

**Russia's Use of Autonomous Weapon Systems: An Analysis of Offensive
Military Policy in the 2022–2024 Russia-Ukraine War**

Glory Mewoh¹, Yanuar Rahmadan²

Universitas 17 Agustus 1945 Jakarta, Indonesia¹²

Correspondent: glorymewoh01@gmail.com¹

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ABSTRACT: The development of artificial intelligence (AI) technology has brought significant changes to the defense sector, particularly through the emergence of autonomous weapon systems. In this context, major countries are competing to harness the potential of AI to enhance their military capabilities, including Russia, which has shown significant progress in integrating AI into its defense policy especially amid rising geopolitical tensions. This study aims to analyze the main factors driving Russia to develop AI-based autonomous weapon systems as part of its military policy during the Russia-Ukraine conflict in the period 2022–2024. Using qualitative methods and a literature review approach, this research processes secondary data from various relevant official and academic sources, including defense reports, peer-reviewed journals, military analyses by experts, and interviews published by credible international media outlets. To better understand Russia's strategic direction, this study uses the Offense-Defense Balance (ODB) Theory, which explores how shifts in dominance between offensive and defensive capabilities affect the likelihood of conflict escalation. This theoretical framework helps explain how technological advances particularly in artificial intelligence (AI)-based weapon systems can alter the military balance and drive more aggressive strategies. Theoretically, this study contributes to the expansion of the application of ODB Theory in AI-driven warfare. Practically, it provides insights into Russia's military modernization efforts and their broader implications for global security, both in the short and long term, within an increasingly complex and unpredictable international landscape.

Keywords: Artificial Intelligence, Autonomous Weapons, Military Policy, Russia-Ukraine Conflict.



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INTRODUCTION

The ongoing conflict between Russia and Ukraine demonstrates the increasing integration of artificial intelligence (AI) technology in modern military operations, particularly through the use

of autonomous and semi-autonomous systems. Although autonomous weapon systems (AWS) have not yet been formally institutionalized in Russian military doctrine, both sides are gradually leveraging AI-based technologies to enhance combat effectiveness, accelerate decision-making, and strengthen tactical coordination on the ground. This development reflects a global trend toward algorithm-based warfare, where the autonomy of digital systems plays a strategic role in shaping the dynamics of armed conflict. This autonomous weapon system is designed to be strengthened through the integration of advanced artificial intelligence (AI), in order to increase capability and responsiveness in various operational conditions. In the context of military defense, the development of autonomous weapon systems continues with a focus on the application of increasingly complex AI technology as part of strategic innovation efforts in strengthening military technological superiority (Yuwono et al., 2022). Major countries such as the United States, China, and Russia are competing in the development of this technology as part of a military superiority strategy in the era of modern warfare.

The Russian-Ukrainian conflict that openly began in 2014 with the annexation of Crimea and the outbreak of war in the Donbas region is the culmination of a long history of arms use. In the early phases of the conflict, both Russia and Ukraine relied heavily on Soviet-era weaponry. Russia's invasion of Ukraine in February 2022 marked a significant escalation of the eight-year conflict since the annexation of Crimea in 2014 and an important turning point for security dynamics in Europe. Ukraine's growing ties with NATO before the 2022 invasion heightened Russia's security concerns, influencing its adoption of advanced military technologies including AWS. Although Ukraine is not yet a NATO member, the growing ties between Kiev and the Western alliance have raised deep concerns in Moscow. NATO's presence on Russia's borders is seen as a form of aggression aimed at weakening Russia's position on the international stage (Rinaldi et al., 2024). Russia's military policy is influenced not only by external factors such as geopolitical pressures and responses to NATO expansion but also by increasingly powerful domestic political dynamics. The Putin administration has actively utilized nationalist sentiments, historical identity, and anti-Western rhetoric to strengthen internal support among the population. One of the main strategies used was to construct a narrative of protection of ethnic Russians and Russian speakers in Ukraine, which served as a moral justification for military action. This rhetoric was also used to shape public perception, maintain domestic political stability, and strengthen the regime's legitimacy amidst a protracted war situation. However, the Russian invasion faced significant obstacles. Ukraine, supported by advanced Western weaponry such as Leopard-2 tanks and Bradley fighting vehicles, put up an effective resistance. With the experience of the Donbas conflict and tactical innovations such as the use of drones and precision artillery, Ukraine demonstrated adaptation to modern warfare, while Russia was seen as still stuck on conventional strategies that were less effective in the contemporary context (Azzahra et al., 2024).

Along with the many fluctuations in conflicts between countries that cause wars to occur until armed contact such as the Russian and Ukrainian wars (Khoirunnisa, Matthew, et al., 2025). the demand for military robots is expected to increase. Based on the latest study report data published by the Market Research Future agency, military robots will experience rapid growth in the period 2017 to 2023 (Anwar Choirul Muhammad et al., 2022). During the Russia-Ukraine conflict in the

period 2022-2024, the use of autonomous weapons such as kamikaze drones and unmanned combat systems took place in various strategic areas. Russia used Lancet drones extensively in the Donetsk and Bakhmut regions, especially in 2023, to attack Ukrainian artillery systems and military vehicles with precision without direct human involvement after launch.

On the other hand, Ukraine utilized Bayraktar TB2 drones in attacks on Russian positions in the Kherson and Zaporizhzhia regions from the beginning of 2022 and used autonomous sea drones to attack Russian ships around the port of Sevastopol in the Crimean region in mid-2023. In the same year, Ukraine also began launching long-range drone attacks on Russian border regions such as Belgorod, targeting logistics facilities and military control centers (Malyasov, 2022). This study aims to analyze the main factors that have prompted Russia to develop autonomous weapons systems based on artificial intelligence (AI) as part of its offensive military policy for the period 2022 to 2024. In addition, this study also aims to analyze whether Russia's policy on the use of autonomous weapons systems reflects an offensive or defensive strategy.

THEORETICAL FRAMEWORK

In the context of developing artificial intelligence (AI)-based autonomous weapon systems, the Offense-Defense Balance (ODB) theory can be used to understand the Russian military's offensive policy in the Russia-Ukraine War of 2022-2024. The ODB theory explained by Charles L. Glaser and Chaim Kaufmann focuses on the balance between offensive and defensive capabilities in an international military context. This theory states that when defense has the upper hand over offense, the likelihood of a major war can be minimized. Conversely, if offense is superior, then the risk of war increases (Glaser & Kaufmann, 1998). or in short, if offense dominates, the security dilemma will increase, followed by an arms race, and ultimately war is likely to occur. Therefore, war can be prevented if defense can outperform offense dominance (Alghifari & Olga Letticia, 2016).

In this context, Russia's use of autonomous weapons can be seen as an attempt to shift the balance towards an offensive advantage, where AI technology enables increased attack speed, accuracy, and effectiveness without direct reliance on human resources. This reflects the assumption that technological dominance can create strategic superiority, which makes offensive actions more advantageous than defensive ones. As such, this theory helps explain how military innovation through AI plays a role in shaping Russia's offensive policies and their perception of the potential for victory in modern armed conflicts, increased offensive capabilities through AI technologies have the potential to shift the balance of power towards offensive superiority, which in turn can increase the risk of conflict and trigger strategic instability. This forces international actors to rapidly adjust their defense policies and strategies to restore the balance and prevent unwanted escalation of tensions.

METHOD

This study employs a qualitative literature review to explore Russia's military offensive policy and the development of artificial intelligence (AI)-based autonomous weapon systems during the 2022–2024 Russia-Ukraine war. This method enables researchers to conduct an in-depth examination of the intricate interrelationships between the deployment of advanced military technologies particularly those involving AI-based autonomous weapon systems and the range of strategic doctrines and operational approaches employed by Russia throughout the conflict. Such analysis contributes to a more comprehensive understanding of the evolving nature of modern warfare, especially in terms of how technological innovation reshapes tactical decision-making, combat effectiveness, and the broader conduct of military engagements.

Data are sourced from news reports, articles, and academic journals, and analyzed descriptively and interpretatively to understand the motives, objectives, and impacts of Russia's AWS policies. With this approach, the research seeks to reveal how artificial intelligence is utilized as part of Russia's offensive military strategy in the context of modern warfare (Firmansyah et al., 2021).

RESULT AND DISCUSSION

A number of studies have discussed the dynamics of conflict and military strategy in the 2022 Russia-Ukraine war, including a study conducted by Rio Muhammad Rinaldi, Prof. Dr. Agus Subagyo, and I Wayan Aditya Harikesa (2024) in a journal entitled "Russian Military Strategy in the Invasion of Ukraine in 2018-2023". Where this research concludes that Russia's military strategy is strongly influenced by the threat of NATO expansion and its national interests in the Caspian Sea and Black Sea regions. In addition, Vladimir Putin's leadership became a central factor in decision-making to launch special military operations in Ukraine, which aimed to secure Russia's strategic influence from the possibility of Ukraine joining NATO. Meanwhile, research by Azzahra and Simanungkalit (2024) influenced offensive realism in Russia's security strategy. They emphasize that military modernization, including the development of AI-based weapon systems and drones, is part of a special military operations strategy that Russia claims is an effort to defend its national security from NATO expansion. This research strengthens the argument that increasing the defense budget and modernizing military technology are strategic moves by Russia to maintain dominance in the region.

And in a journal titled "Implications of Revolution in Military Affairs on the 2022 Russia-Ukraine War Related to the Geopolitical Interests of US Regional Security in Ukraine" by Hidayat and Bustomi (2024) highlights how advances in military technology, such as artificial intelligence (AI) and automation, have changed the strategy and dynamics of modern warfare. The research shows that Russia, in addition to the United States, is actively developing and testing autonomous weapon systems, including combat drones and unmanned vehicles, as part of its military modernization. The experience of operations in Syria prompted Russia to accelerate the adoption of innovative technologies, including AI, to improve the effectiveness of weapon systems and military

operations. In the Russia-Ukraine war, the use of technologies such as drones and AI accelerated the scale and intensity of the conflict, strengthened Russia's military offensive policy, and marked a shift to advanced technology-based warfare.

Meanwhile, in the context of the development of artificial intelligence (AI)-based autonomous weapon systems, several studies highlighted how Russia began to integrate AI technologies in their weapon systems to support offensive policies on the Ukrainian battlefield. The study by Dalsjö et al. (2022) entitled "A Brutal Examination: Russian Military Capability in Light of the Ukraine War" highlights that the conflict in Ukraine has accelerated the modernization of the Russian military, including in the adoption of advanced technologies such as combat drones and autonomous weapon systems. The study also found that the use of AI-based weapon systems not only increases the effectiveness of attacks, but also opens up new challenges related to ethics, control, and regional security stability.

These studies show that in addition to geopolitics and leadership, military technological innovation, including the development of AI-based autonomous weapon systems, became an important element in Russia's offensive strategy during the conflict with Ukraine in the 2022-2024 period. Based on these four studies, it can be concluded that the integration of AI in offensive weaponry became a key component of Russian military policy during the war. This innovation not only increased the effectiveness of Russian military operations, but also reflected the changing paradigm of modern warfare that increasingly relies on automation and artificial intelligence.

The novelty of the research entitled "Russia's Use of Autonomous Weapon Systems: An Analysis of Offensive Military Policy in the 2022–2024 Russia-Ukraine War" lies in the specific analysis of how Russia integrates artificial intelligence in autonomous weapon systems as part of its military offensive policy during the ongoing conflict. This research examines in depth the use of AI technology in autonomous weapons that have not been thoroughly reviewed in the context of the Russia-Ukraine war, as well as how it affects Russia's military strategy in facing technological and geopolitical challenges on the modern battlefield.

1. Conflict Context in the Russia-Ukraine War

Since the beginning of the invasion in February 2022, Russia has openly adopted an offensive policy as part of its geopolitical and military strategy in dealing with Ukraine (Pratiwi, 2023). On February 24, 2022, Russian President Vladimir Putin officially announced the launch of a "special military operation" into Ukraine under the main pretext of protecting the people of the Donbas region who he said had been subjected to intimidation and genocide by the Kiev regime over the past eight years. Putin stressed that the main goal of the operation is to "disarm Ukraine," carry out "denazification" and "demilitarization," and ensure that Ukraine no longer poses a threat to Russia's national security (Malyarenko et al., 2024). The statement also emphasized that Russia has no intention of occupying Ukrainian territory or replacing the ruling regime in Kiev. Previously, on February 2022, Russia officially recognized the independence of the Donetsk and Luhansk People's Republics, two separatist regions in eastern Ukraine that have been in armed conflict since 2014. Despite the pretext of protection, the Russian invasion since late February 2022 has been

offensive in nature, beginning with missile attacks on various cities and the rapid advance of ground troops to the outskirts of Kyiv (Badarin, 2025). The Russians captured eastern and southern regions, including Kherson, and surrounded Mariupol. However, they faced fierce Ukrainian resistance, exacerbated by logistical problems and low troop morale. With Western arms support Ukraine managed to hold off the offensive, and in October 2022, Russia withdrew from the northern regions after failing to take Kyiv (Szóke & Kusica, 2023).

Entering 2023, Ukraine is expected to continue its counteroffensive in the Luhansk region as well as plan the launch of new offensive operations in the south, particularly in the strategic regions of Zaporizhia and Kherson, as part of efforts to reclaim Russian-occupied territory. However, on November 1 2023, the Commander-in-Chief of the Armed Forces of Ukraine, General Valery Zaluzhnyi, delivered an important statement highlighting the challenges facing Ukrainian forces on the battlefield. He emphasized that in order to break out of the 21-month stagnation phase of the war with no significant progress, Ukraine needs to improve its military capabilities, including the mastery of technological innovations, modern weapon systems, and new strategies capable of adapting to evolving conflict conditions (Gleb Voloskyi, 2023). In 2024, the conflict between Ukraine and Russia underwent a significant escalation (Cristy & Khoirunnisa, 2024). with intensive fighting in various frontline sectors. The President of Ukraine, Volodymyr Zelenskiy, has consistently emphasized the urgency of accelerating arms deliveries from Western allies, especially the United States, to strengthen Ukraine's defenses and counter an increasingly aggressive Russian offensive.

In a joint press conference with NATO Secretary General Jens Stoltenberg in Kyiv in April 2024, Zelenskiy stated that Ukraine's ability to withstand Russian attacks depended heavily on the speed of ammunition and weapons deliveries from Western partners (Gray et al., 2024). In October 2024, heavy fighting continued in eastern Ukraine, particularly in the Donetsk region, where Russia attempted to seize strategic cities. Meanwhile, Ukraine launched a surprise attack on Russia's Kursk region, successfully occupying part of it and forcing the Russians to divert their troops and military equipment. Both sides suffered heavy losses in both personnel and military equipment. In the month of September 2024 in particular, Russia recorded an average of 1,271 casualties per day, making it the period with the highest number of casualties since the invasion began, as well as marking the deadliest escalation of the conflict for Russian forces (Tobin, 2024).

2. Russia's Deployment of AI-Based Autonomous Weapon Systems (AWS)

Within the framework of its military strategy, the Russian government not only relies on conventional forces but also officially affirms the importance of mastering and developing artificial intelligence (AI)--based autonomous weapon systems as an integral part of national defense modernization. Since Russia's invasion of Ukraine began in February 2022, the Moscow government has repeatedly emphasized that its military operations are legitimate measures to protect national interests and ward off external threats, especially from NATO expansion (Gautam, 2022). For Russia, this is not just a military operation, but part of a geopolitical strategy to maintain its historical influence in the former Soviet Union (Ty & Rey, 2023). As the intensity of the conflict and Western-backed Ukrainian resistance increased, on March 22, 2024, the

Kremlin officially declared that Russia was in a "state of war" in Ukraine, replacing the previous term "special military operation" used since the beginning of the invasion in February 2022 (Brusylovska & Maksymenko, 2023).

This statement was made by Kremlin spokesman Dmitry Peskov during a press conference highlighting the latest dynamics of the ongoing conflict between Russia and Ukraine. In his statement, Peskov emphasized that the involvement of Western countries, particularly the United States and NATO member states, which are actively providing various forms of support to Ukraine, According to him, this external interference has not only prolonged the duration of the fighting, but has also led to a major escalation that turned the initial situation into a war in the true sense of the word. Nonetheless, Peskov emphasized that from the point of view of Russian domestic law, the government has consistently classified the military actions launched since February 2022 as "special military operations" (Klaric, 2025). The Russian government officially employs the term "special military operation" to characterize its military intervention in Ukraine as a limited and goal-specific action. This linguistic framing serves not only to portray operational restraint but also to circumvent both domestic and international legal ramifications that would typically follow from a formal declaration of war (Mcdermott, 2022).

President Vladimir Putin has called Russia's military strength the strongest it has been since the Soviet era, a claim based on significant progress in the modernization of the armed forces, particularly thanks to the implementation of cutting-edge technologies including artificial intelligence-based autonomous weapon systems that are now one of the mainstays of Russia's defense and offensive strategies on the battlefield (Borchert et al., 2024). In a statement he delivered directly to top defense and industry officials, Putin asserted, *"I know very well, and many of you at our meeting today know it too: there are still not enough of these weapons. Not enough."* He acknowledged that while Russian military production has increased significantly in recent years there is still a shortage of some types of weapons, particularly combat and reconnaissance drones, which are urgently needed to maintain tactical superiority on the front lines of conflict, particularly in the context of a war in Ukraine that demands high-tech efficiency and speed (Reuters, 2025a).

Putin emphasized that the use of kamikaze drones, swarm drones, and AI-based automated artillery has become one of the key elements of Russia's offensive strategy, enabling precision strikes with minimal risk to troops. This policy is in line with Russia's principle of offensive realism, in which military power serves not only as a means of defense, but also as the main instrument for expanding and maximizing geopolitical influence in its strategic regions. Modernization of defense strategy today does not only focus on conventional forces, but also includes the adoption of cyber warfare (Khoirunnisa, Indrawati, et al., 2025). Strategic smart weapons and optimizing the use of fully integrated artificial intelligence (AI) are the main factors in building modern defense capabilities to face various forms of cross-sectoral security challenges, which emerge simultaneously from various domains such as military, cyber, economic, and information, amid an increasingly complex, dynamic, and geopolitical tension-laden global security environment (Azzahra et al., 2024).

Russian Defense Minister Andrei Belousov also emphasized the importance of using artificial intelligence-based technologies, particularly in the form of autonomous drones, as part of the transformation of Russia's military strategy on the modern battlefield. Belousov noted that Russia has been actively implementing AI-based drones in military operations in Ukraine and the border regions. He explained that "two units of drone detachments are already deployed in eastern Ukraine as well as in Russian regions such as Belgorod and Kursk," indicating that the technology has begun to be applied directly in real conflict zones. Furthermore, Belousov emphasized that the use of these drones has shown satisfactory results in supporting the combat effectiveness of troops on the ground. With confidence, he noted that "The guys are fighting, and fighting very successfully," signaling the success of the units in carrying out their missions (Reuters, 2025b).

The statement is in line with a speech delivered by Russian Defense Minister Andrei Belousov at the Army-2024 international military forum that took place in August 2024. In his speech, Belousov emphasized that the development of artificial intelligence (AI), robotic systems, and autonomous drones are key elements that will be decisive in winning armed confrontations against Western countries (Nadibaidze, 2022). He emphasized that technological superiority should be the foundation for the transformation of Russia's military strategy. On occasion, Belousov also explained the four main pillars of Russia's modern military strategy, namely: development of high-precision and technologically advanced weapons, intensive and continuous training of combat personnel, implementation of AI-based command and control systems to improve field coordination and development of new warfare tactics integrated with robotic technology and unmanned combat vehicles. According to Belousov, *"Only such a comprehensive approach is capable of providing a full advantage over the enemy in future conflicts that increasingly depend on technological dominance."* (Times, 2024).

This statement reflects the military's high confidence in the operational capabilities of AI drones in providing tactical advantages, both in attacking enemy targets and in reducing the risk of casualties on its own side. Not stopping at initial deployments, Belousov also revealed that the Russian Defense Ministry has concrete plans to significantly expand the scale of use of this technology. He announced that "five additional units will be established with the aim of making these operations possible continuously, day and night," indicating a strategic intention to make AI drone systems a permanent and integrated element in the structure of Russian military operations. This statement underscores the importance of autonomous technology adoption not only as tactical support but as a key component in strengthening the Russian military's combat power and endurance in long-term conflicts (Reuters, 2024).

3. Analysis Through the Offense-Defense Balance (ODB) Framework

In the Russia-Ukraine conflict of 2022–2024, Russia intensively utilized artificial intelligence-based autonomous weapons, such as the ZALA Lancet kamikaze drone and the Marker combat robot, which are capable of autonomously executing strike operations with a high degree of precision and speed. The use of these weapons significantly enhances Russia's offensive capabilities by reducing direct risks to military personnel and strengthening strike effectiveness across multiple battlefields. However, several technical limitations have emerged, particularly with older systems like the Uran-

9 unmanned ground combat vehicle. Despite being engineered for autonomous engagement, the Uran-9 exhibited significant operational flaws in mobility, communication stability, and targeting consistency, thereby diminishing its reliability in combat environments (Bendett, 2019). In field reports, the system frequently failed to lock targets while on the move and often required manual override, which undermines its classification as a truly autonomous weapon (Keller et al., 2018).

This development illustrates a fundamental tenet of the Offense–Defense Balance (ODB) theory: that technological superiority in offensive capabilities does not necessarily ensure strategic success when confronted by a well-adapted and flexible defense. As Glaser and Kaufmann (1998) argue, when defensive measures evolve effectively in response to offensive innovations, the balance of power can shift away from the aggressor. In the case of the Russia–Ukraine war, although Russia invested heavily in autonomous systems to gain a rapid offensive edge, Ukraine's ability to adapt its defense posture through decentralized command structures, multi-layered air defenses, and real-time intelligence sharing with NATO allies—demonstrates how adaptive defense strategies can neutralize technological advantages. This confirms the ODB assumption that the dominance of offensive capabilities may be undermined by resilient and responsive defense mechanisms in dynamic conflict environments.

In contrast to Russian offensive modernization, Ukraine maintained strong defensive resilience. Despite heavy attacks, Ukrainian forces managed to secure strategic urban centers such as Kyiv and Kharkiv, while slowing the pace of Russian advances in the eastern Donbas region. Although platforms like the ZALA Lancet reportedly achieved over 285 successful strikes, their battlefield impact remained localized due to constraints in visual targeting, payload limitations, and lack of strategic scalability (armyrecognition, 2025).

Throughout the conflict, Ukraine's ability to flexibly adapt and reorganize its air defense network has proven to be a crucial factor in countering the massive waves of unmanned aerial vehicle (UAV) attacks launched by Russia. Ukraine has not relied solely on static defense systems but has actively adapted its layered defense structure to remain effective amid changing enemy attack patterns. This resilience is further strengthened by intelligence support from NATO and the implementation of a decentralized command system, which collectively succeed in reducing Russia's technological advantage on the battlefield (Gjerstad & Di, 2025). Despite Russia increasing the intensity of its drone attacks toward the end of 2024, the effectiveness of its strategy began to decline. Ukraine successfully increased its interception rate against these attacks, making the operational costs of UAV-based offensives far higher than the impact they produced. When attacks no longer yielded maximum results, the technological advantage that Russia had long relied on began to lose its leverage. This demonstrates that high-tech offensive capabilities cannot stand alone without considering adaptive and coordinated defensive responses.

This series of developments reinforces the main assumptions in the Offense–Defense Balance (ODB) theory, which emphasizes the importance of balance between offensive and defensive capabilities in the dynamics of armed conflict. Technological dominance and automatic power projection, as pursued by Russia, do not guarantee success when faced with defense systems that

are capable of evolving in response to the situation. In this context, Ukraine demonstrates that flexible defense, supported by good coordination and international collaboration, can neutralize and even reverse the offensive advantage of the enemy.

4. Implications for Modern Warfare

The integration of artificial intelligence (AI) and autonomous weapon systems (AWS) into military operations has significantly reshaped the contemporary character of armed conflict. These technologies enable faster decision-making processes, improved strike precision, and reduced operational risks, particularly in high-intensity engagements. In the case of Russia, the adoption of AI-powered drones and robotic systems reflects a broader shift toward automated warfare aimed at reducing the need for traditional manpower while maximizing lethality and responsiveness across various combat environments. Nonetheless, the rapid proliferation of autonomous systems has not eliminated core strategic challenges. Many AWS platforms rely on opaque algorithmic models, limiting transparency and complicating battlefield accountability. These so-called “black box” systems generate outputs that are difficult to interpret or justify, especially in fast-moving combat scenarios.

As a result, concerns have been raised regarding the ability of such technologies to comply with international humanitarian principles, particularly those of proportionality, distinction, and precaution in attack (Galetta, 2024). Furthermore, the availability of autonomous weapons has contributed to a recalibration of the political and psychological thresholds for initiating conflict. By reducing the visibility of casualties and minimizing human presence on the front lines, these systems potentially make aggressive strategies more palatable for political actors. Empirical studies have shown that Russia's expanded use of loitering munitions, swarm drones, and AI-coordinated artillery operations between late 2023 and early 2025 reflects an increasingly assertive posture built on technological momentum (Simmons-Edler et al., 2024).

Despite these developments, the Ukraine case illustrates that technological dominance alone does not determine conflict outcomes. Ukraine's integration of multi-layered air defense, Western surveillance assets, and decentralized military command structures enabled it to intercept and adapt to Russia's AWS campaigns with considerable effectiveness. Reports highlight how Ukrainian units absorbed and repelled successive waves of drone attacks, preserving critical infrastructure and territorial integrity despite the scale of automation deployed by Russian forces. These dynamics point to an essential reality of modern warfare: while AI and autonomous systems represent a qualitative leap in tactical capability, they are not a substitute for coherent strategy, resilient defense architectures, and human judgment in complex operational theaters.

Table 1.Types of AWS, Functions, Effectiveness, and Challenges

No	Autonomous Weapon System	Primary Function	Observed Effectiveness	Technical and Operational Challenges
1	ZALA Lancet	Loitering munition for precision strikes on fixed targets.	High: Over 285 verified strikes with ~77.7% target accuracy in 2024–2025 (armyrecognition, 2025)	Line-of-sight target acquisition, limited warhead payload, and constrained range reduce its strategic versatility
2	Marker Robot	AI-driven robotic platform with autonomous targeting modules	Moderate (in testing): High promise in tactical simulations and future integration. (Kechagias-Stamatis & Aouf, 2021)	Experimental phase; lacks real combat validation and suffers from sensor calibration and endurance limitations
3	Uran-9	Unmanned Ground Combat Vehicle (UGCV) with onboard weapons.	Low: Documented failures in Syria and limited battlefield deployment in Ukraine. (Bendett et al., 2021)	Unstable remote control system, poor sensor reliability, and frequent need for operator intervention undermine autonomy.

5. Critical Analysis

While Russia's adoption of autonomous weapon systems (AWS) reflects a strategic effort to dominate the offensive dimension of modern conflict, the practical implementation of these technologies has yielded mixed results. Platforms such as the ZALA Lancet and Uran-9 were designed to increase strike accuracy, reduce soldier exposure, and enable high-speed engagements across multiple fronts. In theory, such capabilities align with the concept of force multiplication through automation. However, the battlefield realities of the Russia–Ukraine war have demonstrated that these systems are still subject to significant technical and operational limitations that reduce their strategic impact.

The Uran-9 unmanned combat vehicle encountered recurring issues with mobility, sensor alignment, and target identification. Although designed as a semi-autonomous platform, its reliance on remote operation and manual control during combat limited its effectiveness as a

dependable offensive asset. Similarly, while the ZALA Lancet achieved tactical success in striking Ukrainian artillery and logistics, it failed to influence the broader course of operations due to its dependence on visual targeting, limited range, and small payload capacity.

These technical constraints were further challenged by Ukraine's agile defense, which utilized layered air defense, flexible command structures, and NATO-assisted surveillance. This enabled Ukrainian forces to disrupt Russian drone missions and intercept a large share of AWS-based attacks. The capacity to respond adaptively, despite technological disadvantage, underscores the enduring importance of human-led coordination and strategic flexibility in countering automated systems.

From a theoretical standpoint, this empirical case supports the fundamental premise of the Offense–Defense Balance (ODB) framework. The ODB posits that when defensive technologies and strategies are strong, they can offset even superior offensive tools, leading to stalemates or attritional conflicts rather than decisive breakthroughs. In Ukraine, the balance tilted toward defense not through numerical or technological parity, but through adaptability, interoperability with allied intelligence systems, and the strategic use of terrain and mobility to nullify Russia's technological advantage. Furthermore, the Russian experience with AWS underscores a broader lesson for future military doctrines: the presence of advanced weapon systems must be matched by integration across logistical, ethical, legal, and tactical dimensions. Without cohesive system architecture and doctrinal coherence, even state-of-the-art platforms risk becoming liabilities rather than assets. As such, while AI-driven warfare holds transformative potential, it does not operate in a vacuum its effectiveness remains contingent on human oversight, operational reliability, and the adversary's capacity to adapt.

CONCLUSION

This research concludes that Russia's development of artificial intelligence (AI)-based autonomous weapon systems during the Russia-Ukraine conflict period of 2022-2024 is part of a clearly offensive military strategy. Through the Offense-Defense Balance (ODB) theory approach, it can be understood that Russia actively encourages the dominance of military technology to create offensive advantages on the battlefield. The use of various types of Autonomous Weapon Systems (AWS) allows Russia to increase efficiency, speed, and precision in launching attacks while reducing direct risks to military personnel. This policy is in line with the principle of offensive realism, in which military power is used as the main tool for expanding geopolitical influence, rather than simply maintaining existing conditions. The Russian government explicitly places AI technology and autonomous weapon systems as an important part of its military modernization, both to counter external pressures such as NATO expansion and to strengthen its strategic influence in the region.

However, while this technology provides significant advantages on the battlefield, there are still a number of technical constraints and operational challenges that hinder the optimization of its functionality. These obstacles include aspects of system stability, communication reliability, and effectiveness in dynamic and unpredictable combat conditions. This condition shows that offensive dominance through technological sophistication does not necessarily guarantee absolute success, especially in the face of adaptive and internationally supported opponents. Overall, the utilization of autonomous weapons in this conflict marks an important shift in the paradigm of modern warfare, where technological innovation plays a central role in the direction of military policy. These findings contribute to understanding the link between military technology and global conflict and emphasize the theoretical relevance of the ODB framework, while highlighting the need for international regulations governing AI-based weapons.

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