The Emerging Role of Drones in Shaping Present and Future Conflicts

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INTRODUCTION

Since the dawn of aviation, scientists and researchers have pondered over the possibility of unmanned flight. Even in the early stages of manned flight, military experts saw the huge potential that unmanned platforms could have in future operations, thus giving birth to this concept. Since then, drone technology has evolved rapidly, emerging as a key player in recent conflicts worldwide. Drones are being employed by governments, rebel groups, terrorists, criminals, and non-state actors in conventional as well as non-conventional battle theatres. Recently, videos shared from cheap and commercially available off-the-shelf weaponised First-Person View (FPV) drones in Ukraine have been taking the social media by storm, displaying their efficacy and out-of-the-box tactics in destroying Russian armoured vehicles, highlighting the rapidly changing war dynamics. Without a doubt, the integration of new technology in the conduct of wars triggers multi-domain

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developments encompassing not just the military but also the economic, political, legal, societal, philosophical, and ethical domains.

Many experts believe that drones will transform the conduct of war, representing a paradigm shift from traditional war-fighting tactics and marking a pivotal change in military history. Their induction in contemporary war-fighting has been assessed to be as transformational as that of aircraft, submarines, and tanks. This will bring about changes not only in the structure of war but also in the doctrines and strategies.[1] Thus, the influential role of drones in modern warfare today extends beyond the battlefield with significant implications even for geopolitics.[2]

CHALLENGES OF DRONE WARFARE

The employment of drones in contemporary conflicts presents a complex and wide array of challenges that traditional military forces must grapple with. These challenges are not merely limited to the technological domain but extend to strategic, ethical, and operational considerations. Most importantly, the asymmetric nature of drone warfare challenges the conventional superiority of nation-states and powerful militaries. Small and middle powers can now acquire and deploy drone technology, making the modern battlefield a level playing field even against the most seasoned and powerful militaries.

TACTICAL CHALLENGES

Air power, characterised by the ability to deliver effects from the medium of the air, is now accessible to all, and at lower price

1. Dominika Kunertova, "The War in Ukraine Shows the Game-Changing Effect of Drones Depends on the Gamem", *The Bulletin of the Atomic Scientists*, 79(2), 2023, pp. 95–102.
2. Antonio Calcara, Andrea Gilli, Mauro Gilli, Raffaele Marchetti, and Ivan Zaccagnini, "Why Drones Have Not Revolutionized War," *International Security*, 71(2), 2022, pp. 130–171.

points. Both state and non-state entities are capitalising on this opportunity, leading to the "democratisation of air power" that is most notable in recent conflicts. Both active and passive measures necessitate a thorough scrutiny to assess their continued efficacy in the face of evolving aerial threats. Over a period of time, strong air forces worldwide have deemphasised Short-Range Air Defence Systems (SHORADS) based on the understanding that existing air superiority assets like modern fighters and Long to Medium-Range Air Defence Systems (LOMADS) are adequate to maintain control of the air. Consequently, the ground forces are reliant on outdated anti-aircraft guns and missile interception systems which are neither operationally efficient nor cost-effective in countering drones.

On the other hand, employing expensive theatre-level air defence assets such as the Patriot missile system against small tactical drones is highly unsustainable, operationally and financially. Supposing that only Patriots and Stingers, which cost US$ 3 million and US$ 38,000 respectively, are used as the primary defence against drones, then adversaries may employ tactics to deplete theatre-level air defence capacity worth millions of dollars. This low-cost, high-impact move could make way for a subsequent conventional air attack, making the entire area of operations vulnerable.

DOCTRINAL CHALLENGES

The historical reliance of the ground forces on air superiority has led to a concerning level of complacency. Many joint tabletop exercises have operated under the dangerous assumption of uncontested air control, neglecting considerations for securing and maintaining air dominance against a proficient adversary, especially operating drones. The emergence of cost-effective and highly capable drones has disrupted this complacency, forcing the Western armed forces to relook and critically reevaluate their existing doctrines. The

traditional concept of air superiority, centred on gaining and maintaining control over a defined airspace, while denying the same to the adversary, primarily focusses on high-altitude air and missile threats. The primary players in this domain are state-of-the-art shooters such as the Patriot Air Defence (AD) system, manned fighter Combat Air Patrols (CAPs), and sophisticated Command-and-Control (C2) networks, whether land-based or airborne. However, the present doctrinal approaches do not address the challenges posed by drones and loitering munitions at much lower altitudes, straddling the boundary between land and air forces, and presenting detection, targeting and engagement difficulties.[3]

SCALE VS SOPHISTICATION

Before Putin's aggression against Ukraine, the Houthi rebels used drones to attack the Aramco oil fields in Saudi Arabia in 2019. These attacks demonstrated that even low-cost low-tech drones can cause significant damage to infrastructure and human life deep inside enemy territory. It was also noted that low-cost drones are difficult to counter with expensive AD systems like Patriot batteries. This stark mismatch illustrates the asymmetry in modern armed conflicts. Similarly, in a scenario where there is no control over the airspace during active conflict, the effectiveness of drone warfare lies less in technological sophistication and more in the ability to deploy them in large numbers. This aspect becomes relevant as armed conflicts turn into wars of attrition, with adversaries seeking to maximise damage, while minimising costs.[4]

3. J Postma, "Drones over Nagorno-Karabakh," *Atlantisch Perspectief*, 45.2:, 2021, pp. 15-20.
4. D Kunertova. "Drones Have Boots: Learning from Russia's War in Ukraine." *Contemporary Security Policy*, 44(4), 2023, pp. 576–591.

CHALLENGES IN THE AIR DOMAIN

The ongoing conflict between Russia and Ukraine has highlighted the evolving challenges in establishing air superiority with existing state-of-the-art assets in the context of drone technology. Despite Russia's efforts to achieve air dominance in the skies, the emergence of drones has added many complexities to the traditional and existing air superiority concepts. Flying multiple high-altitude air superiority missions does not pose any threat to low-altitude drones. Moreover, an air superiority fighter is incapable of targeting a commercial quadcopter.[5] Importantly, the proliferation of inexpensive drones equipped with lightweight explosives has expanded the number of entities fighting for control of the skies. As a result, the modern battlefields not only encompass the surrounding troops; but also the airspace above them, creating aerial minefields.

The large-scale deployment of armed drones may render traditional Close Air Support (CAS) and Ground Attack (GA) aircraft even more obsolete in conflicts featuring more dense and more sophisticated AD systems in future conflicts.[6]

THE DEEPER STRATEGIC RATIONALE – SO WHAT?

The Rise of Asymmetric Warfare

Asymmetric warfare refers to conflicts between states with significantly different military powers, strategies or tactics. It also involves belligerents with uneven resources, leading them to exploit each other's relative weaknesses. Such wars often encompass unconventional warfare, with the weaker side employing new strategies to compensate for deficiencies in its military forces and equipment. Drones, with their advantages

5. Zachary Kallenborn, "Seven (Initial) Drone Warfare Lessons from Ukraine," Modern War Institute at West Point, le 5, 2022.
6. Kunertova, n. 1, pp. 95–102.

of low cost, easy availability and scalability provide such states with effective options to exercise their will and control, targeting stronger militaries, and yielding disproportionate results. A pertinent example of this is the ongoing scenario in the Red Sea, where Houthi rebels have effectively enforced sea denial operations with cheap yet precise drone strikes on military and civil vessels to disrupt Israeli supplies in the continuing conflict in Gaza, putting the formidable US Navy at bay.[7] The strategic importance of drones and their implications in asymmetric warfare can be best understood by the Toft hypothesis. According to Ivan Arreguín-Toft, in the strategic interaction of opposing actors in asymmetric conflicts, all war strategies can be categorised into direct and indirect strategies. Direct strategies involve military forces targeting the opponent's physical and infrastructural capability to wage war, while indirect strategies aim to undermine the enemy's will to fight.[8] Drones, in mass, form a greater part of the indirect strategies in modern warfare.[9]

The hypothesis revealed that in conflicts where both sides employed the same approach, that is, direct-direct or indirect-indirect, the stronger actor emerged victorious in 76.8 per cent of the conflicts. However, in the remaining conflicts, where opposing sides used different approaches, the weaker actor prevailed in 63.6 per cent of the conflicts.[10] This hypothesis provides a clear rationale for the increasing prevalence and success of smaller states deploying drones via asymmetric means against stronger actors, as evidenced by the actions of the Houthi rebels in the Red Sea.

7. R. Aqid, S. Tang and T. Darr, "Houthi Rebel Attacks in the Red Sea," Institute for Youth in Policy, 2024.
8. Ivan Arreguín-Toft, "How the Weak Win Wars," *International Security*, 2001
9. Morgan Guthrie Norman, "Drones And Killing: Ethics of War And Radical Asymmetry." Master in International Studies, College of International Studies, 2022.
10. Arreguín-Toft, n. 8.

THE RETURN OF ATTRITION WARFARE

The swift and definitive victory of the US-led coalition in the 1991 Gulf War showcased a developing concept known as Effects-Based Operations (EBOs).[11] The primary aim of an effects-based approach is to utilise forces that incapacitate the enemy forces and reduce their capacity to engage friendly forces in direct combat. Instead of prioritising casualties and physical destruction to wear down the enemy forces, EBOs emphasise end-state objectives and the means to achieve the same. While many military doctrines prioritise functional paralysis over physical destruction, the recent conflicts suggest a shift back towards attrition warfare.[12] Ongoing conflicts such as the war between Russia and Ukraine, as well as the Israeli action in Gaza, reflect this trend. Due to its costly nature, attrition warfare requires means that are inexpensive and easily replaceable. Consequently, drones have experienced a significant surge in contemporary conflicts due to their sustainability in this changing nature of war.

THE PSYCHOLOGICAL DIMENSION

The ability of drones to disseminate live footage from conflict zones makes them the ideal instrument for psychological warfare. By selectively projecting truth and facts, drones are employed to influence or persuade target audiences, often evoking an emotional rather than a rational response. The strategic use of drones for propaganda and information warfare is quickly gaining momentum in conflicts. In the context of the ongoing conflict between Russia and Ukraine, both countries have employed drones to capture and disseminate footage of military confrontations. Perhaps, the most striking illustration of the profound psychological impact was

11. C.M. Kyle, "RMA to ONA: The Saga of an Effects-Based Operation: A Monograph," Defence Technical Information Center, Fort Belvoir, *VA*, 2008.
12 F. S. Gady and M. Kofman, *Ukraine's Strategy of Attrition, Survival* (Taylor & Francis, 2023), 65(2), pp. 7–22.

displayed when Hezbollah released drone footage on June 18, 2024, depicting surveillance of Israel's Haifa city. The footage spanning over nine minutes revealed highly sensitive and strategic Israeli targets and served as a message to Israel regarding Hezbollah's substantial knowledge of Israeli targets.[13] The repercussions of this footage were substantial, leading to a warning of an all-out war from the Israeli foreign minister, highlighting the deep psychological influence wielded by drones. Not only did the footage shake up the Israeli sense of security, superiority and safety but also brought embarrassment to the unchallenged and sophisticated Israeli air defence. The use of inexpensive drones to target high-value assets of more powerful states at war can provoke a public sense of embarrassment in front of the world media, thus, challenging their notion of superiority. For example, when the Russian guided-missile cruiser, the *Moskva*, the flagship of its Black Sea Fleet, was targeted and sunk using drones, and a Russian Su-57 stealth fighter was allegedly targeted by drones, it highlighted the failure of the Russian defence capabilities and brought embarrassment in front of the international media.[14] Similarly, the targeting of the US Navy's aircraft carrier, the USS *Eisenhower* by the Houthi drones in the Red Sea forced the Carrier Battle Group (CBG) to retreat.

While the Yemeni Army spokesperson Brigadier Yahya Saree made claims of hitting the US Navy's aircraft carrier, the Western media dismissed them as disinformation.[15] Regardless of whether the drones were able to hit it or not, what is certain is that they led to the withdrawal of the carrier from the Red Sea. These examples

13 M. Gebeily, C. Tanios, and J. Choukier, "Lebanon's Hezbollah Publishes Drone Footage Claiming to Show Surveillance of Israel's Haifa", Reuters, June 18, 2024.

14 Thomas J. Kutz, "Lethal Unmanned Aircraft Systems: Democratizing Air Power," Naval War College, 2022.

15. J. LaPorta, and E. Delzer, "Disinformation Campaign Uses Fake Footage to Claim Attack on USS *Eisenhower*", CBS News, June 5, 2024.

underscore how drones can have a significant impact on the psychological morale of the enemy, outweighing their physical and kinetic effects.

LESSONS AND WAY FORWARD

While the nature of warfare has undergone significant transformation due to technological advancements, the enduring fundamental principles that govern the outcomes of war remain unchanged. The integration of drones into modern warfare highlights and reaffirms the timeless nature of these principles of war. The use of cost-effective drones in wars underscores the significance of mass and concentration of force. Although contemporary doctrines emphasise systematic targeting and strategic paralysis over the traditional massing of forces, the use of brute force and mass remains pivotal in deterring, disrupting and potentially yielding decisive outcomes. Additionally, the application of mass forms an integral part of attrition warfare. As militaries gear up for high-intensity conflict scenarios, drones offer the most effective solution for reversing the trend towards the combat fleet lacking organic strength. A belligerent that perceives itself to be at a distinct disadvantage may deliberately resort to attrition warfare and overstretch a conflict to nullify the adversary's advantage over time. Notably, attrition warfare is inherently resource-intensive, and, hence, the use of drones in conflicts seeks to employ the principles of mass and economy, particularly in long-drawn conflicts that strain the resources of a nation. Recent global conflicts have highlighted the necessity for the demonstration of flexibility and adaptation to the dynamic nature of warfare, lest they risk operational failure. A pertinent lesson from the Russo-Ukrainian War lies in the paramount importance of rapid technological adaption.[16] The adeptness of the

16. M.R. DeVore, "No End of a Lesson: Observations from the First High-Intensity Drone War", *Defense and Security Analysis*, 2023, 39(2), pp. 263–266.

Ukrainian forces at adaptive warfare is evident in their innovative responses to these dynamic changes.

The use of 3D-printed devices to enhance the effectiveness of commercial drones and the modification of longer-range Cold-War-era Tu-141 drones to carry out strategic strikes on Russian oil pumping facilities and airfields highlight their aptitude for adaptation in the face of a formidable Russian offensive. Additionally, in the Toft hypothesis cited earlier, it was observed that in 78 per cent of asymmetric conflicts, the losing side did not switch strategies to adapt to the changing nature of warfare. This indicated that actors with force structures, doctrines, and technologies tailored for "symmetric" conflicts and situations where both sides employ the same approach, struggle to adapt their strategies. This lack of strategic flexibility is a key factor contributing to the trend of powerful actors losing to weaker ones in asymmetric wars.[17] The inherent mismatch between the evolving nature of threats and the ability of actors to change their strategies swiftly is a crucial consideration for future conflict planning.

The increasing availability of affordable yet highly capable drones has blurred traditional boundaries and posed challenges to existing doctrines and concepts, as evidenced in recent conflicts. These conflicts have compelled Western armed forces to critically review their battle-proven doctrines. It is highly probable that in future military confrontations, superior military forces may no longer always maintain absolute control of the skies and will face various threats from drone-armed adversaries. Preparation for this scenario necessitates a thorough reassessment of existing operational doctrines and procedures. This is required as existing concepts of air power, air defence, and air superiority may not be relevant given the current technological and operational

17. Navneet Bhushan, "Wars: A Need for Rapid Strategic Switching: Winning the Asymmetric Wars", *Indian Defence Review*, 2016.

advancements.[18] Moreover, because of the gradual transition from manned to unmanned elements and the increasing involvement of Manned-Unmanned Teaming (MUM-T) missions which comprise a combination of manned and unmanned platforms, there is a necessity to implement modifications to the operational philosophies of integrated force deployment within the context of multi-domain warfare.[19]

Lastly, despite the hype and the significance of the role and impact of drones in contemporary conflicts, drones alone do not comprise the future of war.[20] While they may introduce new dynamics in certain situations, they do not singularly determine the outcome of conflicts.[21] The overall potential of the land and other armed forces remains the primary factor in determining victory, and drones add to the existing potential as force multipliers.[22] Adequate control of the air is essential for the effective employment of drones in contested airspaces, and without it, their capabilities are limited. Additionally, a robust AD network is crucial for protecting the ground forces against drone threats. Similarly, Electronic Warfare (EW) and signal jamming are also effective in neutralising drone capabilities, diminishing their combat effectiveness. The employment of drones in combat operations should be a part of the broader concept of the use of air power, and largely, an element of the defence ecosystem. This approach would ensure that drones contribute to synergistic effects in combat operations.

18. Postma, n. 3, pp. 15-20.
19. A. S. Bahal., "UAVs and Air Power Role of UAVs in Future Warfare", *Journal of Defence Studies,* 17(4), 2023, pp. 104–132.
20. A. Calcara, I. Zaccagnini, M. Gilli and A. Gilli, "Military Drones, Air Defence, and the Hider-Finder Competition in Air Warfare", *Defense and Security Analysis*, 2023, 39(2), pp. 260–262.
21. T. Zieliński, "Drones in Military Conflicts: Are Unmanned Aircraft Systems the Future of Wars?" *presentado en Challenges to National Defence in Contemporary Geopolitical Situation (CNDCGS' 2022), Vilnius, Lithuania (2022).*
22. Postma, n. 3, pp. 15-20.

CONCLUSION

The emerging role of drones in shaping present and future conflicts is profound, marking a significant shift in the nature of warfare. Their adaptability and cost-effectiveness have rendered them indispensable tools for both state and non-state actors, thereby altering the strategic balance of military affairs. Drones have demonstrated their capacity to exert disproportionate power and influence in recent conflicts, further exacerbating the concept of asymmetry. Their increasing ubiquity and evolution force a re-evaluation of existing military doctrines, concepts and strategies. As drones continue to evolve and become more lethal, they will undoubtedly remain a central element in strategic considerations of both smaller and powerful actors, consequently reshaping the global security dynamics.