

[www.myveritasjournal.com](http://www.myveritasjournal.com)

# VERITAS:

A MULTIDISCIPLINARY JOURNAL OF  
SOCIAL SCIENCES AND HUMANITIES

ISSN: 3107-748X

Vol. I, Issue 02



December 2025

**Editor: Lt. Dr. B. Ajantha Parthasarathi**

## COUNTERING DRONE THREATS: DETERRENCE AND DEFENCE IN THE 21ST CENTURY

*Dr. Ashima Sahni, Assistant Professor & Head, Department of Political Science, Kanya Maha Vidyalaya (Autonomous), Jalandhar, Punjab. Pin Code 144004*

*Dr. Iqbal Singh, Assistant Professor, Department of Political Science, Kanya Maha Vidyalaya (Autonomous), Jalandhar, Punjab. Pin Code 144004*

*Dr. Prabhjot Kaur, Assistant Professor, Department of Laws, Guru Nanak Dev University, Amritsar, Punjab. Pin Code 143002*

### Abstract

Drones, which were once used for the lone purpose of surveillance, have now become a robust combative weapon. Its colossal usage in army operations has catalysed the urgency for development of drone and anti-drone technologies. The recently concluded military operations like Op Sindoor, Op Spider Web, and the Israel-Iran conflict have brought to the spotlight the need for a multi-layered and rigid defence system other than the protective measures that are currently in place. Even though drones do not provide decisive outcomes in war yet they are game-changers and have created new problems for war and defence strategists. The wave of military conflicts since 2020-2025 have not only proliferated the political-strategic tensions but have also accelerated a contest for developing drone and anti-drone technologies. Recently, a flight test of the Integrated Air Defence Weapon System (IADWS) was successfully conducted in India in August 2025 for detection and destruction of drones. Similarly, in China, multiple types of anti-drone equipment, especially the AJX-002 giant submarine drone and the GJ-11 stealth attack drone, were reviewed in formation at its V-Day military parade in September 2025, ratifying the era of drone-centric warfare. Drones also present economic challenges, including high upfront costs, safety and need for a robust regulatory framework. Correspondingly, the economic metrics suggest that the global anti-drone market is likely to grow from USD 2.70 billion in 2025 and is projected to reach USD 33.97 billion by 2035. Thus, a significant proportion of economic resources is being spent for military efficiency and technological advancements world-wide. It is in this context that this article addresses the key aspects related to air defence vis-à-vis deterrence with respect to the use of drones in military warfare and militarization of economies. A qualitative study approach has been used. In addition, a content analysis method has also been applied to further illustrate and explain the current use of drones among the military and the risk to national security. Hence, the study analyses primary and secondary data gathered from the Government's websites of the respective states and diverse internet databases.

**Keywords:** *Drone Threats, Deterrence, Evolving Battlefields and Drone Interceptors.*

### I. Introduction

In these times, there has been a tremendous upsurge in the use of drones in military warfare. The drones have become a first choice in combat operations and have reconstructed the tactics and theatres of war. Earlier, the U.S. was the prominent user of drone strikes. However, now its usage has expanded beyond the U.S. with states such as Russia, Ukraine, Turkey, and Azerbaijan, India, Pakistan, Israel and Iran. Drones have emerged as a tipping point not only because of their ability to deliver precision strikes from the air, but also due to advanced technologies to deter and to punish, while adequately

defending the airspace. The extensive usage of drones has compelled most militaries across the world to reassess the existing war doctrines as well as the security of their military infrastructure.

The emerging technologies associated with combat zones are posing unforeseeable challenges which are developing at a greater pace, e.g. the “Evolving Battlefield”- where war is between humans and machines or between machines and machines. In the recent conflicts, particularly the Russian-Ukraine war, military forces of both sides have been using drones as opposed to traditional infantry. However, the emergence of vast drone technologies, especially its sizes, is unbounded which can be explored by state actors as well as by non-state actors as per the need. The counter-drone systems and tactics are not limited to military alone as it is being used by internal security agencies as well. Thus, it can be said that recent military operations symbolize a growing trend of drones and drone interceptors which is emerging as a significant mode of deterrence in the 21st century.

### **Objectives of the Study**

- To understand the implications and trends of massive use of drones in contemporary military warfare, most particularly in the year 2025.
- To study key aspects related to air defence vis-à-vis deterrence in the context of militarization of economies

Besides, the study raises several queries, which are mentioned below:

### **Research Questions**

1. How has the massive use of drones in military warfare brought a paradigm shift in modern-day military strategy without using the sophisticated missiles-weapons?
2. What are the security-economic implications of usage of drones and counter drone measures?
3. To what extent the wave of military conflicts since 2020-2025 has created new problems for war cum defence strategists and the security of military infrastructure?

### **Research Methodology**

The present study has been conducted through primary as well as secondary data using documentary analysis of military documents, technical warfare, and security and peace studies, enhanced by empirical data regarding militarization of economies and other relevant technical and economic indicators sourced from government’s websites of the respective states and diverse internet databases. Some studies utilize comparative metrics from before and after 2025 concerning use of drones in military warfare. Viewpoint articles draw from academic literature, media, and policy documents to assess shifts in warfare. A qualitative study approach has been used. In addition, a content analysis method has also been applied to further illustrate and explain the current use of drones in military warfare and the risk to national security.

## **II. Drones and Modern Warfare**

Prior to 1980, drone warfare was largely the province of science fiction, such as Frank Herbert’s *Dune* (1965) and Isaac Asimov’s *Robot* series. However, Peter. W. Singer’s book titled *Wired for War* (2009) may not be the first, but it became the most popular book-length treatment of unmanned aerial vehicles. From the point of modern military usage vis-à-vis tactical approach, the Gulf War of 1991 is called the first war with UAVs. But, the year 2000 was crucial because the US became the first to

successfully fit drones with missiles. The first known killing by armed drones occurred in November 2001, when a Predator targeted Mohammed Atef, a top al-Qaeda military commander, in Afghanistan. Thereafter, drones became lethal and weapons of assassination. The number of countries operating military drones has increased by 58 percent between 2010 and 2019; at least 95 countries now possess or export what was once novel technology, and in geographies beyond those of the War on Terror. Drones are being used with war equipment such as armour, artillery and air power. FPV drones give the operator a driver's view from the camera and have made the battlefield transparent. In the past two decades, the United States has extensively utilized drones in counterterrorism operations in regions such as Iraq, Syria, Afghanistan, Pakistan, and Yemen, highlighting their capability to execute precise strikes with reduced risk to friendly personnel. Nagorno-Karabakh in 2020 is a turning point in drone warfare.

The use of drones in this conflict, deployed for precision strikes and surveillance, has significantly impacted the conflict's outcome by providing superior aerial intelligence and striking capabilities. The recently concluded military conflicts, namely Op Sindoor (May 2025), Op Spider Web (1st June 2025) and the Israel-Iran conflict (2025) are clear signals about the evolution of aerial deterrence- which is more about countering drones as well as anti-drone capabilities. For instance, during Op Sindoor enemy drones were intercepted before they could cause damage. The attacks exposed critical gaps in conventional surveillance and perimeter defences. Therefore, for offensive and defensive purposes, the kinetic and non-kinetic tactics are critical to strengthen the defence against drone threats. So, these conflicts corroborate the essentiality of a more layered and resilient defence system other than the existing exorbitant technologies both for offensive and defensive purposes, particularly kinetic and non-kinetic tactics. Israel already has the Iron Dome, and the United States is thinking of building a Golden Dome. India too has announced plans to develop and deploy *Sudarshan Chakra*- an indigenous, multi-layered defence shield by 2035. Besides this, India has developed *IndraJaal*, which has the capacity to scan airspace 24/7, detect and identify threats, and deploy countermeasures. It integrates technologies such as radars, RF jammers, GNSS spoofers, and direction-finding sensors into a seamless unit. Built on a multi-layered, plug-and-play architecture, SkyOS delivers complete Detect-Track-Identify-Mitigate (DTIM) capability.

### **III. Drones and Deterrence**

Initially, countering drones was a reactive process, relying on manual detection and conventional security measures. Nevertheless, the traditional methods proved inadequate against the advanced drone technologies. A turning point occurred in 2018 when Russian forces repelled the first drone swarm attack at Khmeimim Air Base, signalling a new era of drone usage in combat. In the ongoing Russian-Ukraine war, Russia has also used the Stupor anti-drone rifle to block Ukrainian drones. However, the first drone-on-drone combat took place in late 2022 when Ukrainian DJI Mavic drones rammed Russian drones. Besides, it was in 2023, when Ukraine began using innovative tactics, such as cardboard drones for aerial reconnaissance. Although in 2024, Ukraine had modified piloted aircraft to shoot down Russian drones and engage in drone-to-drone combat, it was in July 2024, a Ukrainian FPV drone destroyed a Russian helicopter, marking the first incident in warfare. But, Operation Spider Web (OSW), which was carried out by the Ukrainians against the Russians on June 1, 2025, has been

the most talked about operation in the history of asymmetric drone warfare. It redefined air defence paradigms vis-à-vis war dynamism and has exposed the defencelessness of even the most advanced militaries.

This operation was executed within Russian territory using autonomous GOGOL-M drones that deploy FVP (First Person View) units for deep precision strikes without GPS or remote control. Due to OSW, approximately 41 Russian bombers such as the Tu-22M3, Tu-95, and the A-50 AWACS across multiple military airbases like Olenya, Belaya, Ivanovo, and Dyagilevo were damaged. It is interesting to note that on June 1, 1996, Ukraine handed over the last of its nuclear warheads and most of its strategic bombers under the auspices of the so-called Budapest Memorandum and, almost exactly 29 years. Later on June 1, 2025, Kyiv put a significant number of those aircraft “beyond use.” However, OSW signifies a shift in modern warfare which can change and adapt with lightning speed. Op Sindoor, which lasted for 80 hours between India and Pakistan, showcased the use of PGMs, which successfully delivered the decisive outcomes from a distance. Pakistan attempted to engage a number of military targets in Northern and Western India which were neutralized by the Integrated Counter UAS (Unmanned Aerial Systems) Grid and Air Défense systems. The hostile technologies that were neutralized by Indian systems were pieces of PL-15 missiles (of Chinese Origin), Turkish-origin UAVs, named “Yiha” or “YEEHAW” and long-range rockets, quad copters and commercial drones. The response was measured and proportionate, reflecting strategic maturity and restraint. Thus, Operation Sindoor marks a historic milestone, in which Unmanned Aerial Systems (UAS) played a primary role in direct military combat between two nuclear-armed neighbours, signalling an uncharted era of drone-centric warfare in South Asia.

In 2025, on the occasion of Independence Day Prime Minister of India Narendra Modi announced to develop and deploy *Sudarshan Chakra*- India’s own air defence system which aims to protect India’s strategic, civilian and nationally important sites, and it will act both as a shield and as a sword. It has been described as a more expansive version of Israel’s Iron Dome and the US’s proposed Golden Dome. Recently, China has unveiled a range of drones and other military hardware in a massive parade. There is a wide range of drones, but the AJX-002 giant submarine drone, the GJ-11 stealth attack drone, besides an array of conventional aerial drones were showcased, and it also shows the military strategy of China to replace traditional structures. Chinese military affairs expert Wang Yunfei told the Global Times, “Given the large-scale deployment of drones on the battlefield, many countries are now pursuing the development of efficient anti-drone systems and platforms.” Thus, the side that learns faster to block drones, fields’ smarter drones, and fights with cheaper drones will shape the future drone battles.

#### **IV. Drones: Militarization of Economies**

Military technology is advancing in 2025 due to innovations in artificial intelligence (AI), connectivity, and autonomous systems. Trends & Innovations in Military Technology in 2025 like AI Integration, Cyber security and Cyber warfare, Energy Efficiency and Sustainability, Autonomous Weapon Systems (AWS), Immersive Technologies, Internet of Military Things (IoMT), 5G Connectivity, Electronic Warfare, Biotechnology, Human Augmentation, Counter-Drone Technology. In the modern battlefield, money is everything. An interceptor’s cost determines how many can be fired. The recent

trend in military spending has proliferated exponentially, not only to sustain hegemony over peripheral countries and to regulate their rivalries, but for operational preparedness to deal with uncertainty even during the period of peace. Defence against drones begins with technologies which can detect them. These technologies have evolved around three complementary pillars- electronic warfare (EW), hard-kill interceptors and directed energy weapons (DEWs). Modern systems employ a mix of AESA radars, electro-optical and infrared sensors, acoustic detectors, and AI-powered systems. Once detected, one option is for drones to be neutralized through kinetic means, that is, with missiles and anti-aircraft guns. But traditional kinetic air defines, especially surface-to-air missiles (SAMs), are costly and less effective against swarms.

The asymmetry in cost remains the central challenge in anti-drone warfare. For example, a swarm costing roughly \$100,000 might take millions of dollars to neutralize using current technologies. Futuristic drones with embedded AI and space-to-space weapons could defend orbital satellites against attack (so-called DSATs) or engage another state's satellites that appear threatening (ASATs). Priority DSATs and ASATs would deter or defend against any threat to the viability of American satellites for warning and assessment; command, control, and communications; geo-location; and other missions. The challenges with respect to deterrence from the perspective of drone warfare are the lack of clarity like, how many drones constitute a serious provocation? At what point does escalation merit a full-spectrum military response? Nuclear deterrence is insufficient, but unmanned systems could be disruptive. Nuclear deterrence operations are capable of deterring activities only at the higher end of the spectrum of conflict. Mr. Rajnath Singh, an Indian Defence Minister, in his address to the Controller's Conference of the Defence Accounts Department (DAD) on July 7, 2025, said, "Peacetime is nothing but an illusion." Mr Singh urged people to perceive defence budgets as growth drivers. The recent military conflicts in the year 2025 not only indicate political-strategic tension but an increased military expenditure. The huge military expenditure to which we commit ourselves is not decided by the dictates of market forces, but by political and social will superimpose the structure of commodity relations that the market forces govern.

**Table 1: World Military Expenditure**

<b>Rank 2025</b>	<b>Country</b>	<b>Defence Budget 2025 (USD)</b>
1.	United States	\$895,000,000,000 (\$895 billion)
2.	China	\$266,850,000,000(\$266.85 billion)
3.	Russia	\$126,000,000,000 (\$126 billion)
4.	India	\$75,000,000,000 (\$75 billion)
5.	Saudi Arabia	\$74,760,000,000 (\$74.76 billion)
6.	United Kingdom	\$71,500,540,000 (\$71.5 billion)
7.	Japan	\$57,000,000,000 (\$57 billion)
8.	Australia	\$55,700,000,000 (\$55.7 billion)
9.	France	\$55,000,000,000 (\$55 billion)
10.	Ukraine	\$53,700,000,000 (\$53.7 billion)

**Source:** *Global Firepower Ranking 2025.*



World military expenditure rose to \$2718 billion in 2024, meaning that spending has been increased every year for a full decade, going up by 37 percent between 2015 and 2024. The 9.4 percent increase in 2024 was the steepest year-on-year rise since at least 1988. The cost imbalance between drones and defence measures is significant, with Ukraine spending millions to counter Russian drone attacks. Cost Asymmetry, A \$1,000 drone damaging a \$200 million aircraft reflects the stark imbalance. Expensive missiles are not cost-effective against cheap drones.

## V. Concluding Observations

To sum up, the drones and anti-drone technology has brought a paradigm shift in modern-day military strategy without using sophisticated missiles-weapons. This strategic shift has compelled most of the militaries across the world to reassess the security of their military infrastructure. The emergence of vast drone technologies especially its sizes are unbounded which can be explored by state actors as well as by non-state actors as per their requirement, making the world more dangerous. Other than the technological superiority, it is peremptory for nation states to confront varied challenges in the battlefields which are evolving speedily. Thus, it is likely that the interdependency between infantry and drones in the future warfare may be much more.

## References

- Amos, Fox. (6 June,2025), Drones Are Game-Changing, But They Are Not the Answer to the Inherent Challenges of Land War, Small War Journal(SWJ) <https://smallwarsjournal.com/2025/08/06/drones-are-gassme-changing/>
- BBC News (Jan 2018).Syria War: Russia Thwarts Drone Attack on Hmeimim Airbase, London, U.K.
- BBC News (July,2022). How are 'kamikaze' Drones Being Used by Russia and Ukraine? BBC News, London, U.K.
- Bedi, Rahul. (30 May, 2025)Autonomous warfare in Operation Sindoor, The Hindu, <https://www.thehindu.com/news/national/autonomous-warfare-in-operation-sindoor/article69633124.ece>
- Bodington, S., George, M., Michaelson, J., Bodington, S., George, M., & Michaelson, J. (1986). The political economy of militarism. Developing the socially useful economy, P.203
- Cherry, Gupta.(June25, 2025) Global Defence Budgets 2025: Top 10 countries and India's rank revealed, Indian Express <https://indianexpress.com/article/trending/top-10-listing/top-10-countries-highest-defence-budget-2025-9840269/>
- D. Hambling. (2022). Ukraine Wins First Drone Vs. Drone Dogfight Against Russia, opening a New Era of Warfare (updated). Accessed: June 21, 2025. [Online]. Available: <https://www.forbes.com/sites/davidhambling/2022/10/14/ukraine-wins-first-drone-vs-drone-dogfight-against-russia-opening-a-new-era-of-warfare/>
- Dutta, Amrita Nayak. (August 27,2025 ) CDS: Sudarshan Chakra both shield and sword for India. Indian Express p. 6. <https://capsindia.org/wp-content/uploads/2021/10/APJ-JULY-SEPTEMBER-2018-FULL.pdf>
- <https://timesofindia.indiatimes.com/city/hyderabad/indrajaal-rolls-out-ai-driven-anti-drone-system-to-protect-critical-infrastructure/articleshow/12>

- <https://www.newindianexpress.com/cities/hyderabad/2025/Jun/05/indrajaal-infra-the-nextgen-battle-do-me>.
- <https://www.rootsanalysis.com/anti-drone-market>
- Joshi, Manoj.( June6, 2025),Infantry Needs an Upgrade , The Indian Express p.13.
- Kaag, J., & Kreps, S. (2014). Drone warfare. John Wiley & Sons.
- Lieutenant Christopher Knight. ( September 2024). Proceedings, Vol. 150/9/1,459 U.S. Navy
- <https://www.usni.org/magazines/proceedings/2024/september/drones-deterrence>
- Liu Xuanzun, Fan Wei and Liang Rui ( Sep 03,2025) Anti-drone laser, microwave, missile and artillery weapons appear at China's V-Day military parade. Global Times
- <https://www.globaltimes.cn/page/202509/1342522.shtml>
- M. Eckstein. (2023). Cardboard Drone Vendor Retools Software Based on Ukraine War Hacks. Accessed: Nov. 25, 2024. [Online]. Available: <https://www.defensenews.com/air/2023/09/13/cardboard-drone-vendor-retools-software-based-on-Ukraine-war-hacks/>.
- Pong, B. (2022). The Art of Drone Warfare. Journal of War & Culture Studies, 15(4), 377–387. <https://doi.org/10.1080/17526272.2022.2121257>
- Press Trust of India. (July8,2025). Controller's Conference of the Defence Accounts Department, The Indian Express, p. 6.
- Shrivastava, Asheesh.(April-June, 2018) Journal of Air Power and Space Studies, Centre for Air Power Studies, New Delhi Vol. 13 No. 2 ,p.60. Retrieved 10june, 2025 from
- Shukla, Ajai. (August 27,2025 ) A Stronger Air Shield . Indian Express p. 1.
- Shukla, Ajai. (August 27,2025 ) A Stronger Air Shield . Indian Express p. 1.
- SIPRI Publications <https://doi.org/10.55163/AVEC8366>
- <https://www.sipri.org/publications/2025/sipri-fact-sheets/trends-world-military-expenditure-2024>
- Stephen, Cimbala.(2025 )Nuclear Deterrence and Drones: An Unpredictable Mix? Global security review <https://globalsecurityreview.com/nuclear-deterrence-and-drones-an-unpredictable-mix/>
- T. Copp. (2023). Elon Musk Blocking Starlink to Stop Ukraine Attack Troubling for DoD. Accessed: august. 25, 2024. [Online]. Available: <https://www.defensenews.com/news/your-military/2023/09/12/elonmusk-blocking-starlink-to-stop-ukraine-attack-troubling-for-dod/>.(<https://smallwarsjournal.com/2025/08/06/drones-are-game-changing/>)
- Trends Research and Advisory. (03 Jun 2025).Significance and Implications of Ukraine's Operation Spiderweb, Strategic Studies Department, Retrieved,10June,2025 from <https://trendsresearch.org/insight/significance-and-implications-of-ukraines-operation-spiderweb/?srsltid=AfmBOoqxmnF1DW1VPO5YbFmOsItQk8PztUcy>
- Trivedi, Saurabh. (July 16, 2025).Pakistan's drones failed to inflict any damage to Indian military or civil infrastructure during Operation Sindoor, said Chief of Defence Staff General Anil Chauhan, The Hindu, New Delhi. <https://www.thehindu.com/news/national/self-reliance-in-uavs-counter-unmanned-aerial-systems-strategic-imperative-for-india-cds-chauhan/article69817607>.



Watling, J., and S. Kaushal. ( 2021). 'The Role of Drones in the Nagorno-Karabakh Conflict.' Royal United Services Institute (RUSI).Retrieved, 10th June,2025 from [RUSI]<https://rusi.org/explore-our-research/publications/commentary/drones-nagorno-karabakh-conflict>.

Wong ,Tessa. ( 3rd September, 2025)What new weapons on show at huge parade say about China's military strength. BBC News. <https://www.bbc.com/news/articles/cjr1reyr059o>.

Xiao Liang, Dr Nan Tian, Dr Diego Lopes da Silva, Lorenzo Scarazzato, Zubaida A. Karim and Jade Guiberteau Ricard (April 2025) Trends in World Military Expenditure, 2024 Stockholm.

Y. Martyniuk.(31st July, 2024) Media: Ukrainian Drone Downs Russian Mi-8 Helicopter in First Such Attack. Accessed: Nov. 25, 2024. [Online]. Available: <https://euromaidanpress.com/2024/07/31/media-ukrainian-drone-downs-russian-mi-8-helicopter-in-first-such-attack>.

Zenko, Micah. (February 27, 2012),When Drones Were Created, How They're Used, And What Their Future Looks Like, Retrieved, 9th June, 2025 from <https://foreignpolicy.com/2012/02/27/10-things-you-didnt-know-about-drones>.