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THE EMERGING ROLE OF DRONES IN SHAPING PRESENT AND FUTURE CONFLICTS

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ABSTRACT

The advent of drone warfare has unravelled a new era in contemporary conflicts, essentially altering the dynamics of global security. Notable drone attacks on primary strategic targets worldwide have accentuated their profound implications and geostrategic impact on the world economy, global supply chain, and volatile geopolitics. As nations strive to bolster their economic and power standing amid rising international competition, defence budgets worldwide have visibly declined. To balance the complex interplay between defence, security, and development, affordable drones have emerged as the ideal weapons in these volatile and uncertain times. Their novel characteristics and advantages make drones pivotal tools for asymmetric warfare, introducing a new layer of complexity to military affairs. Epitomising the principle of mass, suicide drones have reinstated the era of attritional warfare, reminiscent of Sun Tzu's strategy of bleeding the enemy through a thousand cuts, aiming to exploit the economic and psychological strains on adversaries, forcing them into protracted conflicts. Recent conflicts, such as those in Nagorno-Karabakh and Ukraine, starkly illustrate this metamorphosis and the predominant character played by drones in modern warfare. Their extensive integration into conflicts has essentially transformed warfare and challenged battle-hardened doctrines, especially as conflicts become more hybrid and grey. Understanding the deeper underlying rationale behind their rise, the challenges, and the future of drone warfare is vital for comprehending their evolving role in modern warfare.

1.0 INTRODUCTION

Since the dawn of aviation, scientists and researchers have long pondered the possibility of unmanned flight. Even in the early stages of manned flight, military experts recognised the vast potential that unmanned platforms could have in future operations, thus giving rise to this concept. Since then, drone technology has undergone rapid evolution, 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 (Daifullah Al-Garni, 2022). Drones proved to be revolutionary during the 2020 Nagorno-Karabakh Conflict and brought significant success to the Azeri Armed Forces (Antonio Calcara et al., 2022). More recently, videos shared from cheap and commercially available off-the-shelf weaponised FPV (First-Person View) drones in Ukraine have been taking 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 developments that encompass not only the military but also economic, political, legal, societal, philosophical, and ethical domains. Many experts believe that drones would transform the conduct of war, representing a paradigm shift from traditional warfighting tactics and marking a pivotal change in military history. Their induction into contemporary warfighting has been assessed as transformational, comparable to that of aircraft, submarines, and tanks. This would bring about changes not only in the structure of war but also in the doctrines and strategies

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(Kunertova, 2023). Thus, the influential role of drones in modern warfare today extends beyond the battlefield with significant implications even for geopolitics (Antonio Calcara et al., 2022).

2.0 DRONES IN CONTEMPORARY CONFLICTS

The increasing utilisation of drones in contemporary conflicts can be attributed to various underlying factors beyond surface-level explanations. This article further analyses the rise of drones under technological, tactical, financial and intangible factors.

2.1 Technological factors

Apart from being readily available, simple to use and highly lethal, drones are proving to be very difficult to counter using traditional AD (Air Defence) systems. Small drones pose significant detection challenges due to their minimal radar cross-section (RCS) and low-speed flight profiles, which often evade traditional air defence systems (Johnson & Smith, 2021). Empirical studies confirm that commercial quadcopters, such as the DJI Phantom, have an RCS of just $\mathbf{0.01\ m^2}$, making them nearly invisible to conventional radar systems optimised for larger, faster aircraft (Watson et al., 2020). Additionally, their slow speeds (~30–50 knots) cause radar systems to filter them out as ground clutter, further reducing detection probabilities (Kendall & Lee, 2022). Additionally, their smaller engines do not produce strong IR (Infrared) signals, thus presenting a challenge for detection by SHORADS (Short Range Air Defence Systems), which rely on IR signature processing. Small drones are extremely man-portable, often requiring minimal infrastructure and small control stations. Hence, cheap drones are difficult to detect and counter and have a significantly disproportionate cost-to-effect ratio. For example, in May 2019, Iran successfully launched an attack on the Abgaia Oil Facility in the United Arab Emirates (UAE) using 25 drones and cruise missiles. The drones were able to strike their objective despite the target being protected by state-of-the-art AD systems like an American Patriot, Oerlikon GDF 35mm cannon with Skyguard Radar and a French Crotale SAM (Surface to Air Missile) system. This attack resulted in the disruption of 5% of the global oil supply and marked the first known use of a drone swarm on a battlefield. (Koukoudakis, 2024).

2.2 Tactical factors

In long-drawn wars like the one in Ukraine, which is primarily being fought with traditional weapons such as artillery, tanks, missiles, and bombs, drones are indispensable to resource-pressed Ukrainian forces due to the high demand and shortages of conventional and precision weapons. (Chávez & Swed, 2023). In such a scenario, drones may be the answer to counter a stronger and more resourceful aggressor. Drone intelligence also becomes crucial in enhancing the accuracy and lethality of conventional artillery, particularly in wartime scenarios where ammunition is scarce. A digital command and control system connecting drones with artillery batteries reduces the engagement time from detection to firing to a few minutes. The same in the absence of drones may take up to 30 minutes with lesser accuracy, thus saving precious lives as well as optimising ammunition. (Kunertova, 2023). Recent battlefield data from Ukraine demonstrates that drones are increasingly employed as expendable assets, with Ukrainian forces losing an estimated **10,000 drones per month** in 2023 (Kyiv Post, 2023). Their role extends beyond kinetic strikes—persistent drone surveillance disrupts enemy movements, forcing adversaries into costly defensive postures (Chávez & Swed, 2023). For example, Russian forces expended **$15 million in missiles** to intercept $500 commercial drones, illustrating the economic strain imposed by asymmetric drone warfare (CNA Report, 2023). The cost of using drones, which has a destructive effect, is another aspect that draws significant attention. The decreasing cost of producing drones has led to an exponential increase in their lethality, defined by their ability to penetrate the most potent and expensive AD systems, which themselves may cost billions of dollars. (Ciolponea, 2022). Thus, attacking in large volumes can lead to the rapid exhaustion of the adversary's available stockpile of missiles and pave the way for the actual last air wave to address the planned targets using conventional means. Modern Air Defence (AD) systems are expensive and tailored to engage high-value aerial targets. A large swarm of low-cost drones can rapidly alter the cost-to-benefit ratio of such AD systems, rendering them inefficient. (Ciolponea, 2022).

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2.3 Financial factors

The primary and most important factor leading to the preference for drones in today's high-intensity, long-drawn conflicts is their financial advantage. The years preceding the Russo-Ukraine conflict witnessed a rising trend in the development of drones, showcasing their increasing level of sophistication and technical capabilities. However, the long-drawn war has specifically highlighted the significance of the cost-effectiveness and disposable nature of drones. (DeVore, 2023). Since the beginning of the war, drones have witnessed a high level of attrition, driving a gradual conceptual shift towards lower-cost and disposable drones. A 2022 RAND study found that intercepting a **$200 commercial drone** with a **$3 million Patriot missile** results in a cost-disadvantage ratio of **15,000:1** (Hoffman et al., 2022). Similarly, the 2019 Abqaiq attack demonstrated that **$20,000 drones** bypassed **$1 billion air defence systems**, disrupting 5% of global oil supply (Koukoudakis, 2024). Such asymmetry incentivises mass drone adoption, as weaker actors exploit cost imbalances to degrade superior militaries (DeVore, 2023). As an example, in early 2017, a US ally used a USD 3 million Patriot missile to shoot down a small, cheap drone, highlighting the disproportionate response and adverse cost-to-benefit ratio (Hyanki, 2021). The current trend in drone employment is focused on scalability rather than sophistication. Notably, there has been a significant improvement in the cost-effectiveness ratio compared to cruise missiles and rockets. Loitering munitions and FPV drones cost only a few hundred or thousand dollars in comparison to cruise missiles, which cost millions of dollars, yet achieve the same effect. (Kunertova, 2023).

2.5 Intangible factors

One of the strongest and most logical reasons for the utilisation of drones, especially in a high-risk, high-intensity conflict, is to mitigate the irreplaceable loss of human life and the political repercussions that follow. (Kallenborn, 2022). Subject matter experts who have conducted research into the impact of drones on modern warfare have brought out that drones are most likely to be used by leaders who prioritise avoiding casualties and electoral backlashes, as well as fulfilling their role as facilitators of conflict and aggression. Despite lacking the edge in air-to-air combat and lacking the coercive powers fielded by conventional air force capabilities, drones continue to be used and remain a key subject in military strategy. (Kunertova, 2023). Under such circumstances, drones remain a preferred weapon of choice for such states. Apart from its military use, amateurs, media personnel, and public relations teams of the Armed Forces also capture aerial footage of the battlefield and combat zones. These images and videos are then shared on multiple platforms to project military victories, boosting national morale and resolve. An example of this can be seen in the ongoing war in Ukraine, where the Ukrainian Armed Forces have mounted a massive Social Media campaign to highlight their victories to the global forum. Thus, drones have made it easier to gather information and capture footage from war zones, which may otherwise be inaccessible to state media. As a result, drones offer a new perspective on warfighting where they can be used to aggressively push the war of narratives, citing their notion of victory, furthering propaganda and psychological warfare. (Daifullah Al-Garni, 2022). During wartime, states may be subjected to sanctions and embargoes to undermine their war-fighting capability in terms of importing military hardware. In such a scenario, small drones of commercial origin are readily available. Notably, both Russia and Ukraine have received a significant number of drones from hobbyists and enthusiasts through various crowdfunding initiatives during the present war in Ukraine. These drones, often sourced from e-commerce platforms such as Amazon and AliExpress, are repurposed for activities such as surveillance and delivering explosives. (Fuhrmann & Horowitz, 2017).

2.5 Challenges of Drone Warfare

The employment of drones in contemporary conflicts presents a complex and wide array of challenges that traditional military forces must face. These challenges are not limited to the technological domain but also extend to strategic, ethical, and operational considerations. The persistent presence of drones creates long-term psychological distress in civilian populations. A study in Waziristan found that 92% of residents reported anxiety, sleep disorders, and fear of sudden strikes due to constant drone surveillance (International Human Rights Clinic, 2013). The dehumanisation of warfare—where operators remotely kill

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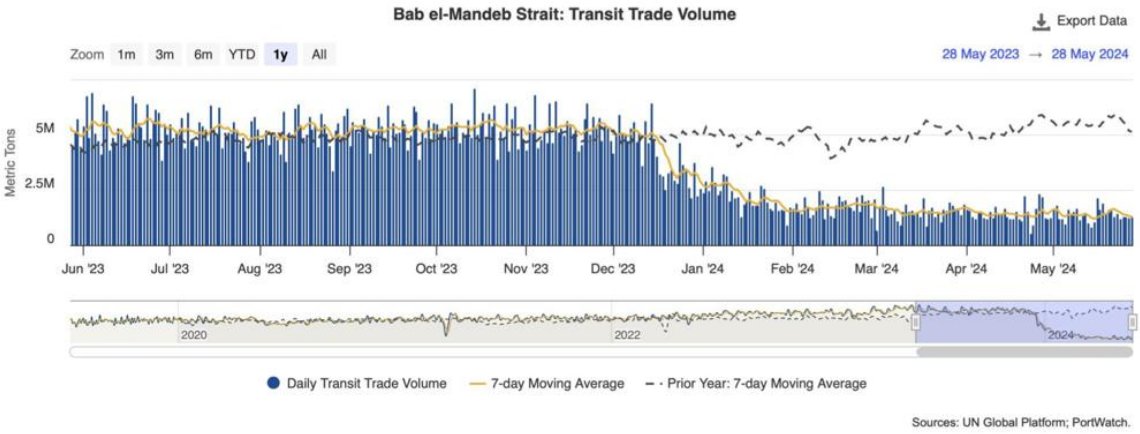

Fig. 1: Bal el-Mandeb Strait: Effect on Transit Trade Volume (Welsh, 2024)

target without facing physical risk—also raises moral concerns about detached warfare ethics (Sparrow, 2016). 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. The contemporary illustration of the asymmetric nature of drone warfare is exemplified by the use of drone strikes by Yemeni Houthis targeting Western vessels passing through the Red Sea, resulting in the disruption of approximately 12% of the global trade and supply chain logistics (**Fig. 1**) (Aqid et al., 2024). This asymmetry strongly challenges traditional notions of military supremacy among world superpowers, necessitating a more profound reevaluation of strategies in modern conflicts.

2.6. Asymmetric Warfare

The use of drones has presented weaker nations and states with the upper hand in asymmetric warfare. The 2022 Russian invasion of Ukraine is possibly the best example of the operational and strategic impacts achievable through tactical drones that presented a multitude of challenges for the stronger Russian Forces. The Russians enjoyed a favourable force ratio of 6:1 in terms of tanks and 3:1 in terms of armoured vehicles. (Kutz, 2022). Despite Russia possessing advantages in traditional operational elements such as time, space, and force, including a superior force ratio and the ability to concentrate forces along the border, the Russian offensive suffered significant setbacks. Notably, the proliferation of small tactical drones played a key role in this outcome.

2.7. Tactical Challenges

Air Power, characterised by the ability to deliver effects from the medium of air, is now accessible to all and at lower price 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. This proliferation poses a substantial threat to future military operations, whether against peer competitors or irregular or hybrid adversaries. Both active and passive measures necessitate thorough scrutiny to assess their continued efficacy in the face of evolving aerial threats. Over time, strong air forces worldwide have de-emphasised short-range air defence systems (SHORADS) based on the understanding that existing Air Superiority assets, such as modern fighters and long- to medium-range air defence systems (LOMADS), are adequate to maintain control of the air. Consequently, 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, both operationally and financially. Suppose only Patriots and Stingers, which cost USD 3 million and USD 38,000, respectively, are used as the primary defence against drones. Adversaries may then employ tactics to deplete the theatre-level air defence capacity worth millions of dollars. This low-cost, high-impact move could pave the way for a subsequent conventional air attack, making the entire area of operations vulnerable. Drones can also hurt the mindset and morale of ground forces. With the induction and stealthy reach of drones on the battlefield, the

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distinction between the safe zone, the war zone (the area where the conflict occurs), and the enemy zone becomes increasingly blurred. The recent conflict between Turkey and Syria in the Idlib province has demonstrated that the use of drones significantly impacted the soldiers' sense of security, even in the safe zone. Drones can infiltrate the supposed safe zones, striking soldiers, weapon systems, and infrastructure, stealthily sneaking into the rear and disrupting military boundaries.

2.8. Doctrinal Challenges

The historical reliance of 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, particularly one that operates drones. The emergence of cost-effective and highly capable drones has disrupted this complacency, forcing Western Armed Forces to re-examine and critically re-evaluate 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 focuses 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 System, manned fighter Combat Air Patrols (CAP), and sophisticated command-and-control (C2) networks, whether land-based or airborne. However, the current doctrinal approaches do not adequately address the challenges posed by drones and loitering munitions operating at significantly lower altitudes, straddling the boundary between land and air forces, and presenting difficulties in detection, targeting, and engagement. (Postma, 2021).

2.9 Scale vs Sophistication

Before Putin's aggression against Ukraine, Houthi rebels used drones to attack 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 (Air Defence) 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 in large numbers. This aspect becomes relevant as armed conflicts turn into wars of attrition, with adversaries seeking to maximise damage while minimising costs. (Kunertova, 2023).

3. 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 complexity to traditional and existing Air Superiority concepts. Flying multiple high-altitude air superiority missions poses no threat to low-altitude drones. Moreover, an air superiority fighter is incapable of targeting a commercial quadcopter. (Kallenborn, 2022). Significantly, the proliferation of inexpensive drones equipped with lightweight explosives has expanded the number of entities fighting for control of the skies. As a result, 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 CAS (Close Air Support) and GA (Ground Attack) aircraft even more obsolete in conflicts featuring denser and more sophisticated AD (Air Defence) systems in future conflicts. (Kunertova, 2023).

4.0 THE FUTURE OF DRONE WARFARE

Recent developments and integration of AI on the battlefield are already regarded as the next revolution in military affairs, making unmanned systems more lethal yet cost-effective than previously believed (Prakash, 2022). The Pentagon's **Project Maven** has already deployed AI-enabled drones capable of autonomous target recognition with **95% accuracy**, reducing human decision-making delays (Scharre, 2023). Meanwhile, China's **Wing Loong-3** demonstrates swarming algorithms that coordinate **over 200 drones simultaneously, overwhelming defences** (CSIS, 2024). Such advancements validate forecasts that **60% of air combat missions** will be drone-led by 2030 (Lim et al., 2025). These advancements have

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extended their operational capabilities, making them attractive alternatives to manned aircraft. While drones have been utilised in wars for many years, their unmatched success in recent conflicts has sparked a genuine interest as well as momentum in their potential use in all air combat domains.

4.1 Manned-Unmanned Teaming (MUM-T) and the Loyal Wingman

Drones currently have limited capabilities and are employed only for specific missions, lacking the multi-mission capabilities of fighter aircraft. However, the next evolution in drone technology is MUM-T, or the Manned-Unmanned Teaming concept, which is swiftly gaining momentum and is expected to overcome the present shortcomings in the employability of drones in Counter-Air Operations. The concept of Manned-Unmanned Teaming (MUM-T) refers to the coordinated use of manned and unmanned systems to accomplish a common mission or a goal. (Pandey, 2023). A variation of this concept in the context of drones is the Loyal Wingman project. A Loyal Wingman is a proposed type of combat drone that integrates Artificial Intelligence (AI) and can work together with the next generation of manned combat aircraft. Unlike a conventional drone, the loyal wingman is expected to have the capability to survive on the battlefield while being significantly lower in cost than its manned counterpart with similar capabilities. The primary purpose of this concept is to empower human pilots as mission commanders. At the same time, AI (Artificial Intelligence) serves as a loyal wingman operating under their tactical control as highly skilled operators of relatively low-cost robotic drones. They can function as both sensors and shooters, and are adequately equipped to survive on the battlefield. The Manned-Unmanned Teaming is designed to enable manned platforms to maintain a safe distance from the enemy's defences while keeping the unmanned platforms ahead. MUM-T and loyal wingman projects are being developed worldwide (**Table 1**) and will define drone battles of the future, utilising the full potential of both manned and unmanned aircraft.

Manned Unmanned Teaming (MUM-T) projects under development			
Country	**Manned Fighter**	**Drone**	**Status**
USA	NGAD (Next Generation Air Dominance)	CCA (Collaborative Combat Aircraft)	Under Development
	F-35	MQ-9	Under Development
Russia	Su-57	S-70 Okhotnik	Test Flight Completed
China	J-20	Wing Loong	Under Development
France	Rafale	MQ-9	Under Development
UK	Typhoon	Protector	Under Development
Israel	F-16	Heron TP	Under Development
India	Tejas Mk-1A	CATS Warrior	Under Development
Turkey	Undisclosed / KAAN	Kizilelma	Under Development
European Consortium	NGF (Next Generation Fighter)	FCAS (Future Combat Air System)	Under Development

Table 1: Global MUM-T and Loyal Wingman projects (Pandey, 2023)

4.2 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 (Tomes, 2004). These types of wars often involve unconventional warfare, with the weaker side employing innovative strategies to compensate for deficiencies in their military forces and equipment. Drones, with their advantages 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 controlled the sea with cheap, yet precise drone strikes on military and civil vessels to disrupt Israeli supplies in the ongoing conflict in Gaza, putting the formidable US Navy at bay (Aqid et al., 2024). The Toft Hypothesis provides a clear understanding of the strategic importance of drones and their implications in asymmetric warfare. According to Arreguín-Toft (2001), the strategic interaction of opposing actors in asymmetric conflicts can be categorised into two types: direct and indirect strategies. Direct strategies involve military forces targeting the opponents' physical and infrastructural capability to wage war, while indirect strategies aim to undermine the enemy's will to fight. Drones, in mass form, comprise a significant portion of indirect strategies in modern warfare (Norman, 2022). The hypothesis revealed that in conflicts where both sides employed the same approach, that is, direct-direct or indirect-

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indirect, the stronger actor emerged victorious in 76.8% (Arreguín-Toft, 2001). However, in the remaining conflicts where opposing sides used different approaches, the weaker actor prevailed 63.6% of the time. 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 Houthis in the Red Sea.

4.3 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 (EBO) (Kyle, 2008). The primary aim of an effects-based approach is to utilise forces that incapacitate enemy forces and reduce their capacity to engage friendly forces in direct combat. Instead of prioritising casualties and physical destruction to wear down enemy forces, effects-based operations emphasise end-state objectives and the means to achieve them. While many military doctrines prioritise functional paralysis over physical destruction, recent conflicts suggest a shift back towards attrition warfare. (Gady & Kofman, 2023). 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.

4.4 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 used to influence or persuade target audiences, often evoking an emotional response rather than a rational one. The strategic use of drones for propaganda and information warfare is quickly gaining momentum in conflicts. (Daifullah Al-Garni, 2022). In the context of the ongoing conflict between Russia and Ukraine, both countries have employed drones to capture and disseminate footage of military confrontations. A 2023 survey of Russian infantry in Ukraine revealed that **72% of soldiers** reported heightened anxiety due to constant drone surveillance, with many describing it as "inescapable" (Galeotti & Bowen, 2023). Psychological studies link drone strikes to **20% higher PTSD rates** compared to conventional artillery, as unpredictability erodes unit cohesion (Watson & Davies, 2022). Hezbollah's 2024 drone footage over Haifa exacerbated Israeli public fear, demonstrating drones' propaganda utility (Gebeily et al., 2024). The repercussions of this footage were substantial, leading to a warning of an all-out war from the Israeli Foreign Minister, highlighting the profound psychological influence wielded by drones. Not only did the footage shake up the Israeli sense of security, superiority and safety, but it 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, 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 international media. (Kutz, 2022). Similarly, the targeting of the US Navy's Aircraft Carrier, USS Eisenhower, by Houthi drones in the Red Sea forced the Carrier Battle Group to retreat. (Middle East Monitor, 2024). While the Yemeni Army spokesperson Brigadier Yahya Saree asserted that hitting the US Navy aircraft carrier, the Western media dismissed these claims as disinformation (LaPorta & Delzer, 2024). Regardless of whether the drones were able to hit or not, what is certain is that they led to the withdrawal of the carrier from the Red Sea. These examples underscore how drones can have a significant impact on the psychological morale of the enemy, outweighing their physical and kinetic effects.

5. LESSONS LEARNT AND THE 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

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attrition warfare. As militaries gear up for high-intensity conflict scenarios, drones offer the most effective solution for reversing the trend of combat fleets 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; hence, the use of drones in conflicts seeks to employ the principles of mass and economy, particularly in long-drawn conflicts that strain a nation's resources.

Recent global conflicts have underscored the need for demonstrating 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 adaptation. (DeVore, 2023). The adeptness of the 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. (DeVore, 2023). Additionally, as noted in the Toft Hypothesis cited earlier, in 78% of asymmetric conflicts, the losing side failed to adjust its strategies to adapt to the evolving nature of warfare. (Arreguín-Toft, 2001). 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 being defeated by weaker ones in asymmetric wars. (Bhushan, 2016). 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 review their battle-proven doctrines critically. 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 advancements. (Postma, 2021). Moreover, due to the gradual transition from manned to unmanned elements and the increasing involvement of MUM-T missions, which comprise a combination of manned and unmanned platforms, there is a need to implement modifications to the operational philosophies of integrated force deployment within the context of multi-domain warfare. (Bahal, 2023).

Lastly, despite the hype and the significance of the role and impact of drones in contemporary conflicts, drones alone are not the future of war. (Calcara et al., 2023). While they may introduce new dynamics in certain situations, they do not singularly determine the outcome of conflicts. (Zieliński, 2022). The overall potential of the land and other armed forces remains the primary factor in determining victory, and drones enhance this potential as force multipliers. (Postma, 2021). Effective control of the air is essential for the successful deployment of drones in contested airspace, and without it, their capabilities are severely limited. Additionally, a robust Air Defence 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 part of the broader concept of air power, and primarily, an element of the defence ecosystem. This approach would ensure that drones contribute to synergistic effects in combat operations.

6. CONCLUSION

The emerging role of drones in shaping present and future conflicts is profound, marking a significant shift in 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 necessitate a reevaluation 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 global security dynamics.

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References

Antonio Calcara, Andrea Gilli, Mauro Gilli, Raffaele Marchetti, & Ivan Zaccagnini. (2022). Why Drones Have Not Revolutionized War. Https International Security, 71(2), 130–171. https://doi.org/10.7910/DVN/BCC6IV

Aqid, R., Tang, S., & Darr, T. (2024). Houthi Rebel Attacks in the Red Sea.

Arreguín-Toft, I. (2001). How the Weak Win Wars.

Bahal, A. S. (2023). UAVs and Air Power: Role of UAVs in Future Warfare. Journal of Defence Studies, 17(4), 104–132.

Bhushan, N. (2016). Wars-A need for Rapid Strategic Switching Winning the Asymmetric Wars-A need for Rapid Strategic Switching.

Calcara, A., Zaccagnini, I., Gilli, M., & Gilli, A. (2023). Military drones, air defence, and the hider-finder competition in air warfare. Defense and Security Analysis, 39(2), 260–262. https://doi.org/10.1080/14751798.2023.2178541

Chávez, K., & Swed, O. (2023). Emulating underdogs: Tactical drones in the Russia-Ukraine war. Contemporary Security Policy, 44(4), 592–605. https://doi.org/10.1080/13523260.2023.2257964

Ciolponea, C.-A. (2022). The Integration of Unmanned Aircraft System (UAS) in Current Combat Operations. Land Forces Academy Review, 27(4), 333–347. https://doi.org/10.2478/raft-2022-0042

CNA Report. (2023). *Cost-Benefit Analysis of Drone Swarms in Modern Conflict*. Center for Naval Analyses.

Daifullah Al-Garni, A. (2022). Drones In the Ukrainian War: Will They Be An Effective Weapon In Future Wars?

DeVore, M. R. (2023a). "No end of a lesson:" observations from the first high-intensity drone war. Defense and Security Analysis, 39(2), 263–266. https://doi.org/10.1080/14751798.2023.2178571

Fuhrmann, M., & Horowitz, M. C. (2017). Droning On: Explaining the Proliferation of Unmanned Aerial Vehicles. International Organization, 71(2), 397–418. https://doi.org/10.1017/S0020818317000121

Gady, F. S., & Kofman, M. (2023). Ukraine's Strategy of Attrition. Survival, 65(2), 7–22. https://doi.org/10.1080/00396338.2023.2193092

Galeotti, M., & Bowen, A. (2023). *The Psychological Toll of Drone Warfare*. War on the Rocks.

Gebeily, M., Tanios, C., & Choukier, J. (2024). Lebanon's Hezbollah publishes drone footage claiming to show surveillance of Israel's Haifa | Reuters.

Hoffman, F., et al. (2022). *The Economics of Drone Warfare*. RAND Corporation.

Hyanki, A. (2021). The Proliferation of Cheap Weaponised Drones-A Tactical Innovation Or A Strategic Military Edge?

Johnson, M., & Smith, R. (2021). *Low-Observable Drones and Air Defense Challenges*. Journal of Military Technology.

Kallenborn, Z. (2022a). Necro-Aeronautics: Raising Undead Aircraft for War.

Kallenborn, Z. (2022b). Seven (Initial) Drone Warfare Lessons from Ukraine.

Kendall, P., & Lee, H. (2022). *Counter-Drone Systems: Limitations and Innovations*. Defense Science Review

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Koukoudakis, G. (2024). Drones' contribution to the transformation of contemporary warfare. Journal of Military Studies, 0(0). https://doi.org/10.2478/jms-2024-0003

Koukoudakis, G. (2024). *Drones' Role in Strategic Infrastructure Attacks*. Journal of Military Studies.

Kunertova, D. (2023a). Drones have boots: Learning from Russia's war in Ukraine. Contemporary Security Policy, 44(4), 576–591. https://doi.org/10.1080/13523260.2023.2262792

Kunertova, D. (2023b). The war in Ukraine shows the game-changing effect of drones depends on the game. Bulletin of the Atomic Scientists, 79(2), 95–102. https://doi.org/10.1080/00963402.2023.2178180

Kutz, T. J. (2022). Lethal Unmanned Aircraft Systems: Democratizing Air Power.

Kyle, C. M. (2008). RMA to ONA: The Saga of an Effects-based Operation A Monograph.

LaPorta, J., & Delzer, E. (2024). Disinformation campaign uses fake footage to claim attack on USS Eisenhower - CBS News.

Lim, M., Tong, R., & Samuel, J. (2015). The Fighter Aircraft and the Future of Airpower: Reflections on the Southeast Asian Landscape.

Lim, T., et al. (2025). *The Sixth-Generation Air Force: Manned-Unmanned Teaming*. RUSI Journal.

Middle East Monitor. (2024). Houthis hit US warship off Yemen coast, spokesperson says.

Norman, M. G. (2022). Drones And Killing: Ethics Of War And Radical Asymmetry.

Pandey, D. K. (2023). MUMT v/s A2/AD: Exploring To Dominate In A Contested Environment.

Postma, J. (2021). Drones over Nagorno-Karabakh. https://doi.org/10.2307/48638213

Prakash, B. (2022). AI and the Future of Air Combat in India.

Scharre, P. (2023). *Army of None: Autonomous Weapons and AI Warfare*. W.W. Norton

Tomes, R. R. (2004). Relearning Counterinsurgency Warfare.

Trsek, R. B. (2007). The Last Manned Fighter: Replacing Manned Fighters With Ucavs.

Vallée, P. (2023). The Role of Unmanned Aerial Vehicles in Current and Future Conflicts.

Watson, T., et al. (2020). *Radar Cross-Section Analysis of Small UAVs*. IEEE Transactions on Aerospace.

Watson, R., & Davies, L. (2022). *Mental Health Impacts of Asymmetric Warfare*. Journal of Traumatic Stress.

Zieliński, T. (2022). Drones in Military Conflicts. Are Unmanned Aircraft Systems the Future of Wars?

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