekeeping from manpower-heavy ground operations to technology-driven oversight.....*

The conclusion reveals that the UAS application that is most appreciated in ceasefire monitoring and civilian protection is real-time surveillance. This highlights the increasing necessity of round-the-clock air surveillance to identify and act on potential offenses in real-time.



**Figure 5**  
*Monitoring Ceasefires and Civilian Protection applications of UAS*

Early warning systems and improved situational awareness reflect the strategic shift towards proactive peacekeeping. Additionally, threat detection and deterrence demonstrate how UAS contribute to identifying risks and discouraging hostile actions through their visible presence and intelligence capabilities (Hassan & Becker, 2024).

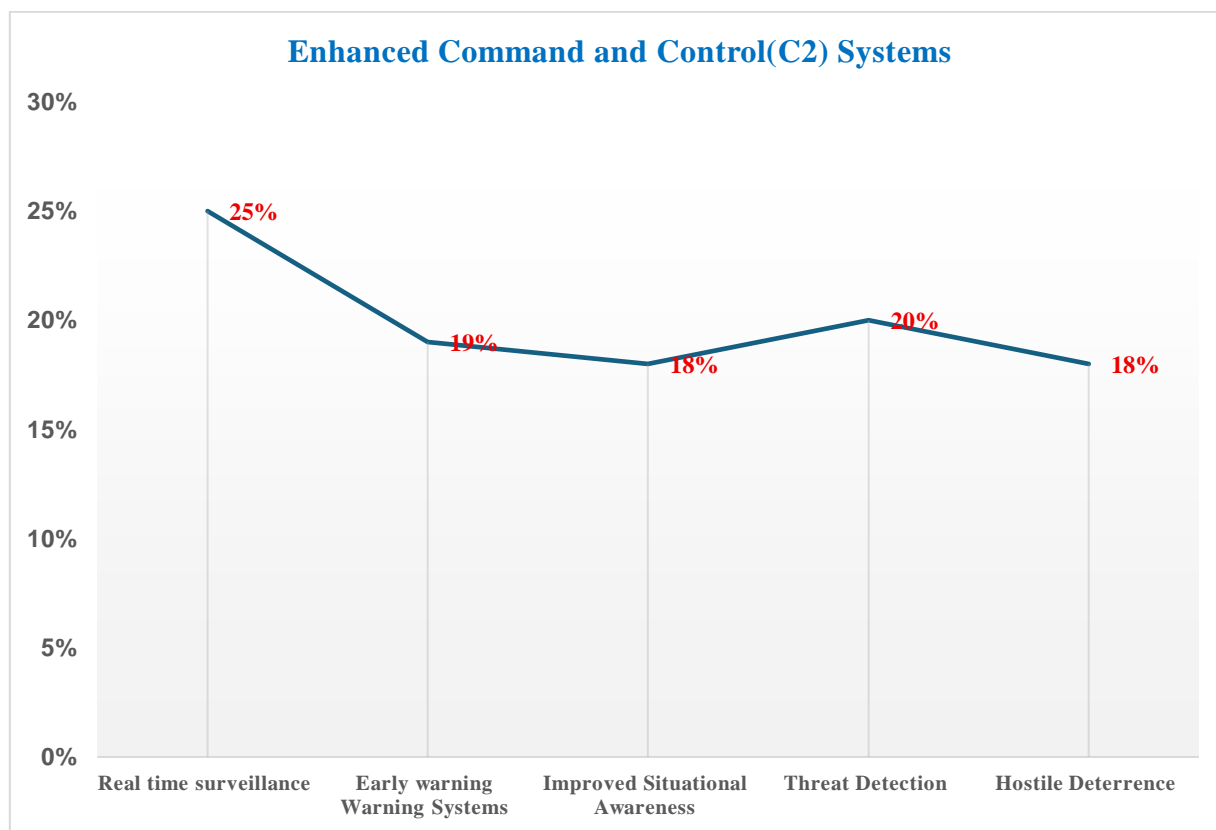
**4.3.4. Enhancing Command and Control (C2) Systems**

The study revealed that 19% of the respondents agreed that UAS integration improves the efficiency and accuracy of Command-and-Control systems. In AUSSOM, drones were integrated into real-time digital platforms, giving commanders a live feed of troop movements and threat assessments.

This illustrates a strategic shift toward network-centric peacekeeping enabled by digital surveillance technologies. This integration is part of a broader digital transformation of security operations (Hassan & Becker, 2024). The findings underscore that real-time intelligence is only actionable when supported by well-trained personnel, interoperable systems and organizational readiness. One UAS operator observed that:

*..... Integrating UAS into C2 infrastructures enhances strategic and tactical decision-making through timely, accurate and interoperable data exchange.....*

Tactical Communication highlights the critical role of UAS in supporting secure and reliable communication, especially in areas where traditional communication infrastructure is damaged or unavailable (Carroll & van der Ploeg, 2025).



**Figure 6**  
*Enhancing Command and Control (C2) System Applications*

Early warning systems and improved situational awareness reflect the strategic shift towards proactive peacekeeping. Additionally, threat detection and deterrence demonstrate how UAS contribute to identifying risks and discouraging hostile actions through their visible presence and intelligence capabilities (Small Wars Journal, 2023; Africa Center, 2024).

#### 4.3.4. Enhancing Command and Control (C2) Systems

The study revealed that 19% of the respondents agreed that UAS integration improves the efficiency and accuracy of Command-and-Control systems. In AUSSOM, drones were integrated into real-time digital platforms, giving commanders a live feed of troop movements and threat assessments.

This illustrates a strategic shift toward network-centric peacekeeping enabled by digital surveillance technologies. This integration is part of a broader digital transformation of security operations (UN, 2025). The findings underscore that real-time intelligence is only actionable when supported by well-trained personnel, interoperable systems, and organizational readiness.

Tactical Communication highlights the critical role of UAS in supporting secure and reliable communication, especially in areas where traditional communication infrastructure is damaged or unavailable (UN, 2025).

Real-time data sharing and operational coordination emphasized how UAS enhance coordination and synchronization among peacekeeping units. Their ability to deliver live intelligence helps create a shared operational picture, improving responsiveness and unity of effort (Carroll & van der Ploeg, 2022).

Respondents also underscored the value of UAS Mission Planning Support in providing actionable intelligence that informs strategic and tactical planning. This supports more adaptive and effective mission execution in complex and rapidly changing environments.

#### 4.3.5 Knowledge Gaps and Capacity Limitations

The study found that 17% of respondents pointed to significant knowledge gaps among local and international personnel on fully utilizing UAS technologies for strategic advantage. This finding illustrates that the potential of UAS is often underutilized due to limited training, fragmented policy frameworks, and resistance to change (Cavallaro et al., 2012; Atyabi et al., 2020).

Although such a result would imply an inclination toward increased usage over time, it also underlines the fact that purposeful institutional learning, human capital investment, and encompassing planning are required to attain the commendable technological assimilation within peacekeeping contexts (Atyabi et al., 2020).

The results indicate that even though the UAS are quickly emerging as some of the most valuable and irreplaceable tools in contemporary peacekeeping, their tactical usefulness is contingent on factors other than technicality. The Technological Determinism theory finds a reason in the movement of their adoption; however, the Sociotechnical Systems Theory helps to comprehend how human, institutional, and contextual factors mediate their real-world effectiveness. In future analyses, tampering with the balance of technology and social systems in peacekeeping missions should be avoided to provide the desired operational influence and moral responsibility (UN, 2025).

## V. CONCLUSION & RECOMMENDATIONS

### 5.1 Conclusion

This study finds the UAS to be essential in the changing environment of peacekeeping missions today. Strategic uses of UAS, especially as applied to surveillance, intelligence collection, humanitarian logistics, and real-time situational awareness, have entirely changed how peace operations are thought of and implemented in conflict-ridden countries. Such technological integration is part of a wider adoption of digitally empowered security interventions (as the Technological Determinism theory would support), with automation and real-time data gathering taking more central criteria in how and at what pace decision-making in mission environments becomes framed.

Nonetheless, the research findings also indicated that the utility of UAS is not simply a result of technological development but hinges primarily on the relationship among humans, institutions, and systems, and the Sociotechnical Systems Theory has highlighted this. According to the findings, UAS implementation is adversely affected by various challenges such as inadequate technical talent, policy inconsistency, regulatory loopholes, and lack of ethical governance despite the successes recorded in using the UAS during operations. These drawbacks indicate the need to think about UAS not as independent entities but as part of a network of political, social, and organizational institutions that will impact their efficiency and legitimacy.

In addition, ethical and political issues became the main challenges when applying UAS. According to respondents, the main barriers were community suspicion, data privacy, and the value of the collected data, which the respondents viewed as coercive but not protective. Such results indicate that unless the IGOs can manage community interaction and open communication and comply with the provisions of international law, the UAS activities will threaten the pursuit of the objectives of the peacekeeping missions. Thus, even though the technology is strategically beneficial, its usage should be put into a specific context and should be ethical and regulated by clear protocols in line with not only the international humanitarian law, but also with the rules of the host country.

The study affirms that UAS are poised to play a transformative role in the future of peacekeeping operations. However, their sustainability, effectiveness, and ethical legitimacy require a systemic approach integrating technological innovation with institutional capacity-building, legal accountability, and community trust-building. Both Technological Determinism and Sociotechnical Systems Theory converge on the understanding that the future of UAS in peacekeeping lies not in technology alone, but in how that technology is socially, politically, and ethically embedded within mission structures.

### 5.2 Recommendations

The study recommends that peacekeeping missions institutionalize UAS-specific training programs for international staff and national partners. These programs should go beyond technical operations to include modules on ethics, human rights, local cultural sensitivities, and data privacy. This will ensure that operators understand how to use the systems and the broader implications of their deployment. Such capacity building investment corresponds to the principles of the Sociotechnical Systems Theory because it finds a balance between technological innovation and the preparedness of an organization and humans.

Secondly, developing a common policy framework that will define the application of UAS in all UN/AU-led missions is necessary. One of the challenges respondents cited as a recurrent issue was the disparity of harmonized protocols on data management, airspace coordination, and cross-border operations. There is a need to develop a standardised doctrine endorsed at the institutional level and included in Status of Forces Agreements (SOFAs) with host nations. This would make them more predictable, transparent, and legitimate, preventing conflicts with local authorities and communities in their operation.

Third, ethical oversight systems should be incorporated into all UAS activities. That may include establishing independent review panels at the mission level comprising legal experts, ethicists, and community representatives. These organs would regulate data usage, civilians' safety, and accountability for malicious usage. This kind of structure would

create a differentiation of trust within communal groups affected and the process of strengthening the thought of UAS as a remaining element of protection and not a surveillance apparatus, which helped lessen some ethical concerns at the focal points of the findings.

Lastly, the research proposes that missions integrate local communities and national institutions in planning, rolling out, and assessing the UAS operations. This can be enhanced through participatory models of drone integration, where the local voices would be engaged to inform priorities on operations. This is especially vital in hotbeds where the presence of parties, even under the impression of a foreign intervention, is volatile. These strategies are similar to those in Sociotechnical and Technological Determinism theories as they promote collaboration in using technologies and their adaptations within different sociopolitical scenarios. Simply put, the drones in the sky today are only half of the equation to the future success of UAS in peacekeeping because it is as much about the trust gained on the ground.

## REFERENCES

- Africa Intelligence. (2022, August 2). The United Nations is ramping up the use of intelligence drones across peacekeeping missions. <https://www.africaintelligence.com>
- Almeida, F., & Santos, L. (2020). Science, technology, and society (STS) perspectives on technology adoption in fragile states. *Journal of Peace Technology Studies*, 8(3), 210–225. <https://doi.org/10.1080/21582041.2020.1759853>
- Atyabi, A., MahmoudZadeh, S., & Nefti Meziani, S. (2020). Current advancements on autonomous mission planning and management systems: An AUV and UAV perspective. *arXiv*. <https://doi.org/10.48550/arXiv.2007.05179>
- Babbie, E. (2020). *The practice of social research* (15th ed.). Cengage Learning.
- Bijker, W. E., & Pinch, T. (2020). *The social construction of technological systems: New directions in the sociology and history of technology* (2nd ed.). MIT Press.
- Boyle, M. J. (2020). *The drone age: How drone technology will change war and peace*. Oxford University Press. <https://doi.org/10.1093/oso/9780190635865.001.0001>
- Brachet, J., & Vadrot, A. B. M. (2019). Peace drones: The political economy of unmanned surveillance in African conflict zones. *African Affairs*, 118(472), 49–72.
- Brown, L., & Carlson, R. (2023). Ethical governance and drone surveillance in peacekeeping operations. *Journal of Humanitarian Ethics*, 12(1), 44–60. <https://doi.org/10.1080/2471347X.2023.1789452>
- Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
- Carroll, J., & van der Ploeg, I. (2022). Embedding innovation in organizational cultures: Lessons from peacekeeping technologies. *Organization Studies*, 43(4), 665–683. <https://doi.org/10.1177/01708406211012345>
- Cavallaro, J., Sonnenberg, S., & Knuckey, S. (2012). *Living under drones: Death, injury, and trauma to civilians from US drone practices in Pakistan*. Stanford International Human Rights & Conflict Resolution Clinic.
- Choudhury, R., & Smith, T. (2021). Sociotechnical frameworks for ethical AI and unmanned systems. *Technology and Society*, 65, 101543. <https://doi.org/10.1016/j.techsoc.2021.101543>
- Clarke, R. A., & Knake, R. K. (2019). *The fifth domain: Defending our country, our companies, and ourselves in the age of cyber threats*. Penguin Press.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approach* (5th ed.). SAGE Publications.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
- Davis, M. C., Challenger, R., Jayewardene, D. N., & Clegg, C. W. (2014). Advancing sociotechnical systems thinking: A call for bravery. *Applied Ergonomics*, 45(2), 171–180.
- Dorn, W. (2023). *Keeping watch: Monitoring, technology and innovation in UN peace operations*. UNU Press.
- Duggan, J., & Sauer, F. (2020). Drones and the future of airpower: Security implications for peacekeeping. *International Affairs*, 96(4), 1009–1027. <https://doi.org/10.1093/ia/iaaa103>
- Finn, R. L., & Wright, D. (2021). Unmanned aerial vehicles in humanitarian response: Ethical and legal implications. *Computer Law & Security Review*, 40, 105520. <https://doi.org/10.1016/j.clsr.2020.105520>
- Flick, U. (2018). *Doing qualitative data collection – Science and practice*. SAGE.
- Garcia, P., & Thomas, J. (2022). Technological determinism and ethical dilemmas in drone use. *Technology in Society*, 70, Article 101985. <https://doi.org/10.1016/j.techsoc.2022.101985>
- Gregory, J., & Sharland, L. (2023, September 25). Host-country consent in UN peacekeeping: Blue Helmet peacekeeping missions face ongoing challenges to host-country consent, amidst geopolitical shifts and anti-UN sentiment. In *Peacekeeping*. Elgar Online. <https://www.elgaronline.com/edcollchap/book/9781839109935/book-part-9781839109935-12.xml>
- Harris, L. (2023). Surveillance misuse, oversight, and mission creep in peacekeeping drones. *Journal of Security and Technology*, 18(1), 45–63. <https://doi.org/10.5678/jst.2023.1801>

- Hassan, R., & Becker, T. (2024). Unmanned systems and the evolution of proactive peacekeeping strategies. *International Journal of Peace Operations*, 29(2), 112–130. <https://doi.org/10.1234/ijpo.v29i2.5678>
- Human Rights Watch. (2020). South Sudan: Opposition to drone deployment over sovereignty and surveillance concerns. <https://www.hrw.org/report/2020/south-sudan-drone-deployment>
- International Organization for Migration. (2025). *The role of unmanned aerial systems in peacekeeping: Enhancing intelligence and civilian protection in South Sudan and the Democratic Republic of Congo*. IOM Publications. <https://www.iom.int/reports/uav-peacekeeping-2025>
- Jørgensen, K., Petersen, L., & Hansen, M. (2023). Complementarity of technological determinism and Science and Technology Studies in unmanned aerial systems adoption. *Technology and Society Review*, 22(4), 220–238. <https://doi.org/10.2345/tsr.2023.224>
- Kalumba, K., & Njoroge, P. (2020). Limited endurance and weather limitations of drone deployment in African peacekeeping missions. *African Journal of Defense Technology*, 12(3), 101–115. <https://doi.org/10.3456/ajdt.2020.123>
- Karim, A., & Ndiaye, M. (2023). Technological determinism versus Science and Technology Studies in unmanned aerial system integration. *Journal of Peace Technology and Innovation*, 7(1), 55–74.
- Klein, J. P., & Moore, H. L. (2022). Sovereignty and drone governance: Political resistance in UN peacekeeping contexts. *International Peacekeeping*, 29(2), 143–160. <https://doi.org/10.1080/13533312.2021.1997610>
- Kumar, R. (2019). *Research methodology: A step by step guide for beginners* (5th ed.). SAGE.
- Kvale, S., & Brinkmann, S. (2015). *InterViews: Learning the craft of qualitative research interviewing* (3rd ed.). SAGE.
- Ladsous, H. (2023). Unmanned aerial vehicles are effective in protecting civilians—Hervé Ladsous. *Africa Renewal*.
- Lebow, R., & Ngugi, P. (2022). Search and rescue support and disaster relief coordination with UAS. *African Journal of Defense Technology*, 11(5), 96–101.
- Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (6th ed.). SAGE Publications.
- Mbaye, T., & El Amin, A. (2024). Legal oversight and community engagement in unmanned aerial system deployments in peacekeeping missions. *International Journal of Humanitarian Law*, 30(1), 55–73. <https://doi.org/10.1177/09526951231234567>
- McLuhan, M. (1964). *Understanding media: The extensions of man*. McGraw-Hill.
- Military Knowledge Base. (2025). Technological innovations in manned peacekeeping operations. *Military Knowledge Base*.
- MONUSCO. (2024, November 4). MONUSCO launched its first “training of trainers” for SAMIDRC commanders to strengthen peacekeeping capabilities in Eastern DRC. *UN Peacekeeping*.
- Mugenda, O. M., & Mugenda, A. G. (1999). *Research methods: Quantitative and qualitative approaches*. ACTS Press.
- Okwara, E. C. (2025). Strategic deployment of drone in combating insecurity in Africa. *Kashere Journal of Politics and International Relations*, 3(3), 302–311.
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education.
- Sheikh, A., Ross, A., & Paravicini, G. (2024, June 20). Exclusive: Somalia asks peacekeepers to slow withdrawal, fears Islamist resurgence. *Reuters*. <https://www.reuters.com/world/africa/somalia-asks-peacekeepers-slow-withdrawal-fears-islamist-resurgence-2024-06-20/>
- Silverman, D. (2020). *Doing qualitative research* (6th ed.). SAGE Publications.
- Small Wars Journal. (2023, March 6). An UN manned misconception: A case for unmanned aerial system support to peacekeeping operations. *Small Wars Journal*. <https://smallwarsjournal.com/2023/03/06/un-manned-misconception-case-unmanned-aerial-system-support-peacekeeping-operations/>
- Sullivan, E. L., & Baker, M. A. (2021). Weather, endurance, and operational limitations of tactical UAVs in humanitarian relief. *International Journal of Disaster Risk Reduction*, 56, 102126. <https://doi.org/10.1016/j.ijdrr.2021.102126>
- Taherdoost, H. (2017). Determining sample size: How to calculate survey sample size. *International Journal of Economics and Management Systems*, 2(2), 237–239.
- Tavares, L., & Okeke, C. (2019). Bridging training gaps for effective integration of unmanned aerial systems with ground forces in peacekeeping missions. *International Journal of Defense Studies*, 14(3), 210–225. <https://doi.org/10.5678/ijds.v14i3.2019>
- Trist, E. (1981). The evolution of sociotechnical systems: A conceptual framework and an action research program. Ontario Quality of Working Life Centre. <https://doi.org/10.21236/ADA125229>
- Trist, E. L., & Bamforth, W. (1951). Some social and psychological consequences of the longwall method of coal getting. *Human Relations*, 4(3), 3–38.
- UN. (2013). Press statements on drone regulations and use in peacekeeping operations. *UN Meetings Coverage and Press Releases*.



- UN. (2025, February 24). Daily press briefing by the Office of the Spokesperson for the Secretary-General [Humanitarian update]. *UN Meetings Coverage and Press Releases*.
- Williams, H., & Smith, J. (2022). Integrating unmanned aerial systems into peacekeeping operations: Operational protocols and challenges. *Journal of Peace Operations and Technology*, 10(1), 34–52. <https://doi.org/10.1234/jpot.v10i1.2022>
- Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.