DEFENSE AND AEROSPACE PROGRAM

JUNE 2025

INDIA'S DRONE IMPERATIVE

Securing Air Superiority Against China and Pakistan by 2030

CSDR
COUNCIL FOR STRATEGIC AND DEFENSE RESEARCH

Recommended citation:
Desai, Hely (2025), Shashank Tiwari. India’s Drone Imperative: Securing Air Superiority Against China and Pakistan by 2030. New Delhi: Council for Strategic and Defense Research.

C-21, 3rd Floor, Qutub Institutional Area, New Delhi, India - 110016.
Phone: 011-43104566 | Email: office@csdronline.org | Web: www.csdronline.org | Twitter:@CSDR_India

ABOUT THIS REPORT

India faces a critical 2030 deadline to achieve drone superiority or risk strategic vulnerability. This comprehensive report analyzes the dual threat from China's AI-enabled "intelligentized warfare" capabilities and Pakistan's cost-effective asymmetric drone strategy. While China deploys over 1,000 advanced UAVs including hypersonic reconnaissance platforms, Pakistan leverages Turkish and Chinese partnerships for credible strike capabilities. India's response combines foreign acquisitions like MQ-9B drones with indigenous development through DRDO and private sector initiatives. However, supply chain vulnerabilities, bureaucratic bottlenecks, and dependence on Chinese components threaten progress. The report advocates for a unified National Mission for Unmanned Systems to coordinate procurement, accelerate indigenous production, and establish India as a global drone power by 2030.

ABOUT CSDR'S DEFENSE AND AEROSPACE PROGRAM

CSDR's Defense and Aerospace Program conducts research, policy analysis, and business consulting. It collaborates with government entities to present various policy options for achieving defense manufacturing, indigenization, and export goals. It also supports private industry in these sectors through comprehensive market research and strategy development services. In partnership with the Indian Armed Forces, we provide critical insights into the implications of emerging technologies and their impact on warfare and security scenarios through battlespace trend analysis and forecasts. Additionally, our program conducts research to formulate procurement strategies and warfighting doctrines that align with these new technologies and weapon systems.

ABOUT COUNCIL FOR STRATEGIC AND DEFENSE RESEARCH

Founded in January 2020 by Lt. Gen. D.S. Hooda (Retd.) and Dr. Happymon Jacob, CSDR is an innovative think tank and consultancy specializing in foreign policy, geopolitical risk, connectivity, and critical areas of defense and aerospace. With a focus on the Indian subcontinent, Eurasia, and the Indo-Pacific, CSDR is committed to generating strategic insights that drive meaningful change. Read more at www.csdronline.com

AUTHORS

Hely Desai - Research Associate, CSDR
Shashank Tiwari - Research Intern, CSDR

RESEARCH DIRECTION

Dr Gaurav Saini, Co-founder CSDR

Executive Summary

India confronts a closing strategic window, set to shut by 2030, within which it must achieve indigenous superiority in unmanned aerial systems (UAS) or risk profound vulnerability. The nation is caught between two converging threats: China's rapid pursuit of high-tech, 'intelligentized' warfare, and Pakistan's effective use of cost-efficient, asymmetric drone capabilities acquired from partners like Türkiye and China. Failure to master this domain will erode India's conventional deterrence, expose it to hybrid warfare, and severely curtail its strategic autonomy in an increasingly volatile region.

China is not merely acquiring drones; it is integrating them into a comprehensive military doctrine. With a vast and sophisticated arsenal that includes stealthy combat UAVs (GJ-11), hypersonic reconnaissance platforms (WZ-8), and concepts for AI-driven swarm attacks, Beijing is positioning itself for technological dominance. Concurrently, Pakistan has astutely leveraged foreign partnerships to field a credible drone force, including armed Bayraktar TB2 and Wing Loong II UAVs. Additionally, its strategy effectively utilizes lower-cost unmanned systems to challenge India's conventional military advantages, creating a persistent, low-threshold threat along the border. The 2025 4-day conflict, following Operation Sindoor, while demonstrating Indian adaptability, starkly revealed gaps in countering swarm tactics and sustaining large-scale offensive drone operations.

India's response, while showing remarkable success, needs to remain ahead of the curve. Positive steps, including the procurement of MQ-9B drones, the liberalization of drone rules, and the emergence of a domestic industry through schemes like iDEX and PLI, are commendable. However, these initiatives operate in the absence of a unified drone strategy. This ad-hoc approach is also undergirded by critical vulnerabilities, such as:

- A brittle supply chain: An alarming dependency on imported components, particularly from China, exposes the domestic ecosystem to significant security risks, including hardware backdoors and supply disruptions.
- Institutional inertia: Bureaucratic silos and legacy procurement processes, unsuited for a rapidly evolving technology sector, impede innovation and delay the fielding of critical capabilities. There is no central, empowered body to drive a cohesive national vision.
- Persistent capability gaps: Despite progress, India is yet to operationalize a potent, indigenously designed and produced armed UAV at scale, a capability its adversaries have already integrated into their forces.

Ceding drone superiority by 2030 is not an option. It would embolden adversaries, undermine India's ability to project power in the Indian Ocean Region, and force it into a perpetual state of technological catch-up. To avert this, a decisive strategic pivot is required.

This report advocates for an urgent and cohesive National Mission for Unmanned Systems. This mission must be empowered to:

- Drive a unified strategy: Formulate and execute a single, national-level roadmap that synchronizes efforts across military, industry, and R&D institutions.
- Overhaul procurement: Implement agile acquisition models to rapidly transition systems from prototype to operational deployment, providing clear, long-term demand signals to the private sector.
- Secure the industrial base: Aggressively fund and mandate the indigenous development of critical sub-systems—including propulsion, sensors, and communication links—to build a resilient and secure supply chain.

- Prioritize disruptive technologies: Focus investment and R&D on next-generation capabilities, including AI-driven autonomy, swarm operations, and advanced counter-UAS systems, to leapfrog existing technologies rather than merely matching them.

The 2030 deadline is not just a target; it is a strategic imperative. The time for isolated successes is over. Only a unified, mission-oriented approach will ensure India can secure its skies and its strategic future.

The Strategic Imperative

The Closing Window

The global landscape of military operations has been profoundly transformed by the rapid proliferation and deployment of Unmanned Aerial Systems (UAS), commonly known as drones. Drones have become indispensable to modern militaries due to their ability to undertake "dull, dirty, and dangerous" missions,[1] ranging from long-endurance surveillance and operations in contaminated zones to high-risk engagements in contested airspace. While initially limited to reconnaissance, UAS now supports a broad spectrum of missions, including intelligence gathering, target acquisition, precision strikes, and battle damage assessment. Armed variants, called unmanned combat aerial vehicles (UCAVs), like MQ-9 Reaper, Karrar, and Wing Loong II can deliver standoff attacks against enemy armor and fortifications, while others conduct interdiction or even air-to-air combat. Some platforms, such as the General Atomics YFQ-42 (in development), are equipped to intercept incoming threats, including cruise missiles and enemy drones.

Against this backdrop, a strategic window extending to 2030 potentially serves as a pragmatic planning benchmark for India to consolidate and scale up its indigenous drone capabilities, a timeline close enough to compel urgency, yet distant enough to allow for meaningful course correction. The pressing nature of this timeline is driven by the accelerating trajectory of modern warfare and the region's fragile geopolitical balance. While optimism is warranted, establishing a defined horizon remains essential to drive strategic coherence across policy, investment, and institutional focus. The imperative is clear: delays in achieving drone maturity, particularly in armed and autonomous systems, could expose India to increasing vulnerabilities in an already volatile security environment where both China and Pakistan are investing heavily in unmanned platforms to complement conventional military strategies with asymmetric capabilities.

Global trends indicate that between now and 2030, several key adversaries are expected to achieve higher levels of autonomy, scale, and integration in their UAS fleets.[2] For India, this means that the coming five years represent a critical window for operationalizing and mainstreaming unmanned capabilities at scale.

The 2030 deadline is not just a target; it is a strategic imperative. The time for isolated successes is over. Only a unified, mission-oriented approach will ensure India can secure its skies and its strategic future.

"Global trends indicate that between now and 2030, several key adversaries are expected to achieve higher levels of autonomy, scale, and integration in their UAS fleets. For India, this means that the coming five years represent a critical window for operationalizing and mainstreaming unmanned capabilities at scale.

The Dual Challenge: China & Pakistan

India faces a similarly critical challenge as militaries worldwide struggle to keep pace with the rapidly evolving threat of drones. Confronted with concurrent threats on both its fronts, from a belligerent China and an increasingly militarized Pakistan, and burdened by a mixed record in self-reliant defense production, achieving a credible indigenous drone ecosystem is no longer aspirational; it is imperative.

The 2025 India-Pakistan conflict, following Operation Sindoor, was a pivotal moment in which India successfully demonstrated its capabilities in loitering munitions, air defense integration, and ISR operations. Yet, the conflict also revealed limitations that require attention. These included gaps in swarm drone operations, constraints in deploying offensive loitering munitions at scale, and challenges in sustaining ISR missions in contested environments. Pakistan's use of Turkish-origin TB2 drones, Chinese YIHA-III loitering munitions, and armed quadcopters,[3] often in coordinated formations, highlighted the shifting nature of regional aerial threats. Even if these platforms were not decisive on their own, they signaled a broader trend: a growing reliance on relatively low-cost, commercially adaptable drones to challenge India's conventional superiority.

This emerging threat landscape necessitates a recalibrated doctrinal and procurement approach, emphasizing rapid induction of scalable unmanned systems and strengthening counter-UAS capabilities across all services.

This shift is even more pronounced in the case of China, where growing drone capabilities are part of a broader military modernization drive aimed at enhancing force projection and operational reach. Its procurement patterns and joint exercises point to a deliberate effort to integrate unmanned systems into operational frameworks. With a fleet of over 1,000 MALE and HALE-class UAVs and significant investments in AI-enabled swarm technologies and electronic warfare integration, China is weaving drones into joint force operations. It is one of the world's largest exporters of armed drones, with over 280 combat Unmanned Aerial Vehicles (UAVs) delivered to more than 17 countries[4] between 2011 and 2023.[5] It has fielded a diverse range of systems—including the CH-4, Wing Loong I/II, and WZ-7—and is integrating them into joint combat doctrines for surveillance, strike, and electronic warfare missions, particularly along the Line of Actual Control (LAC) with India and over the Indian Ocean.[6]

China's integrated approach underlines the strategic imperative for India to accelerate doctrinal reforms and invest in scalable, networked unmanned platforms that can operate synergistically within a multi-domain operational framework.

By comparison, however, New Delhi is progressing only from a constrained baseline. The number of MALE/HALE UAVs is broadly on par with Pakistan's, but unlike Pakistan, India is yet to operationalize any indigenous armed UAV. While DRDO's Rustom-2 (TAPAS-BH-201) completed user-evaluation trials by mid-2023 and is slated for limited production, and the Archer and Archer-NG drone series completed their taxi trials in February 2025,[7] these platforms are still undergoing evaluation. Indigenous swarm drones, loitering munitions such as SkyStriker and Nagastra-1, and tactical UAVs like

> "New Delhi is progressing only from a constrained baseline. The number of MALE/HALE UAVs is broadly on par with Pakistan's, but unlike Pakistan, India is yet to operationalize any indigenous armed UAV. While DRDO's Rustom-2 (TAPAS-BH-201) completed user-evaluation trials by mid-2023 and is slated for limited production, and the Archer and Archer-NG drone series completed their taxi trials in February 2025, these platforms are still undergoing evaluation.

SWITCH have seen operational deployment, but broader doctrinal integration and mass production are still in the process of evolving.

Furthermore, institutionalizing a dedicated inter-service unmanned systems command or directorate could enhance coordination, facilitate joint capability development, and enable agile decision-making, thereby overcoming entrenched bureaucratic silos that currently impede rapid innovation and deployment.

Consequences of Inaction

The most immediate consequence would be heightened vulnerability to asymmetric and hybrid warfare tactics from both China and Pakistan. A significant drone capability gap would lead to an erosion of India's conventional deterrence posture and its ability to maintain escalation dominance in a crisis. If adversaries perceive India to be deficient in offensive or defensive drone capabilities, their calculus regarding the risks and benefits of initiating hostilities could shift. They might be emboldened to undertake aggressive actions, confident that they can leverage their drone superiority to achieve tactical objectives or inflict unacceptable costs on India while minimizing their exposure. At its core, this is not just a technological lag—it reflects a deeper asymmetry in operational risk tolerance that may be rooted in divergent political intent. Adversaries willing to accept unmanned losses do so because their political calculus permits sustained low-intensity coercion below conventional thresholds, enabling them to incrementally shift strategic balances without provoking full-scale conflict. This dynamic exploits not only military capability gaps but also India’s hesitation and a potential lack of political intent to escalate, allowing adversaries to leverage ambiguity and restraint as strategic advantages.

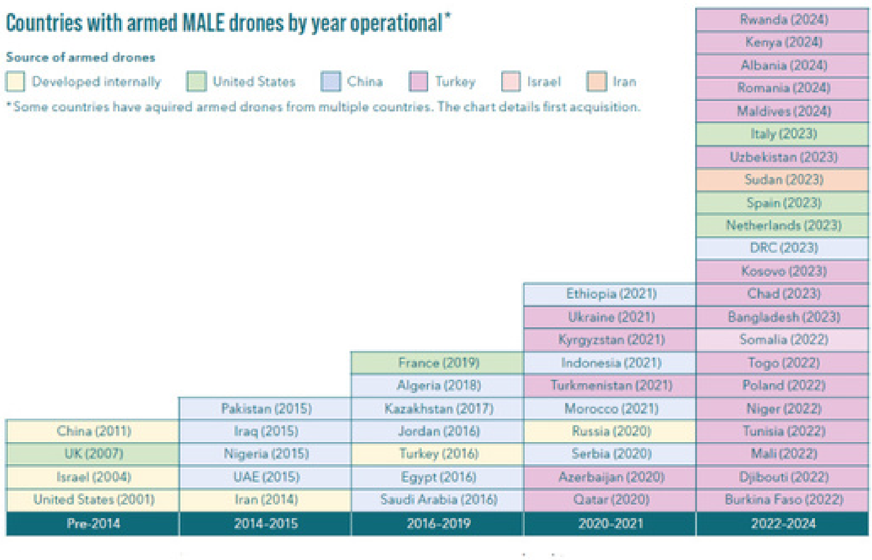
Finally, ceding drone superiority would inevitably lead to a diminished ability for India to project influence and safeguard its broader strategic interests in the Indian Ocean Region (IOR) and beyond. India's aspirations to be a leading power and a net security provider in the region are intrinsically linked to its technological and military capabilities. Maritime surveillance, anti-piracy operations, monitoring of Exclusive Economic Zones (EEZs), and disaster relief efforts are all areas where drones offer significant advantages. Without a resilient unmanned capability, India's ability to sustain presence, persistently monitor key corridors, and respond rapidly to evolving threats may face structural limitations. China's rapidly expanding naval power, increasingly complemented by long-range surveillance drones and potential carrier-based unmanned aerial vehicles, will pose a growing challenge to India's influence in its maritime backyard if India cannot field comparable or countervailing unmanned systems.

“Ceding drone superiority would inevitably lead to a diminished ability for India to project influence and safeguard its broader strategic interests in the Indian Ocean Region (IOR) and beyond...Without a resilient unmanned capability, India's ability to sustain presence, persistently monitor key corridors, and respond rapidly to evolving threats may face structural limitations.

Understanding the Drone Landscape

Over the past decade, more than 100 countries have incorporated UAS into their armed forces[8], with at least 48 nations operating armed MALE drones such as MQ-9 Reaper, Bayraktar TB2 and other UCAVs.[9] While India is not yet among these armed drone operators, this absence is a stark omission in the current strategic landscape and underscores the urgency of closing this capability gap.

Addressing this gap is critical not only for force modernization but also for maintaining strategic deterrence and operational parity in a rapidly evolving aerial warfare environment.



Source: Drone Wars UK

Types of Military Drones

Category	Role	Features	Examples
ISR Drones	Real-time intelligence, surveillance, reconnaissance	High-resolution cameras, EO/IR sensors, extended flight endurance	IAI Heron, MQ-9B SkyGuardian & SeaGuardian, RQ-4 Global Hawk
Unmanned Combat Aerial Vehicles (UCAVs)	Precision strike	Armed with missiles or bombs; may include stealth/autonomy	MQ-9 Reaper, Ghatak (stealth UCAV under development)
Loitering Munitions (Kamikaze Drones)	Hover, identify, and strike with built-in warhead	Typically single-use, GPS/laser guided	SkyStriker (used in Operation Sindoor), Nagastra-1
Commercial-Off-The-Shelf (COTS) Drones	Adapted for reconnaissance, surveillance, tactical ops	–	DJI Mavic series (surveillance), modified Dhaksha DH-HM (logistics support)
Logistics/Resupply Drones	Payload delivery to remote or contested zones	–	Dhaksha DH-HM, Raphe mR-20
Swarm Drones	Coordinated autonomous units for ISR, EW, or strikes	–	NewSpace Research swarm drones

Policy decisions have been initiated in the right direction. The approval of a 3.5 billion USD deal for 31 MQ-9B armed UAVs is a critical step.[10] India's expanding defense industrial base, especially through public-private partnerships, has also helped in developing viable UAS solutions. However, without a clearly defined long-term procurement roadmap and assured funding commitments, these initiatives risk delays and underutilization of industrial capacity. Production timelines, testing cycles, and inter-service harmonization remain areas that require acceleration. To maintain strategic parity, India must also institutionalize mechanisms for continuous technology upgradation and operational feedback, ensuring that indigenous platforms evolve in line with global advancements.

Moreover, the drone domain offers not only strategic but also economic opportunities. The global UAS market is growing rapidly, and India's defense exports, which increased from 83 million USD in 2013-14 to 2.63 billion USD in 2023-24,[11] stand to benefit from scalable, modular drone platforms. UAS represents a high-value, scalable product segment. The global drone market offers a unique entry point. India's competitive edge would lie in cost-effective platforms combining ISR, MALE, loitering munitions, and counter-UAS solutions, leveraging indigenized avionics, AI-enabled sensors, and secure electronics.

Threat Assessment: Regional Adversaries

China's Integrated Drone Strategy

Fleet overview and capabilities

China's ascent as a premier drone power is a defining feature of the contemporary military-technological landscape. China has developed and is actively advancing over 50 distinct drone platforms, with projections indicating production of nearly one million loitering munitions by 2026.[12] Among its most sophisticated systems is the WZ-8, a hypersonic reconnaissance drone capable of reaching up to Mach 3 at 100,000 ft, launched from an H-6M "mothership", of which there is currently no comparable operational drone.[13] Complementing this is the GJ-11 Sharp Sword, a stealthy UCAV with internal weapon bays, designed for precision strikes while minimizing radar exposure, and often seen as China's answer to the U.S. RQ-170 Sentinel, but with enhanced capabilities.[14] Additionally, the Jiu Tian drone carrier, an 11-ton UAV mother ship, can launch swarms comprising up to 100 smaller drones, enabling large-scale coordinated aerial assaults.[15]

Moreover, China has firmly established itself as a leading global exporter of unmanned aerial systems. The CH-4, for example, is cited as China's best-selling UCAV on the international market, with over 100 units delivered to foreign military users, generating approximately USD 2 billion in revenue.[16] These systems have been acquired by a range of client states across the Middle East, Africa, and Asia, often drawn to their relatively lower costs compared to Western counterparts and fewer political restrictions on end-users.

> China has firmly established itself as a leading global exporter of unmanned aerial systems. The CH-4, for example, is cited as China's best-selling UCAV on the international market, with over 100 units delivered to foreign military users, generating approximately USD 2 billion in revenue.

Such capabilities reflect a strategic emphasis not only on advanced technological development but also on establishing an integrated doctrinal framework that prioritizes large-scale unmanned force deployment and synchronized multi-domain operations.

Drone System (Model)	Type	Origin	Endurance (hours)	Armaments	Key Roles
BZK-005 (Sea Eagle / Giant Eagle)	MALE UAV (BZK-005C: MALE UCAV)	China	40	Yes	ISR, strike
GJ-1 (Gongji-1 / Wing Loong I)	MALE UCAV	China	Up to 24	EO turret, KD-9/10 ATGMs	Strike, Reconnaissance
GJ-2 (Wing Loong II)	MALE UCAV	China	32	EO turret, KD-9/10 ATGMs, FT-10/FT-9/FT-7 bombs, BRM1/AKD-10/BA-7 missiles	Surveillance, Aerial Reconnaissance, Precision Strike, Target Acquisition
CASC CH-4 (Rainbow-4)	MALE UCAV (likely CH-4B variant for PLA)	China	Up to 40 (reconnaissance)	AR-1/AR-2 missiles, AKD-10, BRMI-90 rocket, FT-7/FT-9/FT-10 bombs, GB-7/50	Mixed Attack and Reconnaissance
CASC CH-5 (Rainbow-5)	MALE UCAV	China	Up to 60 (extendable to 120)	AR-1/AR-2 missiles (max 16)	ISR, Attack, Cooperation with other CH-series
Tengden TB-001 (Twin-Tailed Scorpion)	MALE UCAV	China	35	250kg laser-guided bombs, FT-7/FT-9 bombs, AR-4/AR-3 missiles, FT-8D/FT-10 missiles	ISR, Communications Relay, Offensive Strike, ASW (MAD sensor variant)
WZ-7 Soaring Dragon (Xiang Long)	HALE UAV, Maritime Surveillance & Patrol	China	10+ (prototype 10h; production longer)	No	ISR
WZ-8	Hypersonic Reconnaissance UAV (air-launched)	China	N/A (Rocket-powered dash)	No	ISR, Pre-attack Target Assessment
GJ-11 Sharp Sword (Lijian)	Stealth UCAV (flying wing)	China	Not specified (Range 4,000 km)	Yes (Internal bays; Bombs)	Precision Strike, ISR, Electronic Warfare
ASN-301	Loitering Munition, Anti-radiation	China	Not specified	Anti-radiation warhead	(SEAD), Precision Attacks
CASC CH-901	Loitering Munition / Tactical UAV	China	Not specified	Precision strike warhead	ISR, Precision Strike
KVD-001	Tactical UAV (fixed-wing)	China	Not specified	No	ISR, Communications Relay
XS101	Loitering Munition (man-portable)	China	Not specified	Explosive warhead	Infantry support, Precision strikes

Source: Defence Hub

Above is the CH-4, closely resembling the General Atomics MQ-9 Reaper (below right), seen during landing. The key visual distinction is the absence of the ventral fin below the V-tail, which is present on the MQ-9. The CH-4 exists in two variants: the CH-4A, a long-range reconnaissance drone with a 3,500–5,000 km range and 30–40 hour endurance, and the CH-4B, a mixed attack-reconnaissance platform capable of carrying six weapons with a payload capacity of 250 to 345 kg. It can fire air-to-ground missiles from an altitude of 5,000 meters, enabling it to stay outside the range of most anti-aircraft guns while offering a wider field of view.

General Atomics MQ-9 Reaper
Source: AFP

Wing Loong II is designed for both reconnaissance and strike missions. It can carry up to 12 air-to-ground weapons with a maximum payload of 480 kg and has an endurance of over 20 hours. It features an inverted V-tail, a ventral electro-optical turret, and straight wings with underwing hardpoints.
Source: Global Times

Source: REUTERS PHOTO: X01793

WZ-7 (Soaring Dragon) is a HALE UAV developed by China for strategic reconnaissance. It features a distinctive tandem-wing design (joined forward and rear wings) and a V-tail, optimized for high-altitude stability and endurance. Powered by a single jet engine, the WZ-7 is designed to operate at high altitudes for extended durations, supporting missions such as border surveillance and maritime patrol.

Intelligentized warfare doctrine

Its drone warfare strategy is deeply intertwined with its broader military modernization and the doctrinal concept of ‘intelligentized warfare’ which emphasizes the seamless integration of artificial intelligence, big data analytics, autonomous systems, and advanced networking capabilities to achieve decision superiority and operational dominance across multiple domains.[17] The anticipated future battlefield, from a Chinese perspective, is one where human-on-human combat may be secondary to machine-on-machine engagements or sophisticated human-machine teaming.

Strategically, China’s investments reflect a deliberate state-driven effort to achieve comprehensive unmanned force integration, enabling not only tactical battlefield advantages but also shaping geopolitical power projection capabilities across the Indo-Pacific region and beyond into key global theaters.

China has explicitly stated its ambition to be a global leader in AI by 2030.[18] This aligns with its broader military modernization objectives, which foresee significant advancements in 'intelligentized' warfare capabilities by 2035, with the 2027 PLA centenary serving as an earlier checkpoint.[19] By 2030, it is highly probable that China will have operationalized many of its next-generation drone concepts.

This export strategy not only generates economic returns but also extends China’s geopolitical influence by creating dependencies through technology proliferation and defense partnerships, reinforcing its position in global defense markets.

Implications for India

Against this backdrop, India faces a strategic dilemma: contending with Pakistan's asymmetric employment of cost-effective UAVs that exploit conventional weaknesses, while simultaneously confronting China's rapid integration of advanced, AI-enabled drone systems into a comprehensive military modernization. Yet, India's policy framework remains fragmented, lacking a cohesive national UAS strategy that aligns procurement, indigenous innovation, and doctrinal evolution. Critical gaps in cross-service coordination, technology absorption, and export control policies hinder India's ability to respond dynamically to multi-domain unmanned threats. Addressing these deficiencies will require India to pivot from reactive procurement towards anticipatory, capability-driven policy-making that recognizes the dual challenge of asymmetric disruption and high-end technological competition.

"Against this backdrop, India faces a strategic dilemma: contending with Pakistan's asymmetric employment of cost-effective UAVs that exploit conventional weaknesses, while simultaneously confronting China's rapid integration of advanced, AI-enabled drone systems into a comprehensive military modernization.

Pakistan's Asymmetric Approach

Partnership-driven acquisitions

As unmanned systems become integral to contemporary military doctrine, Pakistan's drone strategy reflects a calculated shift toward adaptive, cost-efficient asymmetry within South Asia's evolving strategic landscape. For Islamabad, its drone development is primarily driven by its military requirements and its strategic competition with India. Its investment in UAVs offers strategic advantages: it provides a cost-effective boost to its stretched defense budget, creates capability symmetry with India, particularly as a counter to India's missile systems, and enables easy transfer of drones to non-state actors for cross-border insurgent operations.[20]

There is significant reliance on close partnerships with China and Türkiye for access to advanced drone technology, financial assistance, and co-production opportunities.[21] These partnerships have been crucial in enabling Pakistan to acquire and field relatively modern UCAVs and loitering munitions.

Cost-effective force multiplication

This trajectory reflects a broader strategic logic - using unmanned systems as a tool of targeted asymmetry to overcome conventional disadvantages without engaging in full-spectrum platform parity with adversaries.

Pakistan's strategy, therefore, hinges on using cost-effective, technologically accessible drone platforms to offset India's conventional military advantages and inflict asymmetric costs. Leveraging Chinese and Turkish UAV technologies, particularly through joint ventures and technology transfers, Islamabad has developed a credible and adaptive drone capability.

Capabilities assessment

While official figures remain undisclosed, unofficial estimates suggest the Pakistan military operates approximately 80 HALE/MALE platforms, including around two dozen armed UCAVs.[22]

Indigenous efforts by organizations such as the National Engineering and Scientific Commission (NESCOM) and Global Industrial and Defence Solutions (GIDS) demonstrate progress in developing platforms like the Burraq and Shahpar series. Yet, Pakistan's civilian drone industry remains relatively weak, which may limit broader technological spin-offs and applications.[23] Furthermore, performance claims for some indigenous systems, such as the endurance and payload of the Shahpar-II, have been noted as unverified.[24]

“Indigenous efforts by organizations such as the National Engineering and Scientific Commission (NESCOM) and Global Industrial and Defence Solutions (GIDS) demonstrate progress in developing platforms like the Burraq and Shahpar series. Yet, Pakistan's civilian drone industry remains relatively weak, which may limit broader technological spin-offs and applications.

Shahpar-II is a MALE drone developed by Pakistan’s Global Industrial & Defence Solutions (GIDS) for intelligence, surveillance, and precision strike missions. It features a pusher-propeller configuration, high-mounted straight wings, and a V-tail. The drone is equipped with electro-optical sensors and can carry guided air-to-surface munitions. Shahpar-II has an endurance of over 14 hours and supports both day and night operations.
Source: Aaj Tak

Burraq is based on Chinese designs. It features a pusher-propeller configuration, straight wings, and a V-tail. Designed primarily for precision strike missions, Burraq is equipped with laser-guided air-to-surface missiles and has been used in counterterrorism operations within Pakistan’s borders
Source: Millennium Post.

Key Acquired Systems

From Türkiye: Pakistan has operationalized the combat-proven Bayraktar TB2 MALE UCAV, offering up to 27 hours of endurance, and the more advanced Bayraktar Akıncı HALE UCAV, which carries a 1,500 kg payload with 24-hour endurance. Another notable platform is the Asisguard Songar, an armed quadcopter with reported swarming capabilities, allegedly deployed during Operation Sindoor. Pakistan is also believed to operate the Byker YIHA-III loitering/kamikaze drone, possibly developed through a joint venture with Türkiye.[25]

From China: Pakistan's fleet includes Chinese MALE UCAVs like the CH-4B and Wing Loong II, both offering over 30 hours of endurance and payloads exceeding 300 kg.[26] These systems significantly bolster ISR and precision-strike capabilities, particularly in contested airspace and during cross-border surveillance missions.

Bayraktar TB2 is a Turkish MALE armed UAV designed for surveillance and precision strikes. It features a distinctive twin-boom tail, high-mounted straight wings, and a pusher-propeller configuration. The TB2 can carry up to four laser-guided munitions and has an endurance of over 24 hours.
Source: Baykar

Bayraktar Akıncı, developed by Baykar, features a twin-boom tail, turboprop engines mounted on each wing, and a large fuselage for advanced sensors and weapon systems. Akıncı can carry a wide range of munitions—including air-to-ground and air-to-air missiles—with a payload capacity of up to 1,500 kg and an endurance exceeding 24 hours.
Source: Baykar

Bayraktar YIHA-III is a low-cost loitering munition (kamikaze drone) co-developed by Turkey's Baykar and Pakistan's National Aerospace Science and Technology Park (NASTP). It uses an OMTAS-based missile fuselage with wings and rear-mounted propeller, can loiter before a precision terminal attack, and supports both runway and catapult launch modes.
Source: Defence Blog

Drone System (Model)	Type	Origin	Endurance (hours)	Armaments	Key Roles
Bayraktar Akinci	HALE UCAV	Acquired (Turkey)	24	Yes (MAM-L/T/C, Roketsan Cirit)	ISR, Strike
Bayraktar TB2	MALE UCAV	Acquired (Turkey)	27	Yes (MAM-L/C)	ISR, Strike
Wing Loong II	MALE UCAV	Acquired (China)	32	Yes (AR-1/2, Blue Arrow 7)	ISR, Strike
CH-4B	MALE UCAV	Acquired (China)	12 (strike) / 30 (recon)	Yes (AR-1, FT-9 bombs)	ISR, Strike
CH-3	MALE UCAV	Acquire (China)	12 to 15	Yes (AR-1 FT-9 bombs)	ISR, Strike
Burraq	MALE UCAV	Indigenous (NESCOM, with China assist)	12	Yes (Barq laser-guided missiles)	ISR, Strike
Shahpar-II	MALE UCAV	Indigenous (GIDS)	14	Yes (Planned: Barq-2, LG bombs)	ISR, Target Acquisition
Byker YIHA-III	Loitering Munition (OWA)	JV (Pakistan/Turkey)	Unknown	Yes (HE Warhead)	Precision Strike
Asisguard Songar	Armed Quadcopter	Acquired (Turkey)	~20-30 mins	Yes (Machine gun/Grenade launcher)	Close Air Support, Swarm Attack
EMT Luna X-200/Luna NG	UAV	Acquired (Germany)	6 (X-200), 15 (NG)	No	ISR
Selex ES Falco	MALE UAV	Acquired (Italy)	14	No	ISR
Boeing Insitu MQ-27 ScanEagle	UAV	Acquired (USA)	18	No	ISR

India’s Current Position

Existing Capabilities & Inventory

In contrast to China’s aggressive and highly integrated drone modernization, India’s approach reflects a more incremental progression shaped by legacy dependencies and emerging indigenous efforts.

India's drone inventory reflects a multi-layered strategy, combining sophisticated foreign systems for high-end tasks with a growing portfolio of indigenous and smaller imported systems for tactical and potentially attritable roles. India’s unmanned aerial capabilities have expanded significantly, combining legacy imports with growing indigenous development. Long reliant on Israeli platforms like the Searcher and Heron I/II for ISR, India is now transitioning to more advanced systems, notably with the October 2024 deal to acquire 31 MQ-9B drones—SeaGuardians for the Navy and SkyGuardians for the Army and Air Force, set for delivery by 2030.[27] While this tiered approach demonstrates adaptability, it also highlights India’s continued dependence on external suppliers for critical technologies, especially in high-altitude endurance and precision strike domains. Moreover, the absence of a unified acquisition strategy across services has at times led to platform redundancy and suboptimal resource allocation.

Indigenously, DRDO's TAPAS-BH has demonstrated ISR and ELINT utility, but it falls short of military expectations. India's loitering munitions inventory includes Israeli-origin Harop and Harpy drones, supplemented by domestic systems such as SkyStriker (Adani-Elbit) and Nagastra-1 (Solar Industries), both of which were deployed during Operation Sindoor.[28] Archer-NG, a tactical armed UAV, is undergoing trials, while the stealth Ghatak UCAV is slated for its first flight by 2028.[29] India is also investing in autonomous swarm drones through startups like NewSpace Research and Raphe mPhibr, with systems already fielded by the Army.[30] For tactical ISR, the SWITCH drone by ideaForge is widely deployed in high-altitude zones.[31] These platforms, spanning HALE imports to man-portable drones and autonomous swarms, reflect India's emerging multi-tiered aerial ecosystem.

Strategically, it seems that India is pursuing a layered, multi-tier drone doctrine: HALE UAVs for persistent ISR and remote strikes, indigenous MALE and tactical drones to reduce reliance, loitering munitions for SEAD and cross-border strikes, autonomous swarms for tactical saturation, and local C-UAS systems for defense. The dual challenge is balancing short-term force multipliers, such as the MQ-9 B, with the imperative of nurturing platforms like Archer-NG, Ghatak, and swarm technology. Without a clear roadmap for lifecycle sustainment, training ecosystems, and doctrinal standardization, operational gains risk becoming uneven or short-lived. Success will hinge on closing capability gaps by 2030, especially in autonomy, HALE endurance, and operational integration, to sustain credible deterrence against technologically advanced adversaries.

TAPAS-BH-201 (formerly Rustom-II) is an Indian MALE drone developed by DRDO for ISR (intelligence, surveillance, reconnaissance) missions. It features a twin-boom tail, straight wings, and a pusher-propeller configuration. TAPAS has an endurance of over 18 hours, a service ceiling of around 28,000 feet, and is designed to carry electro-optical, radar, and SIGINT payloads.
Source: First Post

Searcher Mk-II is a tactical UAV operated by India, originally developed by Israel Aerospace Industries (IAI). It features a twin-boom tail, high-mounted straight wings, and a front-mounted pusher propeller. Used primarily for reconnaissance and surveillance, it has an endurance of around 18 hours, a ceiling of ~20,000 feet, and carries electro-optical and infrared sensors for day-night operations.
Source: Military World

Heron is a MALE UAV developed by Israel Aerospace Industries and operated by India for strategic surveillance. It features a conventional fuselage with a pusher propeller, high-mounted wings, and a V-tail. The Heron can operate at altitudes up to 30,000 feet, with an endurance of over 30 hours, and is equipped with EO/IR sensors, maritime radar, and SIGINT payloads for all-weather, day-night operations.
Source: Alamo

Drone System (Model)	Type	Origin	Endurance (hours)	Armaments	Key Roles
MQ-9B Sky/SeaGuardian	HALE ISR/Strike	Acquired (in process) (USA)	30-40	Yes (Hellfire, GBU)	ISR, Precision Strike, Maritime Surveillance
Heron (IAI)	MALE ISR	Acquired (Israel)	30+	Yes (potential)	ISR, Target Acquisition
TAPAS-BH (Rustom-II)	MALE ISR	Indigenous (DRDO)	24-30 (target)	Yes (planned)	ISR, ELINT, COMINT
SkyStriker	Loitering Munition	JV (Adani-Elbit/Alpha Design, India/Israel)	1 to 3	Yes (HE Warhead)	Precision Strike, SEAD
Searcher Mk I/II	MALE ISR	Acquired (Israel)	20	No	Surveillance, Reconnaissance
HAROP	Loitering Munition	Acquired (Israel)	6	Yes	Precision Strike, SEAD
Harpy	Loitering Munition	Acquired (Israel)	2	Yes	Precision Strike, SEAD
Elbit Hermes 900	MALE UAV	Acquired (Israel)	30	No	ISR
Warmate	One Way Attack (OWA UAV)	Acquired (Poland)	80 min	Yes	Precision Strike, SEAD
Newspace Beluga/Nimbus	Swarm	Indigenous	3	No	Surveillance, Swarm tactics
IFT SWITCH	UAV	Indigenous (ideaForge)	2	No	Logistics, ISR
Netra	ISR	Indigenous (DRDO & ideaForge)	30 min	No	Surveillance, Reconnaissance
Nagastra-1	Loitering Munition	Indigenous (Solar Ind./ZMotion)	1	Yes (HE Warhead)	Precision Strike
Archer-NG	Tactical Armed UAV	Indigenous (DRDO)	1	Yes (ATGMs, Precision Bombs)	ISR, Precision Strike
Ghatak (AURA)	Stealth UCAV	Indigenous (DRDO)	Medium	Yes (Internal Bay)	Deep Strike, ISR

Indigenous Development Progress

India has registered notable advancements in its indigenous UAV development and manufacturing capabilities, driven by a concerted push towards self-reliance in defense. The indigenous drone efforts, led by DRDO and a growing private sector, have produced promising platforms. Notably, the LOCUST (Low-Cost Unmanned Area Swarm Technology) program aims to deploy swarms of payload-equipped drones from IAF aircraft like the C-130J and C-295M.[32] Systems like the DRDO's Rustom-II (TAPAS-BH) MALE UAV, designed for ISR missions with future strike potential, Nagastra-1 loitering munition, with its unique parachute recovery system for aborted missions, and the Bhargavastra micro-missile array show significant progress. Furthermore, the Indian Army is mulling over pursuing a "Drone-Centric Warfare Capability" to enhance its operational effectiveness.[33] In the process, it has demonstrated initiative by collaborating with entities like the Terminal Ballistics Research Laboratory (TBRL) to develop and induct First-Person View (FPV) drones equipped with anti-tank munitions, showcasing a capacity for rapid, user-driven innovation.

The government's push for self-reliance is also reflected in procurement trends; in Fiscal Year 2024-25, an unprecedented 81% of defense contracts, valued at INR 2.09 lakh crore (approximately $ 24.28 billion), were awarded to domestic manufacturers, marking a significant reversal from previous import-heavy patterns.[34] UAVs have been identified as a key focus area within this modernization drive.[35] In 2021, industry-friendly Civil Drone Rules were introduced, marking a shift in the posture towards UAVs.[36] The Uttar Pradesh Defence Industrial Corridor (UPDIC), announced in the 2018-19 Union Budget, is particularly prominent in plans for UAV development. The Aligarh node has been specifically identified as a hub for drones and anti-drone systems, with 24 firms allotted land, including companies like Verwin Defence and Amit Industries (producing radar systems).[37]

> In 2021, industry-friendly Civil Drone Rules were introduced, marking a shift in the posture towards UAVs. The Uttar Pradesh Defence Industrial Corridor (UPDIC), announced in the 2018-19 Union Budget, is particularly prominent in plans for UAV development. The Aligarh node has been specifically identified as a hub for drones and anti-drone systems, with 24 firms allotted land, including companies like Verwin Defence and Amit Industries (producing radar systems).

The Production Linked Incentive (PLI) scheme for drones and drone components had a defined outlay of INR 120 crore (USD 13.93 million) spread over three financial years (FY 2021-22 to FY 2023-24).[38] For broader Research and Development (R&D), INR 449.62 crore (USD 52.18 million) has been allocated to the Innovations for Defence Excellence (iDEX) initiative, including its sub-scheme Acing Development of Innovative Technologies with iDEX (ADITI), for the 2025-26 fiscal year.[39] However, this momentum risks being undermined by fragmented acquisition cycles, unclear long-term demand signals, and limited synchronization between operational requirements and R&D roadmaps. A national-level integration cell or apex drone authority may be required to rationalize efforts across services, ministries, and industrial stakeholders.

The current focus is also on promoting co-development and co-production with foreign partners rather than solely relying on direct imports. For the first time, India's first private drone manufacturing facility, located in Hyderabad, supplied more than 20 Hermes 900 MALE UAVs to Israel.[40] By 2030, India aims to establish itself as a global drone hub, recognizing the immense potential of this technology. The import policy now prohibits the import of drones in Completely Built-Up (CBU), Completely Knocked-Down (CKD), or Semi Knocked-Down (SKD) form, with exceptions granted for Research & Development, Defense, and Security purposes, while the import of drone components remains free.[41] That said, the current regulatory framework still lacks a consolidated approach to dual-use technologies and operational testing norms, which inhibits the rapid transition of prototypes into deployable systems. Streamlining the pathway from lab to line must be a policy priority.

Name of the Company	Established Year	Manufacturing / Assembling	Support Services	Data Management
Iotechworld	2017	✓	✗	✓
General Aeronautics	2016	✓	✗	✓
Droneacharya	2017	✗	✗	✓
Drone Destination	2019	✓	✓	✗
ideaForge	2007	✓	✓	✓
TROPOGO	2018	✗	✓	✓
ZUPPA	2008	✓	✗	✗
Datasol Innovative Labs	2010	✗	✗	✗
Marut Drones	2019	✗	✓	✓
Dhaksha Unmanned System	2019	✓	✗	✗
Aarav Unmanned System	2013	✓	✓	✓
AOTOM Technology	2005	✗	✗	✗
BharatRohan	2016	✗	✓	✓
UrbanMatrix	2019	✓	✓	✓
Vecros	2018	✓	✓	✓
Garuda Aerospace	2015	✓	✓	✓
Optimized Electrotech	2017	✗	✗	✓
Skylark Drones	2014	✗	✓	✓

Name of the Company	Established Year	Manufacturing / Assembling	Support Services	Data Management
TechEagle Innovations	2017	✓	✗	✗
Paras Aerospace	2019	✓	✓	✓

Additionally, despite these enabling policies, investor sentiment remains cautious due to opaque timelines for platform induction and limited visibility into long-term procurement roadmaps. Clarifying service-level requirements and ensuring predictable acquisition cycles will be key to sustaining private-sector interest. The government, however, projects a significant turnover in the drone market, estimating between INR 120 billion (1.40 billion USD) and 150 billion (1.75 billion USD) by 2026, supported by the PLI Scheme.[42]

> "Despite enabling policies, investor sentiment remains cautious due to opaque timelines for platform induction and limited visibility into long-term procurement roadmaps. Clarifying service-level requirements and ensuring predictable acquisition cycles will be key to sustaining private-sector interest.

AI is becoming a cornerstone of India's UAS modernization. AI-driven drones are now capable of real-time data processing for battlefield intelligence and are being integrated into logistics chains to improve supply efficiency under dynamic conditions. Platforms like the DRDO's Rustom UAV and HAL's Combat Air Teaming System (CATS) are embedding sensor fusion and AI for autonomous target acquisition and collaborative manned-unmanned operations.[43] The Shiv UAV by Aksi Aerospace utilizes AI-powered vision systems, eliminating the need for magnetometers and making it resistant to electronic jamming—a critical advancement for operations in GPS-denied environments.[44] However, to scale such breakthroughs, government policy must now shift toward institutionalizing AI integration through defined operational requirements, national AI testbeds, and incentivized private-sector collaboration under iDEX and SPV-led models.

Platform	Developer	AI Capabilities	Unique Features
Netra V5	ideaForge	Object/person tracking, analytics	Anti-collision, AI-enabled surveillance
Shiv UAV	Aksi Aerospace	Computer vision for navigation	Jam-resistant, no magnetometer
Rustom II	DRDO	Sensor fusion, autonomy	Medium altitude, long endurance ISR
CATS ALFA-S	HAL	Swarm AI coordination	Swarm decoys, coordinated strikes, MUM-T
Bhargavastra C-UAS	Solar Group	Threat detection & prioritization	Swarm neutralization up to 64 drones

The recent advancements in the UAV sector are undeniable. India is witnessing a surge in private companies and startups designing and manufacturing a wide array of drones for both civil and military applications. The armed forces are increasingly looking towards domestic players for their UAV requirements, from tactical surveillance drones to more advanced systems. However, this progress appears to be the result of a collection of well-intentioned but somewhat disconnected initiatives rather than a centrally orchestrated, long-term strategy. The current approach can be characterized as "strategy by announcement," where individual policies and schemes, while beneficial in isolation, do not necessarily add up to a cohesive whole.

This ad-hoc approach, while allowing for flexibility, presents several challenges that could impede India's achievement of its 2030 goals. Without a clear, overarching plan, there is a high probability of redundant research and development efforts across various government agencies, defense public sector undertakings (DPSUs), and private companies. This can lead to wasteful expenditure of financial and human resources, with multiple entities potentially "reinventing the wheel" in areas such as propulsion systems, communication links, and sensor integration. A national roadmap would delineate specific roles and responsibilities, ensuring a more focused and efficient allocation of resources towards key technological goals.

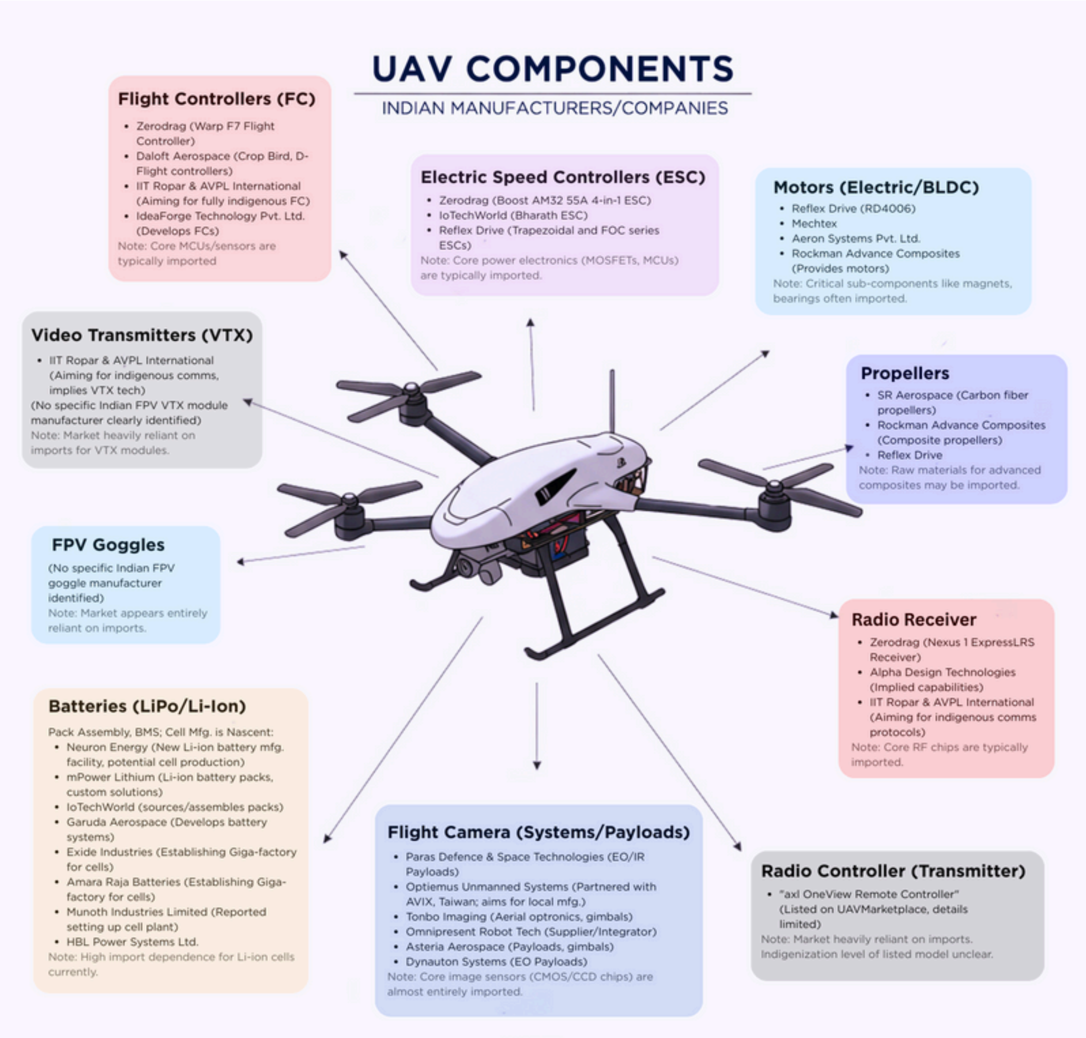


Image: CSDR

International Partnerships

To bridge the gap between operational needs and indigenous capacity, India has strategically leveraged partnerships primarily with the USA and Israel to advance its UAS ecosystem.

Partner Country	Foreign Entity	Indian Partner/Program	Focus Area	Output / Platform
Israel	IAI	DCX Systems / ELTX	Airborne radars, ground systems, UAS tech transfer	Co-development of ISR and UAS electronics
Israel	Elbit Systems	Adani Defence	MALE UAV production	Hermes 900 UAV localized production
Israel	Multiple	Indian Army, DRDO	Loitering munitions (kamikaze drones)	Tactical loitering munitions
USA	Anduril Industries	Mahindra Group	Counter-UAS, maritime autonomous platforms, AI integration	AI-enabled maritime drones, counter-drone tech
USA	US DOD/ASIA/INDUS-X	Indian startups & DRDO	Co-development of autonomous systems	R&D, prototyping, and tech transfer
France	Safran	HAL	Electro-optical payloads and navigation systems	Indigenous sensor capability in UAVs
UK	QinetiQ / BAE Systems	DRDO / Private sector	Testing and integration of swarm drones	Experimental and operational swarming UAVs

Lessons from Operation Sindoor (May 2025)

Conflict Overview and Drone Employment

The brief but intense May 2025 conflict—India’s Operation Sindoor—between two nuclear-armed neighbors highlighted a stark reality: while the threshold for military strikes using manned aircraft remains extremely high due to the risk of rapid escalation into the nuclear domain, the use of UAVs effectively lowers that threshold through a “grey zone” approach. With no clear international norms governing drone use, both sides deployed loitering munitions and swarms of UAVs to conduct strategic strikes and ISR, keeping the engagement limited and reversible. Unlike downed fighter jets—which carry political weight, pilot risk, and strong escalation potential—the loss of UAVs posed less immediate pressure to retaliate. The result was a calculated use of unmanned systems that avoided triggering nuclear alarms. Still, this doesn’t mean UAV strikes are escalation-free—attacks on critical infrastructure or nuclear-related sites could cross a red line, prompting full-scale war.

The conflict demonstrated a rapid, reactive cycle of drone deployment. Initial strikes by one side using a certain type of drone or tactic were often quickly met with countermeasures or imitative attacks by the other, indicating a steep, real-time learning curve for both militaries. For instance, India's reported use of loitering munitions early in the conflict was followed by Pakistan's deployment of its own kamikaze drones like the Yiha-III later.[45] Similarly, Pakistan's initial attempts to probe or saturate Indian air defenses with drone swarms were met by robust Indian AD responses, followed by Indian drone strikes specifically targeting Pakistani air defense assets. This tit-for-tat escalation within the drone domain, all occurring within a compressed four-day timeframe, highlights the dynamic and rapidly evolving nature of this new form of warfare. Prioritizing the development of agile procurement and rapid response frameworks is crucial to keep pace with the fast-evolving threats and operational tactics.

Possible remnants of Pakistan-launched Byker YIHA III Kamikaze drones found in Amritsar, Punjab, India.
Source: X/@ANI

Furthermore, these "drone duels" suggest that future conflicts in the region might increasingly feature a "battle for electromagnetic spectrum dominance" as a critical precursor or concurrent element to physical drone engagements. The reported Indian use of decoy drones and anti-radiation drones, alongside Pakistan's attempts at electronic deception and jamming, underscores the growing importance of disrupting enemy command and control (C2), intelligence, surveillance, and reconnaissance (ISR), and guidance systems.[46] The success of drone operations will progressively depend on the ability to protect one's own C2 links while effectively degrading those of the adversary, making electronic warfare (EW) and cyber capabilities as crucial as the drone platforms themselves.

"The reported Indian use of decoy drones and anti-radiation drones, alongside Pakistan's attempts at electronic deception and jamming, underscores the growing importance of disrupting enemy command and control (C2), intelligence, surveillance, and reconnaissance (ISR), and guidance systems.

Critical Gaps Revealed

Despite achieving success in its objectives, Operation Sindoor revealed notable vulnerabilities in India's drone and counter-drone posture.

First, Pakistan's ability to deploy massed drone swarms, primarily probing attempts and signals-intelligence missions, exposed India's susceptibility to saturation-style attacks. Although Indian air-defense systems held firm, more advanced and numerous swarms could pose a serious challenge, as legacy guns would be unable to handle such intensity.

Second, even contested reports of Indian manned aircraft losses highlight the heightened risks to traditional airpower operating amid dense drone and surface-to-air missile (SAM) environments. This underscores the critical need for enhanced suppression of enemy air defenses (SEAD) capabilities, potentially through the use of UCAVs and loitering munitions.

Third, while India effectively employed loitering munitions like SkyStriker and Harop for targeted SEAD and precision strikes, the country still lacks deeper, sustained offensive drone operations at scale—especially using indigenous platforms—against a peer adversary with integrated air defenses.

Fourth, maintaining persistent ISR in contested airspace remains a challenge for less stealthy UAVs, as they risk detection or loss in heavily defended zones.

Finally, the psychological impact of drone incursions, even when intercepted, on civilian populations near border regions was palpable. This experience underscores the need for not only stronger civil defense preparations but also effective public communication strategies during such crises.

“Pakistan's ability to deploy massed drone swarms, primarily probing attempts and signals-intelligence missions, exposed India's susceptibility to saturation-style attacks. Although Indian air-defense systems held firm, more advanced and numerous swarms could pose a serious challenge.

Post-Conflict Acquisitions

Pakistan

In the aftermath of Operation Sindoor, Pakistan has significantly enhanced its aerial combat and defense posture. It reportedly placed an order for 30 Chinese Wing Loong UCAVs to bolster its drone strike capabilities along the Line of Control and border regions.[47] Simultaneously, Islamabad is looking for a major arms package from China: 40 J-35A fifth-generation stealth fighters, alongside KJ-500 AEW&C aircraft, and HQ-19 ballistic missile defense systems.[48] These additions mark a shift toward multi-layered airpower dominance, with stealth, airborne situational awareness, and missile defense enhancing both offensive and defensive warfighting competencies. This expansion signals Pakistan's intent to leverage advanced technologies to offset its conventional disadvantages, intensifying the security dilemma in the region and, in turn, necessitating calibrated Indian responses across multiple domains.

To further reinforce its drone force structure, Pakistan is reportedly renewing its 2021 agreement with a Turkish firm for further attack drones, with high-level military discussions scheduled for July 2025.[49] Moreover, analyst Farrukh Saleem has proposed the formation of a Pakistan National Drone Army (PNDA), suggesting the institutionalization of UAV operations as a distinct force element.[50] All these investments are underpinned by a 20% hike in the defense budget for FY 2025–26, raising it to PKR 2.55 trillion (approx. USD 9 billion)—about 2% of GDP.[51]

> "To further reinforce its drone force structure, Pakistan is reportedly renewing its 2021 agreement with a Turkish firm for further attack drones, with high-level military discussions scheduled for July 2025... All these investments are underpinned by a 20% hike in the defense budget for FY 2025–26.

India

India, too, has taken several decisive steps post-Sindoor to strengthen its defense readiness. The Advanced Medium Combat Aircraft (AMCA) program has been fast-tracked, with new industry participation encouraged through tenders and partnerships focused on indigenous design and manufacturing.[52] The Ministry of Defence is poised to formally approve the procurement of three regiments of indigenous QRSAM (Quick Reaction Surface-to-Air Missile) systems, with a funding envelope of INR 30,000 crore (USD 3.48 billion), underscoring an emphasis on integrated air defense.[53]

Additionally, a supplementary defense budget provision of INR 50,000 crore (~USD 6 billion) is planned for the upcoming Winter Session of Parliament.[54] This boost aligns with priorities such as drone R&D, C-UAS deployment, and the rapid modernization of key defense systems. To ensure these investments yield strategic dividends, India must embed unmanned systems within broader deterrence and warfighting strategies, linking capability development with scenario-based force planning, adversary-specific threats, and targeted operational experimentation across diverse theatres.

> "India must embed unmanned systems within broader deterrence and warfighting strategies, linking capability development with scenario-based force planning, adversary-specific threats, and targeted operational experimentation across diverse theatres.

Critical Challenges Facing India

Strategic Dependencies

India's military remains significantly dependent on foreign suppliers for the acquisition and sustainment of its UAS capabilities. This reliance creates two major vulnerabilities.

First, in a crisis or conflict scenario, the limited number of operational UAVs—most of which require foreign-origin components or maintenance—could severely constrain India's ability to maintain surveillance coverage or supply lines. Such dependency exposes the armed forces to potential delays or denials of spare parts, software updates, or critical subsystems. Export control regimes, such as the U.S. International Traffic in Arms Regulations (ITAR), can restrict the transfer of specific payloads or data links, thereby reducing the operational flexibility and combat readiness of imported drones at the most inopportune times.

Second, continued reliance on off-the-shelf platforms hampers the growth of India's domestic drone ecosystem. It discourages long-term investments in critical technologies such as advanced avionics, stealth airframes, autonomous navigation, and AI-driven mission systems, creating persistent capability gaps and technological dependencies.

Bureaucratic Bottlenecks

India's most significant gaps in the drone domain are both institutional and technological. While the establishment celebrates isolated victories, such as DRDO's licensing of counter-drone systems or tactical UAV deployments during Operation Sindoor, there is no overarching body tasked with doctrinal evolution, inter-service integration, or strategic visioning for unmanned systems, which stunts operational integration. Currently under the DGCA, the formation of a centralized authority that bridges silos between defense services, industry, internal security, and research institutions may be beneficial.

"While the establishment celebrates isolated victories, such as DRDO's licensing of counter-drone systems or tactical UAV deployments during Operation Sindoor, there is no overarching body tasked with doctrinal evolution, inter-service integration, or strategic visioning for unmanned systems, which stunts operational integration.

This need arises fundamentally from the nature of drone warfare itself. Drones are inherently multi-domain platforms—they fly, hover, loiter, gather intelligence, strike targets, jam signals, and, in swarms, even shape operational tempo. They require integration not only across services (Air Force, Army, Navy) but also across ministries (Defence, Civil Aviation, Home Affairs) and functions (R&D, procurement, logistics, intelligence). A platform-agnostic, inter-ministerial command could ensure coherence in deployment, procurement, and innovation, overcoming current bureaucratic bottlenecks.

At the politico-strategic level, India currently lacks a formally articulated drone doctrine or framework. The potential role of UAV squadrons within the Indian Air Force's force structure and their operational integration across the Army, Navy, and Air Force remains unclear. This ambiguity reflects not just institutional inertia unsuited to the dynamic requirements of unmanned warfare, but also a deeper question: Is the political culture responsible for the slow uptake and doctrinal neglect of such unmanned systems? Or is it a result of the entrenched bureaucratic dysfunction and siloed decision-making that resists adaptive change?

Industrial Ecosystem Fragilities and Investment Uncertainties

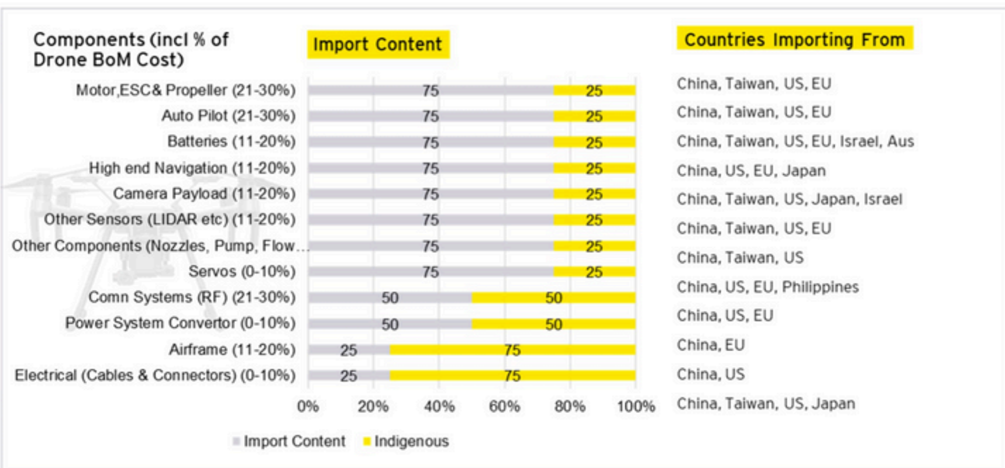
The current civil-military complex also suffers from legacy dysfunctions. Supply chains remain fragile, especially for high-end components such as AI processors and imaging sensors. Even as India plans to invest over 470 million USD in UAVs over the next two years, according to the Drone Federation of India,[55] this investment lacks strategic direction. Financing mechanisms for MSMEs remain insufficient, and there is little clarity on long-term government commitment. India's defense innovation is still treated as a siloed function. While initiatives like iDEX are promising, they are not substitutes for a sustained procurement strategy. The private sector repeatedly cites the lack of demand visibility and policy continuity as its greatest barrier.[56] A centralized command with a clear mandate and budgetary visibility may enable streamlining this relationship.

Supply Chain Vulnerabilities

The domestic manufacturing base remains fragmented, and supply chains are susceptible to vulnerabilities. The local manufacturing of core drone components is often scattered, small-scale, and lacks the capacity for producing critical items like military-grade sensors and high-performance microchips at the required scale and quality.[57] This forces even committed indigenous developers to rely on imports for key elements. The heavy reliance on imported components, particularly from a strategic competitor like China, establishes a critical strategic dependency. Case in point, in August 2024, the Defence Ministry formally cautioned domestic manufacturers against using any Chinese components, citing vulnerabilities to firmware backdoors and unauthorized data exfiltration.[58]

> "The domestic manufacturing base remains fragmented, and supply chains are susceptible to vulnerabilities. The local manufacturing of core drone components is often scattered, small-scale, and lacks the capacity for producing critical items like military-grade sensors and high-performance microchips at the required scale and quality...The heavy reliance on imported components, particularly from a strategic competitor like China, establishes a critical strategic dependency.

Subsequent intelligence audits by the Directorate General of Military Intelligence (DGMI) uncovered multiple cases where "indigenous" UAVs contained unverified Chinese electronics, prompting an urgent policy review.[59]In February 2025, the Indian Army scrapped a 27 million USD contract for 400 logistics and tactical drones after probes found embedded Chinese-origin parts, underscoring the scale of the threat to frontline capabilities.[60] China's documented behavior of restricting exports of dual-use technologies[61] and its overarching dominance in the global drone component market[62] provide Beijing with significant leverage. As the figure below illustrates, a substantial portion of India's drone hardware, particularly critical components such as propulsion systems, autopilots, batteries, sensors, and communication modules, is imported, with China being a major supplier.



Source: E&Y

Strategic Roadmap for Short & Long Term

Despite growing momentum, India lacks a unified strategic approach to building a robust UAS ecosystem. To evolve into a global drone leader, India must go beyond catching up with powers like the U.S., China, or Türkiye by introducing disruptive technologies through a vision and mission document. A roadmap, rolled out in two phases (2025–2030 and 2031–2047), indicating both short-term and long-term goals, can catalyze this transformation.

Phase 1: Building Foundations (2025-2030)

The period between 2025 and 2030 is critical for laying a robust groundwork upon which India's long-term UAS ambitions can be built.

Procurement Framework Reforms

India's traditional defense procurement is slow, often taking 5-7 years from Acceptance of Necessity (AoN) to contract, with field trials alone lasting up to 3 years,[63] which can delay critical UAS induction in a fast-moving tech landscape. There is a need to transition from ad hoc acquisitions to a capability-based procurement model, prioritizing systems that offer strategic depth and asymmetric advantage. An overhaul of DAP 2020 to reduce the time taken for Request for Proposal (RFP) formulation is a small but significant step to consider. A model to consider is the Other Transaction Authority (OTA) (utilized by the U.S. Department of Defense (DoD)), which is a flexible mechanism that allows the DoD to bypass certain standard Federal Acquisition Regulation (FAR) requirements such as engaging with non-traditional defense contractors - startups, small businesses, and academic institutions.[64]

Ecosystem Development

India needs to foster an integrated ecosystem that allows domestic manufacturing to thrive through structured procurement pipelines, assured demand visibility, streamlined compliance norms, and dedicated infrastructure support. This includes strengthening tiered supply chains and incentivizing the co-location of industry, research and development (R&D), and testing facilities. These hubs can be conceptualized as "Drone Valleys" similar to Hyderabad's Pharma City, offering tax incentives for IP creation and fostering Center–State collaboration.[65] Moreover, the existing defense corridors in Tamil Nadu and Uttar Pradesh can provide necessary infrastructure and incentives for UAV manufacturing. Tamil Nadu is already taking the lead by establishing India's first Unmanned Aerial Systems (Drone) Common Testing Centre at the SIPCOT Industrial Park, Vallam Vadagal, near Sriperumbudur, under the Defence Testing Infrastructure Scheme (DTIS).[66] More such initiatives need to be introduced.

Civil-Military integration

Establish enduring coordination frameworks between defense, civil administration, and industry to enable structured engagement through regular inter-agency working groups. Set up a high-level Civil–Military Tech Council, akin to the Defence Planning Committee (DPC, 2018), with representatives from MoD, DRDO, DGCA, industry, academia, and state governments.[67] Formalizing civil-military academia exchange, similar to IIT-Kanpur's engagement with Army leadership, can serve as an experimental model.[68] These mechanisms should address systemic gaps in R&D, workforce development, and export control regimes, fostering cross-sectoral coherence and strategic alignment.

Strategic imports with sunset clauses

India should enable selective foreign procurement in the short term to address critical gaps, but with clearly defined sunset clauses that require a phase-out within 5 years or after achieving a certain level of domestic production capacity. Further, there is a need to tie all imports to technology access, licensing, or co-production, ensuring they contribute to long-term self-reliance rather than perpetuating off-the-shelf dependency. In the MQ-9B case, General Atomics has already committed to increasing Indian content from ~8% to ~16-20%, and to offer consultancy to DRDO on HALE UAV development.[69] To ensure that such policies meet their objectives, sunset timelines must be realistic and monitored. Therefore, contracts should stipulate that once local production and certification milestones are met, foreign procurement of the same class is phased out.

Phase 2. Leading the industry (2030-2047)

The 2047 horizon aligns with India's centenary of independence, serving as a strategic milestone for achieving full-spectrum technological self-reliance and military modernization. Successfully advancing the development of such capabilities may align with the ambition to emerge as a leading aerospace power with globally competitive unmanned capabilities.

National Mission for Unmanned Systems (NM-US)

To drive India's UAS leadership, a National Mission for Unmanned Systems (NM-US) can be considered, modeled on the U.S. DARPA for breakthrough innovation and Türkiye's SSB for strategic industrial coordination. DARPA's success lies in its agile, autonomous research and development for disruptive technologies, while SSB oversees over 1,100 defense projects worth more than $100 billion, with an emphasis on localization, infrastructure, and exports.[70] The proposed NM-US should adopt a lean structure, led by empowered program managers, to integrate R&D, industry, and defense needs for rapid capability development.

Export-grade capabilities

Consider expanding initiatives like DRDO's technology transfer of nine land and CBRN systems to PSUs and private firms.[71] Furthermore, create a dual-use registry and reduce compliance through a harmonized licensing mechanism, allowing civilian companies like BEL to pivot quickly to defense-relevant manufacturing (e.g., Akashteer C4ISR). The DRDO's "Category B" initiative, which openly shares spin-off technologies such as microwave-absorbing materials and smart helmets, facilitates commercial uptake.[72] Scaling this model, UAV-related IP (e.g., AI analytics, communications hardware) should be similarly batch-released to incubate civilian startups and MSMEs.

Technological supremacy

India should increase its focus on developing export-grade capabilities in critical technologies - AI-enabled autonomy, resilient communications modules, advanced sensors, stealthy radar-absorbent materials, and low-signature designs, through enhanced public-private partnerships and expanded R&D funding. A case in point is platforms like Nagastra-1, which already have more than 75% indigenous content.[73] Building a supply chain that minimizes foreign dependencies is essential to meet international quality and reliability standards.

India needs to identify and focus on the components of UAVs that account for the majority of the UAV's cost. Primarily, four components—motors, Camera Payloads, Communication Modules, and Batteries— comprise ~75% of the total manufacturing cost.[74] There is a need to target emerging and mid-tier defense markets where Indian UAS technologies can effectively address existing capability gaps, thereby maximizing export potential while aligning with India's broader geopolitical and security objectives.

Endnotes

1. Chopra, Anil. “UAV Trends.” SP’s Aviation, no. 12-2023, SP Guide Publications Pvt. Ltd., 2023, www.sps-aviation.com/story/?id=3424&h=UAV-Trends&s=08
2. Easley, Mikayla. “China’s Drone Modernization Efforts Close to ‘Matching U.S. Standards,’ Pentagon Report Says.” DefenseScoop, 18 Dec. 2024, https://defensescoop.com/2024/12/18/chinas-drone-modernization-efforts-close-to-matching-us-standards-pentagon-report-says/.
3. Wadikar, Ria Amol. “Turkish Kamikaze Drones Used by Pakistani Military to Attack India: What Are They?” Hindustan Times, 10 May 2025, www.hindustantimes.com/india-news/turkish-kamikaze-drones-used-by-pakistani-military-to-attack-india-what-are-they-101746870092072.html
4. Darbey, Abhishek Kumar. “China’s Increasing Global Drone Footprint.” Manohar Parrikar Institute for Defence Studies and Analyses, 21 Nov. 2024, https://www.idsa.in/publisher/comments/chinas-increasing-global-drone-footprint-2#footnote3_6w4nbiz
5. Rasheed, Zaheena. “How China Became the World’s Leading Exporter of Combat Drones.” Al Jazeera, 24 Jan. 2023,https://www.aljazeera.com/news/2023/1/24/how-china-became-the-worlds-leading-exporter-of-combat-drones#:~:text=Data%20from%20the%20Stockholm%20International,exporter%20of%20the%20weaponised%20aircraft.
6. Narang, Anshuman. “PLA’s Unmanned Vehicles’ Employment in Western Theatre Command.” Synergy, vol. 2, no. 2, Sept. 2023, https://www.cenjows.in/wp-content/uploads/2023/10/Ch-04-Anshuman-Narang.pdf.
7. “Second Archer-NG UAV Prototype Ready for Testing as Engine Trials on First Conclude.” Indian Defence Research Wing (IDRW), 1 Mar. 2025, https://idrw.org/second-archer-ng-uav-prototype-ready-for-testing-as-engine-trials-on-first-conclude/
8. Horowitz, Michael C. “Do Emerging Military Technologies Matter for International Politics?” Annual Review of Political Science, vol. 23, 2020, pp. 385–400, https://doi.org/10.1146/annurev-polisci-050718-032725.
9. “Who Has Armed Drones?” Drone Wars UK, https://dronewars.net/tag/armed-drones/.
10. Peri, Dinakar. “India to Procure 31 Predator Long-Endurance Drones from US.” The Hindu, 15 Oct. 2024,https://www.thehindu.com/news/national/india-to-procure-31-predator-long-endurance-drones-from-us/article68755738.ece
11. Saini, Gaurav; Tiwari, Shashank. “Forging a New Frontier: India’s Emergence as a Global Leader in Ammunition, Artillery, and Small Arms Manufacturing.” Council for Strategic Defence and Research (CSDR), Mar. 2025, https://csdronline.com/wp-content/uploads/2025/03/Forging-a-New-Frontier-Indias-Emergence-as-a-Global-Leader-in-Ammunition-Artillery-and-Small-Arms-Manufacturing-2.pdf.
12. “Drones, Not Diplomats: China’s New Warfare Strategy Is Loud, Fast, Autonomous — and Already War-Ready.” The Economic Times, 11 Apr. 2025, https://economictimes.indiatimes.com/news/defence/drones-not-diplomats-chinas-new-warfare-strategy-is-loud-fast-autonomous-and-already-war-ready/articleshow/120209778.cms?from=mdr.
13. D'Urso, Stefano. “Modified Chinese H-6 Bomber Spotted Carrying Mysterious Drone.” The Aviationist, 22 Apr. 2024,https://theaviationist.com/2024/04/22/chinese-h-6-bomber-with-drone/.
14. Crowley, Taylor. “GJ-11 Sharp Sword – China’s Stealth UAV Powerhouse.” National Security Innovation Network, 19 Mar. 2025, https://www.nsin.us/gj-11-sharp-sword/.
15. Pine, Damien. China Has Developed the Largest Drone Carrier in the World—and It's Getting Ready for Takeoff. Live Science, 29 May 2025, https://www.livescience.com/technology/engineering/china-has-developed-the-largest-drone-carrier-in-the-world-and-its-getting-ready-for-takeoff.
16. Zhao, Lei. “Chinese Drones Hailed in Global Market As ‘Sharp’ Weapon Against Terrorism.” China Daily, 19 May 2025,https://www.chinadaily.com.cn/a/202505/19/WS682b4886a310a04af22c04a6.html.
17. Baughman, Joshua. “The Path to China’s Intelligentized Warfare: Converging on the Metaverse Battlefield.” The Cyber Defense Review, Fall 2024, https://cyberdefensereview.army.mil/Portals/6/Documents/2024-Fall/Baughman_CDRV9N3-Fall-2024.pdf.
18. Robles, Pablo. “China Plans to Be a World Leader in Artificial Intelligence by 2030.” South China Morning Post, 1 Oct. 2018,https://multimedia.scmp.com/news/china/article/2166148/china-2025-artificial-intelligence/index.html
19. Hart, Brian, et al. “China’s 2027 Goal Marks the PLA’s Centennial, Not an Expedited Military Modernization.” China Brief, vol. 21, no. 6, 26 Mar. 2021, Jamestown Foundation, https://jamestown.org/program/chinas-2027-goal-marks-the-plas-centennial-not-an-expedited-military-modernization/.

Endnotes

20. Kweera, Rakshit. “Drones in Modern Warfare: Utilization in India-Pakistan Cross-Border Terrorism and Security Implications.”Strategic Analysis, vol. 47, no. 4, 11 Dec. 2023, pp. 376–388, https://doi.org/10.1080/09700161.2023.2288989

21. Ghoshal, Devjyot, Ariba Shahid, and Shivam Patel. “India and Pakistan’s Drone Battles Mark New Arms Race in Asia.” Reuters, 27 May 2025, https://www.reuters.com/business/aerospace-defense/india-pakistans-drone-battles-mark-new-arms-race-asia-2025-05-27/#:~:text=Pakistan%20is%20likely%20to%20build,of%20defence%20intelligence%20firm%20Janes.

22. Chopra, Anil. “China’s Military Aviation Support to Pakistan – Need to Watch India.” Indian Aerospace & Defence Bulletin, 31 May 2025, https://www.iadb.in/2025/05/31/chinas-military-aviation-support-to-pakistan-need-to-watch-india/#:~:text=Pakistan%20has%20a%20substantial%20fleet,of%20surveillance%20and%20attack%20drones.

23. Altaf, Zohaib, and Nimra Javed. “India–Pakistan Development of Drones: Implications for Strategic Stability.” South Asian Voices, 19 Mar. 2025, https://www.researchgate.net/publication/389961238_India-Pakistan_Development_of_Drones_Implications_for_Strategic_Stability.

24. Singh, Suchet Vir. “Drone Warfare: Contrasting India–Pakistan Tactics and Capacities.” Observer Research Foundation, 17 May 2025, https://www.orfonline.org/expert-speak/drone-warfare-contrasting-india-pakistan-tactics-and-capacities.

25. Sharma, Shivani. “Turkey Helped Pak Army Plan Attack on India, Supplied 350 Drones, Military Operatives: Sources.” India Today, 14 May 2025, https://www.indiatoday.in/india/story/turkey-helped-pak-army-plan-attack-on-india-supplied-350-drones-military-operatives-sources-2724565-2025-05-14.

26. Madhavan, Adya. “Pakistan’s Uncrewed Aerial Vehicle Ecosystem.” The Takshashila Institution, 2 June 2025,https://takshashila.org.in/blogs/pakistans-uav-ecosystem.

27. “India Signs MQ-9B Sky/Sea Guardian HALE RPAS Deal with US.” Airforce-Technology, 16 Oct. 2024, https://www.airforce-technology.com/news/india-signs-mq-9b-rpas-deal-us/.

28. Parashar, Vaishnavi. “What Is Loitering Munitions? India’s First Use in Operation Sindoor.” India Today, 8 May 2025,https://www.indiatoday.in/information/story/what-is-loitering-munitions-indias-first-use-in-operation-sindoor-2721499-2025-05-08.

29. Kunde, Raunak. “Ghatak UCAV: India’s Stealth Drone to Advance with Air-Superiority Variant.” Indian Defence Research Wing (IDRW), 10 June 2025, https://idrw.org/ghatak-ucav-indias-stealth-drone-to-advances-with-air-superiority-variant/.

30. Singh, Suchet Vir. “Army Bolsters Military Capability with Two Sets of Swarm Drones for Surveillance, Close Recce.” ThePrint, 26 Aug. 2022, https://theprint.in/defence/army-bolsters-military-capability-with-two-sets-of-swarm-drones-for-surveillance-close-recce/1101665/.

31. Saballa, Joe. “Indian Army Purchases Additional IdeaForge SWITCH Drones.” The Defense Post, 25 Jan. 2022,https://thedefensepost.com/2022/01/25/indian-army-ideaforge-switch-drones/.

32. Kunde, Raunak. “DRDO and Private Sector Collaborate on Swarm Drone Technology for IAF Transporters.” Indian Defence Research Wing, 31 May 2025, https://idrw.org/drdo-and-private-sector-collaborate-on-swarm-drone-technology-for-iaf-transporters/.

33. Shivane, Ashok Bhim. “Indian Army Needs Drone-Centric Warfare Capability.” Raksha Anirveda, 14 Jan. 2025,https://raksha-anirveda.com/indian-army-needs-drone-centric-warfare-capability/.

34. PIB. “India’s Defence Leap.” Press Information Bureau, 10 June 2025, https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=154617&ModuleId=3#:~:text=Record%20Defence%20Contracts%20in%202024,to%20%E2%82%B91%2C68%2C922%20crore.

35. Blair, Alex. “India Pledges Record 9.5 % Increase in Defence Budget.” DSEI Japan News, 14 Feb. 2025, https://www.dsei-japan.com/news/india-pledges-record-95-increase-defence-budget.

36. PIB. “Rules for Commercial Use of Drones.” Press Information Bureau, Ministry of Civil Aviation, 4 Aug. 2015,https://www.pib.gov.in/newsite/PrintRelease.aspx?relid=124316.

37. “Missiles in Lucknow, Drones in Aligarh: How UP Is Powering India's Defence Future.” The Economic Times, 14 May 2025,https://m.economictimes.com/news/defence/missiles-in-lucknow-drones-in-aligarh-how-up-is-powering-indias-defence-future/articleshow/121160249.cms.

Endnotes

38. PIB. “Operation SINDOOR: The Rise of Aatmanirbhar Innovation in National Security.” Press Information Bureau, 14 May 2025, https://static.pib.gov.in/WriteReadData/specificdocs/documents/2025/may/doc2025514554901.pdf.
39. PIB. “Make in India Powers Defence Growth; Production Hit ₹1.27 Lakh Crore in FY 2023-24.” Press Information Bureau, Ministry of Defence, 24 Mar. 2025, https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2114546.
40. “India Delivers Made-in-Hyderabad Hermes Drones to Israel.” NDTV, 9 Feb. 2024, https://www.ndtv.com/business-news/in-a-first-india-delivers-made-in-hyderabad-hermes-drones-to-israel-5024597.
41. DGFT. “Notification of ITC (HS), 2022 – Schedule I (Import Policy).” Directorate General of Foreign Trade, 9 Feb. 2022,https://content.dgft.gov.in/Website/dgftprod/7d5fd1eb-ad39-4c99-b760-014223657469/Eng-Notification%2054%20dated%209%20Feb%202022%20ITC(HS)%202022%20_with%20Annexures.pdf.
42. Cyrill, Melissa. “Investing in India’s Drone Industry: Liberalized Rules, PLI Beneficiaries, Incentives & Details.” India Briefing, 5 Sept. 2022, https://www.india-briefing.com/news/investing-in-indias-drone-industry-liberalized-rules-pli-beneficiaries-list-incentives-details-23181.html.
43. Kumar, Ashok, editor. SYNERGY: Journal of the Centre for Joint Warfare Studies, vol. 3, no. 2, Aug. 2024, Centre for Joint Warfare Studies, https://cenjows.in/wp-content/uploads/2024/10/SYNERGY_Aug_2024_Online_Edition_CENJOWS-1.pdf.
44. Pabolu, Vindhya. “Aero India 2025: Drone Makers Drum Up Desi Quotient, Use of AI.” The Times of India, 11 Feb. 2025, timesofindia.indiatimes.com/city/bengaluru/aero-india-2025-drone-makers-drum-up-desi-quotient-use-of-ai/articleshow/118126018.cms
45. Clary, Christopher. “Four Days in May: The India-Pakistan Crisis of 2025.” Stimson Center, 28 May 2025,https://www.stimson.org/2025/four-days-in-may-the-india-pakistan-crisis-of-2025/.
46. Clary, Christopher. “Four Days in May: The India-Pakistan Crisis of 2025.” Stimson Center, 28 May 2025,https://www.stimson.org/2025/four-days-in-may-the-india-pakistan-crisis-of-2025/.
47. Singh, Jitendra Bahadur. “Chinese Killer Drones, Launchers: Pakistan Ramps Up Arms Shopping with China, Turkey.” Business Today, 26 May 2025, https://www.businesstoday.in/india/story/chinese-killer-drones-launchers-pakistan-ramps-up-arms-shopping-with-china-turkey-477753-2025-05-26.
48. Yeo, Mike. “Pakistan Says China Offered 40 J-35 Stealth Aircraft, among Others.” Breaking Defense, 10 June 2025,https://breakingdefense.com/2025/06/pakistan-says-china-offered-40-j-35-stealth-aircraft-among-others/.
49. Singh, Jitendra Bahadur. “Pak on Shopping Spree for Drones, Launchers after India’s Op Sindoor: Sources.” India Today, 26 May 2025, https://www.indiatoday.in/world/story/pakistan-shopping-spree-drones-launchers-after-india-operation-sindoor-sources-2730580-2025-05-26.
50. Saleem, Farrukh. “The National Defence University (NDU) should establish a dedicated Drone Warfare School (DWS). Why Pakistan is still relying on outdated drone tactics is beyond comprehension.” X, 12 June 2025,https://x.com/SaleemFarrukh/status/1933035228970222016.
51. Hussain, Abid. “How Is Pakistan Raising Money for a 20 Percent Hike in Defence Spending?” Al Jazeera, 12 June 2025, https://www.aljazeera.com/news/2025/6/12/how-is-pakistan-raising-money-for-a-20-percent-hike-in-defence-spending
52. PIB “Aatmanirbhar Bharat: Raksha Mantri Approves Advanced Medium Combat Aircraft Programme Execution Model through Industry Partnership.” Press Information Bureau, 27 May 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2131528.
53. "Indian Army to Get Rs 30,000 Crore QRSAM Air Defence Missile System Boost." The Economic Times, 21 Mar. 2023,https://economictimes.indiatimes.com/news/defence/indian-army-to-get-rs-30000-crore-qrsam-air-defence-missile-system-boost/articleshow/121731429.cms?from=mdr.
54. Sharma, Akhiles. "India Defence Budget Increased by Rs 50,000 Crore for Operation Sindoor." NDTV, 21 Mar. 2023,https://www.ndtv.com/india-news/india-defence-budget-increased-rs-50000-crore-operation-sindoor-india-pakistan-news-8426848.
55. “India and Pakistan’s Drone Battles Mark New Arms Race in Asia.” The Economic Times, 27 May 2025, https://economictimes.indiatimes.com/news/defence/india-and-pakistans-drone-battles-mark-new-arms-race-in-asia/articleshow/121426191.cms?from=mdr
56. Inamdar, Nikhil. "India Defence Budget Increased by Rs 50,000 Crore for Operation Sindoor." BBC News, 27 Mar. 2025,https://www.bbc.com/news/articles/c5y9n4n491po.

Endnotes

57. “7 Challenges Building Self-Reliant Drone Industry in India.” InsideFPV Blogs, 3 May 2025,https://insidefpv.com/blogs/blogs/7-challenges-building-self-reliant-drone-industry-india.
58. “Defence Ministry Cautions Against Use of Chinese Parts in Indian Military Drones.” The Economic Time, 30 Aug. 2024,https://economictimes.indiatimes.com/news/defence/defence-ministry-cautions-against-use-of-chinese-parts-in-indian-military-drones/articleshow/112899688.cms?from=mdr.
59. Philip, Snehesh Alex. “Intel Agencies Flag Chinese Components in Drones Procured, Army to Formulate New Policy.” ThePrint, 4 Sept. 2024, https://theprint.in/defence/intel-agencies-flag-chinese-components-in-drones-procured-army-to-formulate-new-policy/2252367/.
60. Sharma, Shivani. “Army Cancels Rs 230 Crore Drone Contracts over Alleged Use of Chinese Components.” India Today, 7 Feb. 2025, https://www.indiatoday.in/india/story/army-cancels-rs-230-crore-drone-contracts-over-alleged-use-of-chinese-components-2676137-2025-02-07.
61. Ganguly, Nabodita, and Shruti Tripathi. “India’s Drone Dream Still Flies on Foreign Parts.” Outlook Business, 26 May 2025,https://www.outlookbusiness.com/start-up/indias-drone-dream-still-flies-on-foreign-parts.
62. Burnham, Jack, and Miles Kershner. “President Trump Issues Executive Orders to Counter China’s Drone Industry.” FDD – Policy Briefs, 10 June 2025, https://www.fdd.org/analysis/policy_briefs/2025/06/10/president-trump-issues-executive-orders-to-counter-chinas-drone-industry/.
63. “Defence Procurement Overhaul: MoD Aims To Cut Delays, Faster Acquisitions.” Bharat Shakti, 3 Mar. 2025, bharatshakti.in/defence-procurement-overhaul-mod-aims-to-cut-delays-faster-acquisitions/
64. “Other Transaction Authority (OTA).” AcqNotes, 3 June 2023, https://acqnotes.com/acqnote/careerfields/other-transaction-authority-ota.
65. Rastogi, Shreeya. “How India Can Build a Self-Reliant Drone Manufacturing Ecosystem.” Inc42, 24 May 2025, inc42.com/resources/how-india-can-build-a-self-reliant-drone-manufacturing-ecosystem/.
66. Kandavel, Sangeetha. “India’s First Unmanned Aerial Systems Common Testing Centre to Be Established in Tamil Nadu.” The Hindu, 16 Aug. 2023, www.thehindu.com/news/national/andhra-pradesh/indias-first-unmanned-aerial-systems-drone-common-testing-centre-under-defence-testing-infrastructure-scheme-to-be-established-in-tamil-nadu/article67202641.ece.timesofindia.indiatimes.com+11thehindu.com+11government.economictimes.indiatimes.com+11.
67. Shankar, P. R. “Civil-Military Fusion: A Model for India.” MyIndMakers, 27 Mar. 2023., myind.net/Home/viewArticle/civil-military-fusion-a-model-for-india.
68. TNN. “IIT-K Hosts Army Commander to Forge New Path for Army-Academia Collaboration.” The Times of India, 16 May 2025, timesofindia.indiatimes.com/city/kanpur/iit-k-hosts-army-commander-to-forge-new-path-for-army-academia-collaboration/articleshow/121196153.cms.
69. IDRW. “General Atomics Agrees to Further Boost IC in MQ-9B UAVs for India.” Indian Defence Research Wing, 10 Sept. 2024, idrw.org/general-atomics-agrees-to-further-boost-ic-in-mq-9b-uavs-for-india/.
70. Defence Turkey Magazine. “SSB’s 2024 Evaluation & 2025 Goals.” Defence Turkey, vol. 19, no. 138, Mar. 2025 (updated 26 June 2025), www.defenceturkey.com/en/content/ssb-s-2024-evaluation-2025-goals-6214.
71. TNN. “To Expand Defence Manufacturing Base, DRDO Transfers Tech on 9 Systems.” The Times of India, 9 June 2025, timesofindia.indiatimes.com/india/to-expand-defence-manufacturing-base-drdo-transfers-tech-on-9-systems/articleshow/121713005.cms.
72. DRDO. “Transfer of Technologies.” DRDO, Ministry of Defence, Govt. of India, 21 Dec. 2023, www.drdo.gov.in/drdo/index.php/transfer-technologies.
73. “India Army’s Drone Arsenal Expands: Nagastra-1 Brings Enhanced Lethality and Precision to Battlefield.” The Week, 4 Dec. 2024, www.theweek.in/news/defence/2024/12/04/india-armys-drone-arsenal-expands-nagastra-1-brings-enhanced-lethality-and-precision-to-battlefield.html.
74. EY & FICCI. Making India the Drone Hub of the World. EY–FICCI Drones Report, Sept. 2022, www.ey.com/content/dam/ey-unified-site/ey-com/en-in/insights/government-public-sector/documents/ey-ficci-drones-report-final.pdf.

CSDR
COUNCIL FOR STRATEGIC
AND DEFENSE RESEARCH

C-21, 3rd Floor, Qutub Institutional Area, New Delhi, India - 110016.
Phone: 011-43104566 | Email: office@csdronline.com | Web: www.csdronline.com | Twitter:@CSDR_India