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Indian aerospace and defence sector – From import dependence to export powerhouse

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Executive summary

In a rules-based global order, countries have adopted a protective defensive security ideology that is typically reactive in nature; however, the last few years have seen an erosion of the rules-based order, resulting in rethinking defence and security strategy. India has been one of the first movers with **a mindset shift from 'Aatmanirbharta' to 'modernisation', to 'reform-jointness' and now to 'ownership'** and is positioning itself as a deterrent-based, proactive technology-enabled force.

India's Defence budget for FY 2026–2027 touched an all-time high at US$88 billion,[1] which shows a significant increase of 15.2 percent over FY 2025–2026, and focused on the broader national vision of Aatmanirbhar Bharat, modernisation and reform of ownership. Furthermore, Budget 2026 plans a significant increased outlay towards capital expenditure (21.8 percent over previous year) and Research and Development (R&D) (8.50 percent over previous year) that reinforces the vision and continues to drive the theme of self-reliance, and support for the entire defence ecosystem from manufacturing to AI (Artificial Intelligence), quantum computing, data centres and the space sector.

This paper looks to examine the development of the defence eco-system in India from a policy perspective, the changing nature of warfighting and emerging technologies and the maturing of the sector as an investment option.

Relaxed Foreign Direct Investment (FDI) norms (74 percent under automatic route), Positive Indigenisation Lists (PIL), updates in Defence Procurement Manual (DPM 2025) and Defence Acquisition Procedure (DAP 2020), export targets for Defence Public Sector Undertakings (DPSUs), technology and R&D focus and support for the startup ecosystem, at a sectoral level, is driving a transformation from historical import dependence to development of an indigenous defence manufacturing ecosystem aimed at export competitiveness. It is positioning India as an alternative source of defence

[1] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2222601&reg=3&lang=2

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equipment for countries in the Indian Ocean Region (IOR) and the Global South.

In a world shaped by geopolitical volatility and technological disruption, it is vital to harness every potential approach to strengthen national security. Operation Sindoor highlighted the growing importance of dual use technologies such as unmanned aerial vehicles (UAVs), AI-enabled command and control systems, satellites and AI-powered radars which have been adapted and ruggedised for military use.

Every soldier on the ground, every ship at sea, every aircraft in the sky depends on assets orbiting hundreds of kilometres above land. For India, this reality is amplified by geography and geopolitics, with a 7,516 kilometre coastline, 15,000 kilometre of land borders, and a two-front security challenge, India's strategic interests span from the Himalayas to the IOR. Securing this vast expanse requires persistent surveillance, seamless communication and precision navigation, capabilities that only space can provide at scale. Satellite communications enable real-time command and control. Navigation systems guide precision munitions to their targets. Intelligence, Surveillance and Reconnaissance (ISR) satellites provide eyes beyond the horizon. Space has become the ultimate force multiplier, the invisible infrastructure upon which military power is built.

As the defence ecosystem matures and the focus on dual-use technologies deepens, defence companies have diversified revenue streams, making them less dependent on government procurement cycles and more resilient to demand fluctuations. Further, Ministry of Defence (MOD) payment cycles have also matured with better reliability and regularity in line with contracts, thus providing better monetisation cycles and liquidity to defence companies. This evolution has strengthened investor confidence by positioning defence businesses as commercially scalable, technology-driven opportunities rather than purely policy-led plays. Investments are gradually shifting towards larger venture capital (VC), private equity (PE) and institutional investments to support scaling up manufacturing operations, diversification across the value chain, innovation and exports. While the overall number of deals has moderated primarily due to a decline in smaller angel-stage transactions, the aggregated funding value has increased, indicating higher ticket size transactions.

With the sector transitioning into a more mature, technology-driven ecosystem, the future deal landscape in India's defence industry is expected to see increased transaction flow particularly in dual-use technology segments and export-ready businesses with scalable models. Overall, the next phase of investment is expected to prioritise sustainable value creation, long-term capability development and the creation of globally competitive defence technology.

Nevertheless, there are still areas for improvement from a more coordinated and collaborative ecosystem, increased focus on R&D and foundational and emerging technologies, including propulsion systems, directed energy weapons, hypersonic technologies, space-defence integration, cyber and electronic warfare, to name a few.

While the outlook for the Indian defence sector is positive, there is still a long way to go to becoming an export powerhouse.

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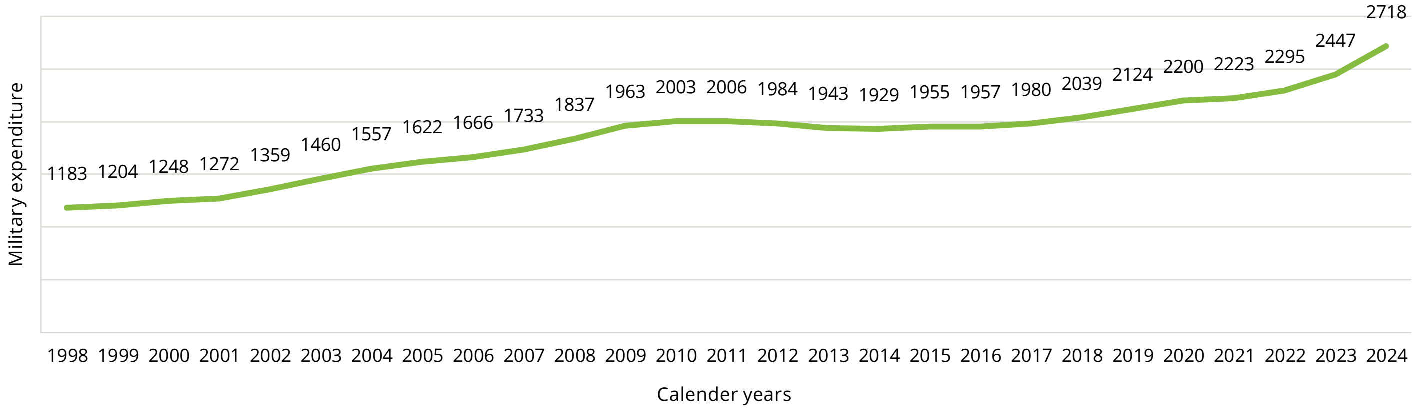
A volatile geopolitical reality

India's defence sector is leading a calibrated and consequential transformation at a time of heightened geopolitical uncertainty, evolving nature of warfare and rapid technological disruption. This transformation has been amply demonstrated during Operation Sindoor.

Considering the prevailing volatile geopolitical realities, countries, both with established military capabilities and developing countries, are actively looking to further **modernise their armed forces and defence equipment, harnessing emerging technologies with an increasing focus on deterrence, driving up spending** in the defence sector globally. Reflecting heightened geopolitical tensions, total global military expenditure surged to US$2,718 Bn in CY2024, a 11.05% increase from US$2,447 billion in CY2023, which reflects a significant uptick from previous years.

Exhibit 1: World military expenditure (US$ Bn)[2]



Note: All figures are at constant 2023 prices and exchange rate, except for 2024 figure which is at 2024 current prices and exchange rates.

[2] https://www.sipri.org/sites/default/files/2025-04/2504_fs_milex_2024.pdf; Deloitte Analysis

The five highest spenders on defence were the United States of America, China, Russia, Germany and India, which together accounted for 61 percent of the world's military spending in CY2024. India was the fifth largest spender in CY2024 at US$86.1 billion, up by 4.6 percent from CY2023.

Exhibit 2: Trends in world military expenditure[3]

Defence spending	CY 2024 (US$ Bn)[1]	% share of global spending 2024	% of GDP 2024[1]	% change in spending 2023–2024[3]	% change in spending[2] 2015–2024[4]
Global	2,718.0	100.0%		11.1%	39.0%
US	997.0	37.0%	3.4%	8.8%	22.5%
China	315.0	12.0%	1.7%	6.4%	58.3%
Russia	149.0	5.5%	7.1%	36.7%	98.7%
Germany	88.5	3.3%	1.9%	40.5%	92.4%
India	86.1	3.2%	2.3%	4.6%	45.9%
UK	81.8	3.0%	2.3%	8.6%	30.7%
Saudi Arabia	80.3	3.0%	7.3%	3.3%	-18.8%
Ukraine	64.7	2.4%	34.0%	-0.3%	1209.7%
France	64.7	2.4%	2.1%	8.8%	23.9%
Japan	55.3	2.0%	1.4%	15.0%	41.8%

Notes:

1. Global defence spending and GDP numbers are at CY2024 current prices.
2. Change in spending from 2015 to 2024
3. CY 2023 numbers are based on 2023 constant, prices and CY 2024 numbers are based on 2024 current prices
4. CY2015 to CY2023 numbers are based on 2023 constant price and CY2024 numbers are based on 2024 current prices
5. Figures and percentages are rounded off and may not add up to the stated totals.

Exhibit 3: Focus areas for defence spending[4]

Country	Key Focus Areas
US	• Nuclear weapon modernisation • Missile defence systems • F-35 combat aircraft weapon systems • New naval vessels • Support to Ukraine and Israel • Bolster capabilities in the Indo Pacific region, including military aid to Taiwan • US submarine industrial base for AUKUS
China	• Longterm military modernisation target for 2035 across all domains • Stealth combat aircraft • UAVs • Unmanned underwater Vehicles (UUVs) • Nuclear arsenal expansion • Strengthening counterspace and cyberwarfare capabilities

[3] https://www.sipri.org/sites/default/files/EMBARGO%20FS1604%20Milex%202015.pdf ; https://www.sipri.org/sites/default/files/2024-04/2404_fs_milex_2023.pdf ; Deloitte Analysis
[4] https://www.sipri.org/sites/default/files/2025-04/2504_fs_milex_2024.pdf ; Deloitte Analysis

Country	Key Focus Areas
Russia	• Weapons systems procurement for Ukraine conflict • Social support and payments to military personnel
Germany	• Arms procurement • R&D investments • Military financial aid to Ukraine
India	• Modernisation needs, including procurement of aircraft and naval vessels • Revenue expenditure on salaries and pensions

India's Defence budget for FY 2026–2027 touched an all-time high at US$88 billion, a significant increase of 15.2 percent over FY 2025–2026,[5] and focused on the broader national vision of *Aatmanirbhar Bharat,* modernisation and reform to ownership. These strategic imperatives also align with Viksit Bharat 2047, envisioning India's global leadership in defence manufacturing by achieving self-reliance, pioneering advancements in critical niche technologies and as a prominent exporter. Furthermore, the Budget 2026 reinforces the vision and continues to drive the theme for self-reliance and support for the entire defence eco-system from manufacturing to AI, Quantum, Data Centres and Space.

Aatmanirbhar Bharat coupled with relaxed FDI norms (74% under automatic route), Positive Indigenisation Lists (PIL), updates in DPM 2025 and DAP 2020, export targets for DPSUs, technology and R&D focus, and support for the startup ecosystem, at a sectoral level, is driving a transformation from historical import dependence to development of an indigenous defence manufacturing ecosystem aimed at export competitiveness, and positioning India as an alternative source of defence equipment for friendly countries in the Indian Ocean Region (IOR) and the Global South.

[5] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2222601&reg=3&lang=2 ; Deloitte Analysis

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Reducing import dependence: A foundational pillar of India's defence transformation

Currently, 65 percent of defence equipment are manufactured domestically. This is a significant shift from the earlier 65–70 percent import dependency, showcasing India's emerging self-reliance in defence.[6] While strengthening the domestic defence ecosystem is a strategic necessity, this transformation is shaped by two parallel imperatives. The **long-term objective of building a resilient, self-reliant defence industrial ecosystem** capable of meeting the modernisation needs of the armed forces while also meeting the **immediate requirement for high levels of operational readiness and deterrence** in an increasingly volatile geopolitical environment.

For decades, India has been heavily dependent on foreign suppliers, and for the period 2020–2024 was the second largest arms importer, accounting for 8.3 percent of global demand.[7] Disruptions in global supply chains and resultant delays in critical defence programmes have re-emphasized the need for import substitution not only for sustainment, but for future modernisation as well.

While Russia remains a major defence supplier to India's imports, the share has significantly declined from earlier periods to 36 percent in 2020–2024. Nevertheless, Russia still makes major contributions to India's military strength with S-400 defence systems, Sukhoi-30 MKI, MiG-29 fighter jets and T-90 tanks. Russia has prioritised its own military needs due to ongoing conflict, and combined with sanctions, there is considerable strain on its production capabilities and supply networks. Russia's share of global arms exports declined sharply by 64 percent from 21 percent during 2015–2019 to 7.8 percent in the period of 2020–2024.[9] India's 2018 deal for five S-400 squadrons has been postponed multiple times. While three units were delivered between 2021 and 2023, the last two deliveries are expected by 2026–2027, i.e., a three-year delay beyond the original schedule. Further, component supply chain issues in Russia have led to delays in the modernisation of platforms.

India is actively diversifying its imports to reduce reliance on Russia, shifting towards France, US and Israel to reduce single supplier risk and meet the immediate requirement of high levels of operational readiness, technological requirements and deterrence.

Exhibit 4: India's imports from top countries[8]

Countries	2010-2014	2015-19	2020-2024
Russia	72%	55%	36%
France	1%	12%	33%
US	13%	10%	10%
Israel	4%	15%	13%

Note: This data relates to the year in which actual deliveries are made.

[6] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2116612&reg=3&lang=2 ; Deloitte Analysis
[7] https://www.sipri.org/databases/armstransfers ; Deloitte Analysis
[8] https://www.sipri.org/databases/armstransfers ; Deloitte Analysis
[9] https://www.sipri.org/databases/armstransfers ; Deloitte Analysis

Exhibit 5: India's procurements from France, Israel and US[10]

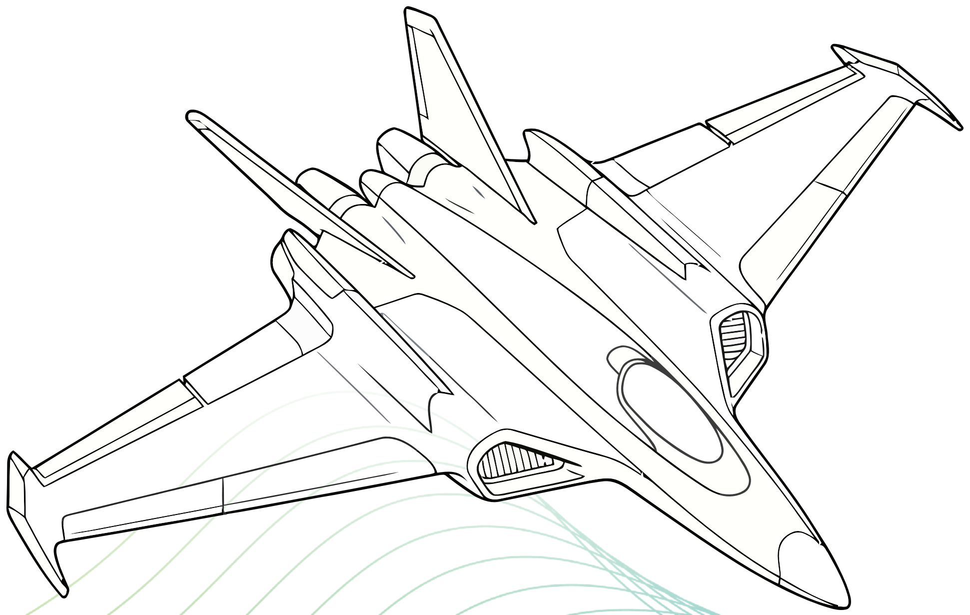
France	Israel	US
• Six Scorpene class submarines • 24 second-hand Mirage 2000 aircraft • 36 Rafale fighter Jets for IAF • 26 Rafale fighter jets for the Indian Navy • 114 Rafale fighter jets (discussions initiated) • 120-140 Kn thrust jet engine for ACMA Mk2, co-development featuring 100 percent technology transfer	• Barak-Surface Air-to-Missile Systems (joint development) • Heron UAVs • Spice 2000 precision munitions • Various radars and sensors • SPICE-1000 Long Range Guidance Kits for IAF (Acceptance of Necessity (AON))	• AH-64 Apache combat helicopters • APG-78 Longbow combat helicopter radars • Chinook CH-47 helicopters • C-130J Super Hercules and C-17 Globemaster III transport aircraft • P-81 Poseidon maritime surveillance aircraft • MK 54 ASW torpedoes etc • 100 Javelin anti-tank missiles • 216 Excalibur precision artillery shells

These diversified procurements demonstrate India's commitment to enhancing its frontline readiness and imperative combat effectiveness, while also developing long-term self-reliance goals. However, this strategy is not without its challenges:

A nearly two-year delay in the delivery of F-404 engines is one of the causes disrupting the production schedule of the indigenous LCA Tejas Mk-1A. Further, imports also face cost escalation challenges.

The P75 Submarine project for six Scorpene submarines, manufactured in India under technology transfer (ToT) from France faced significant delays and cost escalations. The contract was signed in 2005 for INR 18,706 crore, while the cost escalated to about INR 23,000 crore; the first Scorpene submarine was inducted in 2017 instead of 2012.

Additional challenges such as prolonged negotiations over scope of ToT, policy hurdles and lengthy approval processes have further extended procurement cycles.



10. PIB Announcements; Deloitte Analysis

Policy evolution: from import-centric to self-reliance and export-oriented

India's defence policy framework has undergone significant evolution over the past decades, seeking to balance both long- and short-term objectives. The policy reforms initiated over the last decade are aimed at building self-reliance and a modern, competitive defence industry by streamlining and easing constraints imposed by cumbersome procurement processes, easing licensing policies, encouraging private-sector participation, levelling the playing field with DPSUs, and supporting innovation, the startup ecosystem and access to technology.

Exhibit 6: India's Defence Policy Evolution

Year	Policy Initiative	Focus
2001	26% FDI permitted, 100% private sector participation allowed	Open defence manufacturing to the private sector and to foreign participation allowing infusion of capital and technology for enhancing self-reliance in India's defence production
2005	Defence Offset Policy	Requiring foreign vendors invest in India's defence ecosystem
2016	Technology Development Fund (TDF) scheme launched by DRDO	Promote indigenous R&D by supporting MSMEs and start-ups
2018	Defence Corridors	Create a self-reliant manufacturing ecosystem to boost domestic production and defence industrial clusters
2018	Launch of Innovations for Defence Excellence (iDEX)	Foster a start-up and innovation-centric culture, accelerating new technologies through challenges and grants.
2020	DAP 2020	Streamlining of procurement procedures, prioritising indigenously designed, developed and manufactured (IDDM) components
2020	Foreign Direct Investment (FDI) limit raised to 74% under the automatic route	Allowing a controlling stake to foreign investment and joint ventures and encourage technology transfer and indigenous manufacturing
2020	1st Positive Indigenisation List (PIL) list	Import embargo to promote indigenous manufacturing
2021	Corporatisation of 41 Ordnance Factory Board (OFB) units into 7 DPSUs	To enhance functional consolidation and autonomy, remove bureaucratic hurdles, improve self-reliance and competitiveness
2021	Liberalisation of Drone Rules	Enable rapid growth of the drone ecosystem by simplifying approvals and reduced compliances
2023	Indian Space Policy	Allow the private sector to conduct end-to-end space activities
2024	IN SPACE guidelines	Single window nodal agency under the Department of Space to provide a transparent regulatory framework
2024	National Quantum Mission	Position India to lead in frontier technologies such as quantum computing, sensing and secure communication
2025	Integrated Theatre Command	Strengthen jointness and interoperability among services to enable faster, coordinated, technology-driven warfare
2025	Technology Perspective and Capability Roadmap (TPCR) 2025	Articulating the Indian Armed Forces' requirements and offering industry a clear line of sight over the next 15 years
2026	DAP 2026	Further refined procurement processes focusing on "Owned by India"

Five policy themes represent a coherent shift in India's policy architecture: (a) streamlining defence acquisition procedures, (b) encouraging indigenous manufacturing with order visibility, (c) strengthening the defence industrial and innovation ecosystem (d) ease of doing business and (e) boosting defence exports.

a. Streamlining of acquisition procedures

i. India's defence acquisition framework has undergone a fundamental transformation aimed at overcoming legacy challenges of procedural delays, fragmented decision-making and excessive import dependence.

ii. At the core of these reforms is the DAP 2020, which serves as a strategic roadmap to streamline capital procurement by removing procedural bottlenecks, simplifying the processes, reducing timelines, and delegating powers, ensuring faster decision-making. It gives the **highest priority to the Buy (Indian IDDM) category,** setting higher thresholds for Indigenous Content (IC).

iii. A Draft DAP 2026, an update of DAP 2020, has been released by MOD on 11 February 2026 for public consultation. DAP 2026 marks a major shift in India's procurement policy from **"Made in India" to "Owned by India". The Draft DAP 2026 focuses on Jointness, Atmanirbharta and Innovation (JAI)** as keystones of government policy for defence preparedness.

Exhibit 7: Proposed changes in DAP 2026[11]

Doctrine departure from **"Transfer of Technology",** which often results in dependency and legacy issues, to **"Co-development and Intellectual Property (IP) ownership"**	Capital acquisition to prioritise co-development, IP ownership and retention of source codes and critical design data within Indian entities, positioning India as a global design and development hub rather than a build-to-print destination.
Aligns domestic requirements with export potential	Exportability would also become a desirable qualitative requirement (QR) in the development of new platforms. Adequate certification support would be given by the defence forces for selected and qualified equipment, so that these can be accepted by other countries with limited trials.
Strengthen its position as the **"Net Security Provider"**	Building systems for partners in the IOR and the Global South.
Simplification of **Inter-Governmental Agreements** processes	To enable the availability of best and selective defence technologies to India's defence forces without affecting domestic capability.
Acknowledge that for the foreseeable future, the **primary challenge of the acquisition process will not be budget, but obsolescence**	Procurement protocols have been updated to use fast-evolving systems in AI, quantum computing, new tech drones and directed energy weapons, **where the rate of change outpaces the traditional 2-3-year acquisition cycle.**
Underscores that **software is equally important along with hardware,** in the era of multi-domain warfare	Upgrades will be an important part of the acquisition.
Institutionalises Civil–Military Fusion	Enables the armed forces to procure commercial off-the-shelf drone swarms, space technologies and cyber security tools, with minimal desirable customisation, to enable conversion of advanced civil technology for military capability.
Recognizes **IDEX as one of the mainstream acquisition pathways** rather than just a startup experiment	Empowers the defence forces to efficiently acquire equipment from "make, design and develop" projects and iDEX.
Reinforces a clear order of preference	Buy (Indian–IDDM) as the top priority when eligible Indian vendors meet indigenous design and content requirements. **Even single-vendor cases are permitted under this category, if only certified Technology Readiness Levels are met.** If IDDM conditions cannot be satisfied, the hierarchy moves to 'Buy (Indian) and Manufacture in India', followed by 'Buy (Global) and Manufacture in India', and finally 'Buy (Global)'. Equipment listed in the Positive Indigenisation Lists (PIL) cannot be procured under Buy (Global), thereby tightening import restrictions and reinforcing domestic production.

11. https://mod.gov.in/sites/default/files/DRAFT-DAP-2026_0.pdf ; Deloitte Analysis

iv. Building upon the DAP framework, MOD introduced DPM 2025, the first comprehensive update of the manual since 2009. It is designed to streamline revenue purchases that sustain day-to-day operations and ensure operational readiness of the Indian Armed Forces. **The new DPM** also decentralises decision-making powers and financial powers, which **will reduce delays in procurement.**

v. The release of the **Technology Perspective and Capability Roadmap (TPCR) 2025,** articulating the Indian Armed Forces' requirements and offering the industry a **clear line of sight on capability needs over the next 15 years.** TPCR 2025 clearly signals long-term demand for next-generation defence platforms.

Exhibit 8: Indicative technologies in the TPCR 2025 (Non-exhaustive)[12]

Next gen platforms

- Nuclear-propelled naval platforms
- Electromagnetic Aircraft Launch System (EMALS)
- Future-ready combat vehicles
- Directed energy and stealth systems
- Hypersonic missiles

Unmanned Systems

- UAVs
- UGVs
- UUVs

Technologies

- AI/Machine Learning- (ML)enabled systems
- Cyber technologies
- Quantum computing and communications
- Advanced materials

b. Encouraging indigenous manufacturing and visibility of orders

i. Over the past decade, the Government of India (GOI) has implemented a series of targeted initiatives aimed at promoting indigenous manufacturing. A key enabler is an increase in defence budget allocations, with a focus on capital expenditure. **Defence budget for FY 2026–2027, touched an all-time high at INR7.85 lakh crore, a significant increase of 15.2 percent over FY 2025–2026.**

ii. Modernisation of armed forces remains a strategic imperative with the current geopolitical sensitivities. For FY 2026–2027, **capital budget allocation stands at INR2.19 lakh crore, which is 21.84 percent higher than for FY 2025–2026.** Out of this, INR1.85 lakh crore

Exhibit 9: Defence budget[13]

Financial year	Defence budget (INR crore)	YoY increase
2016–2017	3,40,922	
2017–2018	3,59,854	5.6%
2018–2019	4,04,365	12.4%
2019–2020	4,31,011	6.6%
2020–2021	4,71,378	9.4%
2021–2022	4,78,196	1.4%
2022–2023	5,25,166	9.8%
2023–2024	5,93,538	13.0%
2024–2025	6,21,941	4.8%
2025–2026	6,81,210	9.5%
2026–2027	7,84,678	15.2%

12. https://www.mod.gov.in/dod/sites/default/files/FINAL-TPCR-2025_0.pdf ; Deloitte Analysis
13. Union Budgets; Deloitte Analysis

is earmarked for capital acquisition in FY 2026–2027. Further, MOD has earmarked INR1.39 lakh crore i.e., **75 percent of the capital acquisition budget for procurement from domestic industries during FY 2026–2027.**

Exhibit 10: Capital budget[14]

Financial year	Capital budget (INR crore)	YoY increase
2016–2017	78,587	
2017–2018	86,488	10.1%
2018–2019	99,564	15.1%
2019–2020	1,08,249	8.7%
2020–2021	1,18,555	9.5%
2021–2022	1,35,061	13.9%
2022–2023	1,52,370	12.8%
2023–2024	1,62,600	6.7%
2024–2025	1,72,029	5.8%
2025–2026	1,80,000	4.6%
2026–2027	2,19,306	21.8%

iii. Funds are allocated to the armed forces based on the projections submitted during the budget-making process. Over the years, there has been a high shortfall in the capital budget allocation to the armed forces as compared to their projected needs. However, **in 2023–2024 and 2024–2025, the capital budget allocation for the armed forces has no shortfall, reflecting heightened focus on capital procurements.**

Exhibit 11: Shortfall in allocation vs projection in capital budget for the Armed Forces[15]

Financial year	Projection (INR crore)	Allocation (INR crore)	Shortfall
2019–2020 (BE)	1,56,774	92,014	41%
2020–2021 (BE)	1,61,848	1,02,431	37%
2021–2022 (BE)	1,98,922	1,22,998	38%
2022–2023 (BE)	1,99,788	1,36,556	32%
2023–2024 (BE)	1,48,953	1,48,413	0%
2024–2025 (BE)	1,57,271	1,57,271	0%

iv. **Defence R&D** (DRDO) **budget** has also been **increased to INR29,100 crore in FY 2026–2027, an increase of 8.5 percent** from INR26,816.82 crore in FY 2025–2026. Out of this allocation, INR17,250.25 crore, i.e., **59 percent is earmarked for R&D capital expenditure.**[16]

v. Additionally, **AnUSndhan National Research Foundation (ANRF) has also been established in 2023. It is driving India's R&D,** and is intended to provide strategic direction, competitive funding opportunities and collaboration pathways across industry, academia and government, aligning with the Viksit Bharat 2047 goals.

vi. During the period of January 2025 to December 2025, **MOD has signed capital acquisition contracts worth INR2.20 lakh crore,** while the Defence Acquisition Committee (DAC) has given **AON for INR3.84 lakh crore for the same period,** indicating a strong momentum for future procurements.

[14] Union Budgets; Deloitte Analysis
[15] https://sansad.in/getFile/lsscommittee/Defence/18_Defence_2.pdf?source=loksabhadocs ; Deloitte Analysis
[16] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2222601&reg=3&lang=2 ; Deloitte Analysis

Exhibit 12: Capital acquisition contracts for the period of January 2025 to December 2025[17]

Date	Platform	Value of Contract (INR crore)
Dec-25	Close Quarter Battle (CQB) Carbine	2,770
Dec-25	Local manufacturing of two high-precision, combat-proven systems: a. SIGMA 30N Digital Ring Laser Gyro Inertial Navigation System, used in artillery guns, air defence systems, missiles & radars and b. CM3-MR Direct Firing Sight, designed for artillery guns and anti-drone systems	-
Dec-25	48 Heavy Weight Torpedoes	1,896
Sep-25	97 Tejas Mk1A Light Combat Aircraft (LCA) for IAF	62,370
Apr-25	26 Rafale-M for the Indian Navy	63,000
Mar-25	Light Combat Helicopter (LCH) Prachand (66 for IAF and 90 for Indian Army)	62,700
Mar-25	Tank-72 Bridge Laying Tanks and Nag Anti Tank Missile System (NAMIS) for the Indian Army	1,801
Mar-25	155mm/52 Calibre Advanced Towed Artillery Gun Systems (ATAGS)	6,900
Mar-25	5,000 Light Vehicles	~2,500
Feb-25	a. Upgrades in SHAKTI Software; b. 28 EON-51 (Electro Optical Fire Control systems) for New Generation Offshore Patrol Vessels and Cadet Training Ships for Indian Navy; c. 149 Software Defined Radios for Indian Coast Guard; d. Air Defence Fire Control Radars for the Indian Army.	3,502
Feb-25	Area Denial Munition (ADM) Type-1 (DPICM) for PINAKA Multiple Launcher Rocket System (MLRS) for Indian Army	10,147
Feb-25	High Explosive Pre-Fragmented (HEPF) Mk-1 (Enhanced) rockets for PINAKA Multiple Launch Rocket System (MLRS) of Indian Army	
Jan-25	Medium-Range Surface-to-Air Missiles (MRSAM) for Indian Navy	2,960
	Total	**2,20,544**

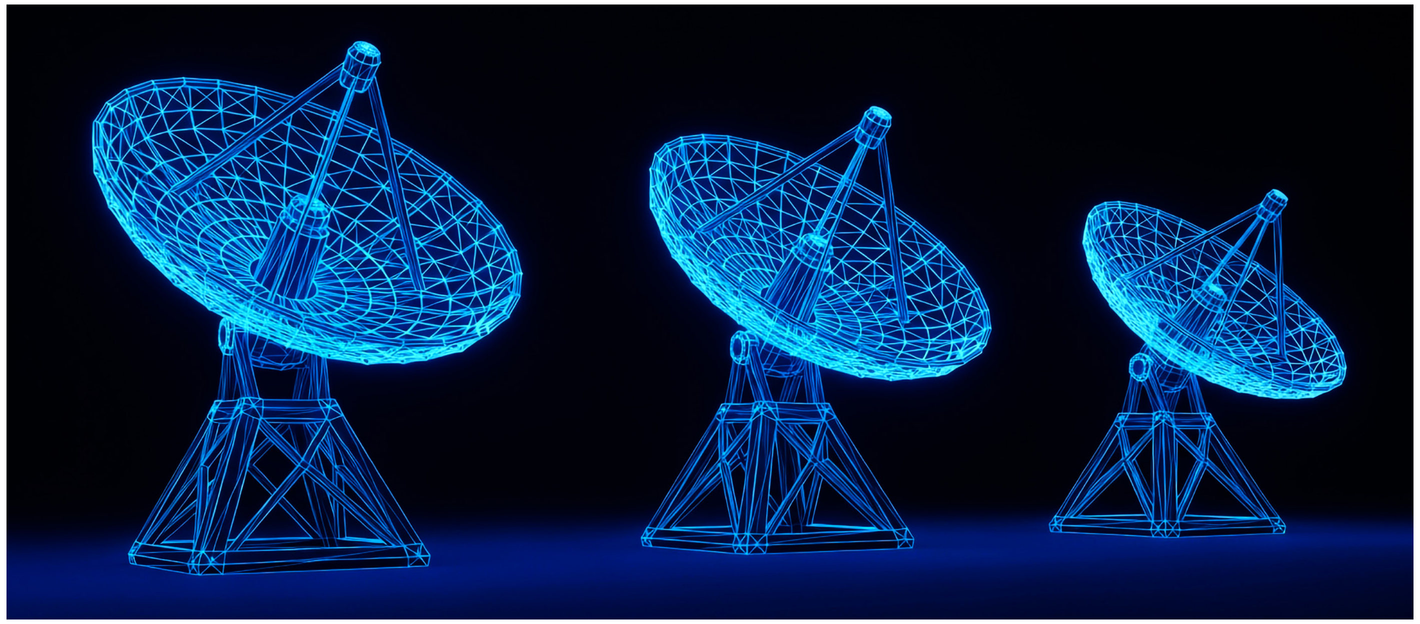
[17] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2210154&reg=3&lang=1; PIB announcements; Deloitte Analysis

Exhibit 13: AONs for the period of January 2025 to December 2025[18]

Date	Approval by DAC	Value (INR crore)
20 March 2025	1350 HP engine to upgrade the present 1000 HP Engine for T-90 Tanks	54,000
	Varunastra Torpedoes (Combat)	
	Airborne Early Warning & Control (AEW&C) Aircraft Systems	
3 July 2025	Armoured Recovery Vehicles, Electronic Warfare System, Integrated Common Inventory Management System for the Tri-Services and Surface to Air Missiles	1,05,000
	Moored Mines, Mine Counter Measure Vessels, Super Rapid Gun Mount and Submersible Autonomous Vessels.	
5 August 2025	Compact Autonomous Surface Craft, BrahMos Fire Control System & Launchers and Upgradation of BARAK-1 Point Defence Missile System	67,000
	Mountain Radars and Upgradation of SAKSHAM/SPYDER Weapon System	
	Medium Altitude Long Endurance (MALE) Remotely Piloted Aircraft (RPAs)	
	C-17 and C-130J fleets, and comprehensive annual maintenance contract of S-400 Long Range Air Defence Missile System.	
23 October 2025	Nag Missile System Mk-II (NAMIS), Ground Based Mobile ELINT System (GBMES) and High Mobility Vehicles (HMVs) with Material Handling Crane (For the Indian Army)	79,000
	Landing Platform Docks (LPD), 30mm Naval Surface Gun (NSG), Advanced Light Weight Torpedoes (ALWT), Electro Optical Infra-Red Search and Track System and Smart Ammunition for 76mm Super Rapid Gun Mount (For the Indian Navy)	
	Collaborative Long Range Target Saturation/Destruction System (CLRTS/DS)	
29 December 2025	Loiter Munition System for Artillery Regiments, Low Level Light Weight Radars, Long Range Guided Rocket Ammunition for Pinaka Multiple Launch Rocket System & Integrated Drone Detection & Interdiction System Mk-II for Indian Army; Bollard Pull Tugs, High Frequency Software Defined Radios Manpack and for leasing High Altitude Long Range Remotely Piloted Aircraft System for the Indian Navy; and Automatic Take-off Landing Recording System, Astra Mk-II Missiles, Full Mission Simulator and SPICE-1000 Long Range Guidance Kits for the Indian Air Force.	79,000
	Total	**3,84,000**

18. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2210154&reg=3&lang=2 ; Deloitte Analysis

Indian aerospace and defence sector – From import dependence to export powerhouse



vii. GOI has also released **five PILs** of 506 subsystems and 5012 components aimed at prohibiting the import of these items beyond the stipulated timelines. Of the ~5500 items across the PILs, 3,000 have already been indigenised as of February 2025.[19]

viii. **In FY 2024–2025 India has recorded the highest ever defence production of INR1.50 lakh crore.** This achievement reflects the cumulative impact of sustained policy reforms, increased budgetary support and a deliberate shift towards indigenous procurement. India aims to reach a **targeted production of INR3 lakh crore by FY 2028–2029 and INR 8.8 lakh crore by 2047,** aligned to the Viksit Bharat Vision and to establish itself as a global defence manufacturing hub.

Exhibit 14: Defence production[20]

Year	Total production (INR crore)	Increase
2016–2017	74,054	
2017–2018	78,820	6.4%
2018–2019	81,120	2.9%
2019–2020	79,071	-2.5%
2020–2021	84,643	7.0%
2021–2022	94,845	12.1%
2022–2023	1,08,684	14.6%
2023–2024	1,27,434	17.3%
2024–2025	1,54,071	20.9%
2028–2029 (target)	3,00,000	
2046–2047 (target)	8,80,000	

c. Strengthening the defence industrial and innovation ecosystem

i. GOI is focused on strengthening the defence ecosystem by accelerating innovation through public–private partnerships, MSMEs, startups and academia. **India's robust defence industrial ecosystem includes 16 DPSUs, 462 licensed companies and over 16,000 MSMEs and startups.**[21] Government initiatives continue to play a central role in shaping the growth of the startup ecosystem, particularly by connecting R&D, startups and procurement into a single continuum.

ii. The strategic partnership model (SPM) fosters long term alliances between Indian private firms and global Original Equipment Manufacturers (OEMs) to indigenously manufacture major platforms via technology transfer. The government has also eased regulations and simplified procedures to attract foreign investors, with 74 percent FDI permitted under the automatic route and 100 percent under the government route.

iii. GOI has also launched **iDEX aimed to engage startups and MSMEs in technology development and foster innovation,** including in the domains of AI/ML, autonomous systems, Augmented Reality (AR)/Virtual Reality (VR), cryptography, material science, smart human protection systems, communication systems and radar systems.

19. https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2114546&reg=3&lang=2 ; Deloitte Analysis
20. https://ddpdashboard.gov.in/; https://www.pib.gov.in, ; Deloitte Analysis
21. https://www.pib.gov.in/PressReleseDetail.aspx?PRID=2191937&reg=3&lang=2 ; Deloitte Analysis

Exhibit 15: Joint Ventures or Memorandum of Understanding (MOUs) between Indian defence companies and Foreign Original Equipment Manufacturers (FOEMs) (non-exhaustive)[22]

CY	Foreign country	Purpose /platform
2006	Israel	Joint Development Programme for development and production of Medium Range Surface-to-Air Missile (MRSAM)
2007	US	Design and development of avionics
2007	Israel	Design and manufacture of avionics and training devices
2008	US	Manufacturing of aerospace components
2010	UK	Manufacturing of aerospace engine components
2013	US	Production and integration of aerostructures such as Centre Wing Box, empennage and wings
2014	France	Design and development of civilian and select defence radars
2015	Israel	Development, production and integration of high-end digital communication systems
2016	US	MoU for development under the TOT for tactical vehicles and mobility platforms
2016	US	Manufacture of aerostructures & AH-64 Apache helicopter fuselages
2016	Israel	Design, development and manufacture remote weapon systems, missile components and advanced defence systems
2017	UK	Assembly, integration and testing of the M777 Ultra Lightweight Howitzer.
2017	France	Developing and supplying state-of-the-art missile systems
2018	Israel	Production of Hermes 900 UAVs
2020	US	MoU for co-production and co-assembly of Javelin ATGMs for Indian forces
2021	France	Manufacturing. engineering of detailed parts and final assembly of the C295 aircraft
2021	France	Production of STAR Streak missile systems
2021	France	Final assembly, integration and test (FAIT) of the Advanced Short Range Air-to-Air Missile
2023	France	Design, development and manufacturing of Engines for Indian Multi Role Helicopter (IMRH) and Deck-Based Multi-Role (DBMR) helicopters and LEAP engine parts manufacturing.
2023	Israel	Manufacture and supply of its long range artillery weapon system
2024	UAE	Development, production and maintenance for defence and aerospace solutions
2024	Brazil	MoU for C-390 Millennium multi-mission aircraft
2024	France	Production of HAMMER Smart Precision Guided Air-to-Ground Weapon
2024	France	Final Assembly Line (FAL) to produce H125 helicopter
2024	Russia	MoU for co-production of Panstir air-defence systems.
2025	France	MoU for design, construction and export of advanced submarines (Project-75)
2025	France	Production of Ice Breaker, a fifth generation long-range autonomous precision-guided weapon system

A total of **549 problem statements have been opened involving 673 startups with 520 contracts being signed until December 2025.**[23] These include the Armed Forces procuring 43 items worth INR2,400 crore from iDEX-supported startups, as of February 2025.[24] This marks a turning point where there is a direct startup-to-procurement pathway and the ecosystem now rewards solutions that meet real operational needs. iDEX has become a crucial accelerator for defence innovation. It operates a challenge-based model that brings user requirements directly to innovators, supports milestone-based development and user trials and creates clearer pathways toward procurement.

[22] Official news announcements; Deloitte Analysis
[23] https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2114546&reg=3&lang=2; https://ddpdashboard.gov.in/; Deloitte Analysis
[24] https://www.pib.gov.in/PressReleasePage. ; Deloitte Analysis

Indian aerospace and defence sector – From import dependence to export powerhouse

The Acing Development of Innovative Technologies with iDEX (ADITI) initiative expands this approach to deeper strategic technologies under the Department of Defence Production.

iv. **Technology Development Fund (TDF) is implemented by the DRDO and aimed at building subsystem strength. It provides support to MSMEs and startups** to design, develop and produce advanced defence and dual-use technologies, including Radio Frequency (RF) modules, propulsion components, materials and electronics. This strengthens domestic capability and reduces import dependence. **Since its inception in 2016, 85 projects have been approved under TDF. Of these, 30 technologies have already been developed successfully.**

Exhibit 16: Successfully-developed TDF technologies (non-exhaustive)[25]

Technologies
Divya Drishti- A cutting-edge AI tool for Personal Identification
Autonomous UAV for Search and Report Operations in Enclosed/Indoor Environments
Prussian Blue Formulations (Capsules)
Simulator for unmanned ground, marine (Sea-Surface and underwater) and aerial vehicles
Water Tight (WT) Gas Tight (GT) and Fire Class EMI-EMC complaint doors & hatches for Indian Naval Ships
Composite materials seawater pumps
Development of Tools for Data Assessment, Active Learning & Believability for Visual Data
Virtual Sensors for Aero Gas Turbine Engine Health Monitoring
Fuel System: Temperature Transducer For Aircraft Application
ARINC 818 Video Processing & Switching Module and Smart Multi-functional Display- Military Grade
Indigenous High-Voltage Power Supply for Airborne Self-Protection Jammers

v. **DRDO has established 15 Industry–Academia Centres of Excellence (DIA–CoEs) to focus on accelerating indigenous, high-end and futuristic technology development.**[26] These COEs address 82+ research verticals and involve premier institutions, such as IITs and IISc to bridge the gap between academic research and industrial application.

vi. **Space-sector enablement through IN SPACe,** which has made private participation in space predictable and transparent. It oversees activities across manufacturing, launch support, satellite operations and downstream services. Complementary instruments such as the Technology Adoption Fund and proposed space-focused venture mechanisms aim to support commercial and dual-use innovation.

vii. The **ANRF supports long-term research in frontier technologies** such as AI/ML, quantum, materials, sensors and advanced manufacturing. By connecting academia with industry and allowing multi-year funding, ANRF improves the upstream pipeline that can feed future industrial and defence applications.

d. Ease of doing business

i. India's defence startup ecosystem is increasingly underpinned by industrial infrastructure, rather than isolated innovation grants. Defence industrial corridors are enabling supplier co-location, shared facilities and integration with anchor OEMs.

ii. Initiatives regarding industrial licences have been taken in 2019 to encourage investment in the sector.
  - Parts, components, castings, forgings and test equipment, etc. were delicensed.
  - Only defence items specifically listed in the defence product list of The Department for Promotion of Industry and Internal Trade (DPIIT) would require an industrial license.
  - Further, the validity of the defence industrial license has been extended from 3 years to 15 years.

iii. **Two Defence Industrial Corridors (DICs) have been set up in Uttar Pradesh (UPDIC)**

[25] https://tdf.drdo.gov.in/ ; Deloitte Analysis
[26] https://www.drdo.gov.in/drdo; Deloitte Analysis

and Tamil Nadu (TNDIC) to boost the defence manufacturing ecosystem. These corridors have become a testing ground for what "policy to product" really looks like, integrating R&D, manufacturing and MSME vendor ecosystems. These corridors aim to incentivise both domestic and foreign investors by providing tax incentives, subsidies, land acquisition support, plug & play land allocation, single window clearances and streamlined approvals, customised local utilities, infrastructure and logistics setups and vendor development support for MSME integration to companies investing in the sector. These measures reduce time-to-market and operational risks, enable supply chain development and lower production costs while enhancing scalability.

As on December 2025, **289 MOUs have been signed with UPDIC and TNDIC with potential investments of INR68,975 crore and an amount of INR 9,165 crore invested till December 2025**.[27] Together, these industrial corridors position India as a cost-competitive, export-oriented defence manufacturing hub capable of supporting global OEM supply chains and advancing a "Build for the World" strategy.

e. Boosting defence exports

i. India's defence sector is shifting from import dependence to export competence, including **specific approval of 156 subsystems/systems for exports,** and the mandate to DPSUs to increase their revenue share from exports to 25 percent. Furthermore, simplification of export procedures with an end-to-end online portal that **processes export authorisations digitally. Incidentally, 1500 authorisations were issued in FY 2025**.[28]

ii. These initiatives, along with a focus on indigenous manufacturing, have translated into a significant growth in India's defence exports**. Indian defence exports have grown 34 times to reach a record high of INR23,622 crore in FY 2024–2025 from INR686 crore in FY 2013-2014**.[29] India aims to reach a **targeted export of INR50,000 crore by FY 2028–2029 and INR2,80,000 crore by 2047 under Viksit Bharat Vision.** India is exporting defence items to over 100 countries, with the US, France and Armenia being the top 3 countries in FY 25.

iii. Exports to the US include aircraft parts and components such as fuselages, wings and subsystems, while exports to France include electronics and software systems. Armenia has emerged as a significant buyer of indigenously developed platforms in FY 2025.

iv. India's rise as an exporter of platforms particularly benefits developing countries seeking affordable, reliable alternatives. India is assisting friendly countries in the IOR and Global South to better meet their security challenges by exporting platforms such as ALH Dhruv helicopters, BrahMos missiles, Akash SAMs, Pinaka MBRL, Dorniers and Offshore Patrol Vessels (OPVs).

Exhibit 17: Key platforms exported from India[30]

Country	Platform	Year	Order value
Mauritius	Dornier aircraft and Dhruv helicopter	2021	US$100 million
Philippines	BrahMos supersonic cruise missile system	2022	US$375 million
	Akash missiles	2025	US$200 million
Armenia	Akash surface-to-air missiles	2025	US$3.5 to 4 billion
	Pinaka multi-barrel rocket launcher	2025	
	BrahMos supersonic cruise missile system	2025	
Vietnam	BrahMos supersonic cruise missile system	2025 (Advanced Stages)	US$700 million
	Offshore patrol vessels (OPVs)	2025 (Line of Credit)	US$300 million

27. https://ddpdashboard.gov.in/ ; Deloitte Analysis
28. https://www.pib.gov.in/PressReleasePage ; Deloitte Analysis
29. https://ddpdashboard.gov.in/; https://www.pib.gov.in ; Deloitte Analysis
30. Official news announcements; Deloitte Analysis

v. Alongwith India's maturing defence capabilities, its geopolitical role is also expanding. India is emerging as a trusted security partner for countries in the IOR and Global South. India has significantly strengthened its global defence outreach through an expanding network of defence wings and attachés. **India currently has 52 defence wings across the globe and aims to expand this number to over 90 by 2032.** In 2024, India has deployed new defence attachés to several countries, including Poland, Armenia, Tanzania, Mozambique, Ethiopia, Djibouti, Ivory Coast and the Philippines.

vi. While **India's defence transformation is inward-looking from a capacity and capability perspective, it is outward-looking from a strategic and market reach perspective,** which is already influencing the geopolitical environment.

a. India has extended naval surveillance support and training to countries such as Bangladesh, Sri Lanka and the Maldives, to help protect the IOR.

b. India has training programmes for military officers from several African and Asian countries at its institutions in India.

c. While India conducts joint exercises with almost all major countries, India has also supported exercises of many small countries which rarely get such opportunities. Most notably, Exercise MILAN has grown into an extensive biennial naval exercise involving 50+ countries, including Southeast Asian and African countries such as Vietnam, Malaysia, Myanmar, Seychelles, Egypt, Mauritius, Mozambique, Namibia, Nigeria, etc.

d. India has also donated or sold equipment on easy terms, such as patrol boats to Mauritius and Seychelles, and helicopters to Afghanistan.

e. India is a key player in coalitions such as the Quad (with the US, Japan and Australia) and has deepened defence ties with countries such as France and Israel. Quad has also launched the Quad Critical Minerals Initiative to strengthen economic security and collective resilience by collaborating on securing and diversifying critical mineral supply chains.

f. In November 2025, India and Israel strengthened their strategic defence partnership by signing an MoU focused on advancing cooperation in AI-driven cybersecurity, joint technology innovation and counter-terrorism.

g. India and France have launched the "India - France AI roadmap" focused on the development of secure and trustworthy AI.

Despite progress, where exports have risen from INR686 crore in FY 2013–2014 to INR23,622 crore in FY 2024–2025, India's share of the global defence export market remains muted**. India is ranked 28th among the global defence exporters for the period 2020–2024 with a share of 0.2 percent of global exports,** well below the top 5 countries, namely, US (43 percent), France (9.6 percent), Russia (7.8 percent), China (5.9 percent) and Germany (5.6 percent).[31]

Taken together, the initiatives taken by the GOI reflect the intent and efforts to cultivate a resilient, innovation-driven defence industrial ecosystem that integrates industry, academia, startups and global partners.

31. https://www.sipri.org/databases/armstransfers ; Deloitte Analysis

Indian aerospace and defence sector – From import dependence to export powerhouse

The future of warfighting

The character of warfare is undergoing a profound shift, driven by the rapid integration of advanced technologies into military strategy and operations. What once centred on troop-based, land-based operations have evolved into multi-domain operations spanning land, sea, air and space, where information dominance, technological superiority and controlling the narrative shape outcomes. In the future of warfare, interoperability is more than just a political expedient; it is a strategic advantage. Jointness and integration of services is a fundamental necessity for the future of warfighting, providing greater strategic agility in meeting any threat, in any domain and with any mix of partners that context might dictate.

While sophisticated military tools, such as fifth-generation fighter aircraft, autonomous drones and advanced cyber capabilities, will likely define much of the modern battlefield, success in deterring war and protecting the security of countries will require equally sophisticated abilities to build, buy and deliver those combat resources. Developing capable, modern militaries requires placing equal emphasis on the value of software, IP and digital systems for supplying and sustaining military operations as on weapon systems.

From the Ukraine-Russia conflict, Israel–Gaza conflict to Operation Sindoor, we are witnessing a new era of warfare.

Russia–Ukraine conflict: AI and emerging technologies fundamentally transformed the Russia–Ukraine conflict, making it one of the most technologically driven wars in modern history, and often referred to as "the first AI war." US's Project Maven AI and data intelligence model was deployed by Ukraine to rapidly evaluate drone footage and satellite imagery to identify Russian troops' locations and equipment. Ukraine also deployed AI-enhanced UAVs such as Corvo Precision Payload Delivery System (PPDS), a low-cost cardboard UAV (supplied by Australia) for ISR and logistics, QinetiQ kamikaze UAV (supplied by UK), Vector Surveillance UAV (supplied by Germany) and Teledyne FLIR Black Hornet Nano UAV (supplied by Norway) for reconnaissance and target identification. Russia, on the other hand, was the first country to deploy a hypersonic missile – the Kh-47M2 Kinzhal (also known as Dagger) in combat, targeting targets from MIG-31 aircraft. Russia also used Kamikaze UAV KUB-BLA for precision strikes.

Israel–Gaza conflict: Israel's conflict with Gaza in Palestine has ushered in a new era of technologically advanced warfare, combining traditional military systems with rapidly evolving AI-enabled capabilities. The Iron Dome, an air defence system (developed by Israel) was used for intercepting short-range rockets and artillery shells, David's Sling, an air and missile defence system (codeveloped by Israel and US) was deployed to counter medium- to long-range rockets, cruise missiles and tactical ballistic missiles. The Arrow missile system was deployed to intercept threats. AI-driven tools , such as "The Gospel" to generate a list of targets, "Lavender" for identifying suspected militants and "Where's Daddy?" to determine the location of the target. Israel has also deployed a range of surveillance drones such as the Heron and Thor and MagniX, alongside attack drones such as Hermes 450 (Zik) and Firefly loitering munition.

Gaza has employed a wide mix of weapons against Israel, including single-use attack drones, modified commercial quadcopters for dropping explosives and loitering munition suicide drones, namely Shahab and Zouari.

Operation Sindoor: Conducted in May 2025, it was a defining, AI-enabled and technologically-advanced counter-terror military strike by India, aimed at destroying terror infrastructure in Pakistan without crossing the Line of Control. Operation Sindoor showcased India's multi-domain capability and ability to integrate technological systems deployed for national defence.

While recent conflicts have demonstrated the growing relevance of dual-use technologies in modern warfare, US and China are also pursuing initiatives to accelerate the development and integration of dual-use technologies.

US has been increasingly focusing on development of AI capabilities. Department of War's (DOW) investments in AI have grown from US$600 million in FY 2016 to approximately US$1.8 billion in FY 2024. The DOW has released a new strategy in 2026 called the "AI acceleration strategy".[33] This strategy, as the name suggests, aims to accelerate America's Military AI Dominance by becoming an "AI-first" warfighting force across all components. It has also launched an AI platform GenAI.mil designed military personnel, civilians and contractors with safe access to advanced AI models for unclassified work. DOW has also announced a partnership with AI companies to integrate AI chatbots into GenAI.mil.[34] In September 2025, the US Army awarded a five-year contract of US$98.0 million to deploy AI-powered edge target recognition capabilities.[35]

Exhibit 18: Key technologies deployed in Operation Sindoor[32]

Parameter	Platforms	Combat value in Operation Sindoor
MALE ISR drones	• Heron MK-II (Israel) • Rustom-II (Indigenous)	Target identification
Loitering munitions (Kamikaze)	• Harop (Israel) • Nagastra -1 (Indigenous) • Skystriker (Israel)	Precision strikes
Command and Control	Integrated Air Command and Control System (IACCS) – (Indigenous)	Integrates data from ground and airborne radars for real-time situation awareness and threat detection
Air Defence Control	Akashteer – (Indigenous)	Handles ground-based air defence weapon systems and monitors low-level airspace. To improve air defence jointness, Akashteer is connected to IACCS
Space	10 ISRO-operated satellites	Real-time surveillance and navigation

The US has the highest share of granted patents (27 percent) in quantum technology.[36] In the unmanned systems domain, the US operates one of the largest UAV fleets, which includes the MQ-9 Reaper, RQ-4 Global Hawk, MQ-1C Grey Eagle, etc. DOW also launched Drone Dominance Programme in December 2025 aimed at procuring more than 3,00,000 industry-made drones by 2027.[37]

US dominates the semiconductor chip design market with investments announced for over 100 semiconductor chip ecosystem projects across 28 states. In 2024, the overall R&D investment in US's semiconductor industry was US$62.7 billion.[38]

China's People's Liberation Army (PLA) is emphasizing on waging advanced air warfare using stealth, drones and high-technology weapons. China has also pursued language and facial recognition technologies, which it plans to integrate into the country's domestic surveillance network. Such technologies could also be used to counter espionage and aid military targeting. In October 2025, China's state-owned defence company, unveiled a military vehicle capable of autonomously conducting combat-support operations at 50 kilometres per hour, powered by DeepSeek.[39] Further, the 14th Five-Year Plan (2021–2025) and Made in China plan have designated additive manufacturing a national priority, driving massive investment in R&D, advanced materials and automation.[40]

Several countries have set up R&D agencies for driving dual-use innovation and leveraging civil technologies for military needs.

i. The US Defence Innovation Unit (DIU), set up in 2015, serves as a critical bridge between the military and commercial technology sectors in the US, accelerating the adoption of cutting-edge commercial technology for military needs. It directly connects with the commercial technology innovation ecosystem and streamlines

32. https://www.pib.gov.in/PressReleasePage.Operation Sindoor. ; Deloitte Analysis
33. https://media.defense.gov/2026/Jan/12/2003855671/-1/-1/0/ARTIFICIAL-INTELLIGENCE-STRATEGY-FOR-THE-DEPARTMENT-OF-WAR.PDF; Deloitte Analysis
34. https://www.war.gov/News/Releases/Release/Article/4401775/genaimils-rapid-expansion-continues-with-openai-partnership/; Deloitte Analysis
35. https://www.turbineone.com/newsroom; Deloitte Analysis
36. Year on Quantum : From Concept to Reality 2025 Report by Mckinsey; Deloitte Analysis
37. https://www.war.gov/News/News-Stories/Article/Article/4399192/as-promised-war-department-moving-out-fast-on-drone-dominance/; Deloitte Analysis
38. Semiconductor Industry Association – State of Semiconductor Industry report 2024; Deloitte Analysis
39. https://www.reuters.com/world/asia-pacific/robot-dogs-ai-drone-swarms-how-china-could-use-deepseek-an-era-war-2025-10-27/; Deloitte Analysis
40. https://www.imts.com/read/article-details/Shifting-the-Balance-China-s-Rise-in-Additive-Manufacturing/2171/type/Read/1; Deloitte Analysis

processes to deliver rapid prototypes to DOW within 12 to 24 months. Where, upon completion, the successful prototypes may transition to follow-on orders, providing scalable revenue opportunities for commercial vendors.

ii. Israel also runs an INNOFENSE innovation program. As part of the program, a list of multi-pronged defence challenges is published with the aim of attracting commercial start-ups to field their commercial technology for defence purposes and test the technology's feasibility for defence use-cases.

iii. India has also set up iDEX and TDF to engage a large pool of innovators, academia, MSMEs and startups to foster innovation in the dual-use technology domains in a coherent and integrated manner. Draft DAP 2026 also allows defence forces to procure commercial-off-the-shelf drone swarms, space technologies and cyber security tools with minimal desirable customisation.

As countries increasingly prioritise adaptive and dual-use technologies, there is a growing imperative for India to keep pace by closer collaboration between users and innovators, enabling faster development cycles and a stronger focus on technologies suited to its own strategic needs. US's 2026 Budget has allocated US$979 million for the Defence Innovation Unit (DIU) while iDEX under the Defence Innovation Organisation was allocated INR449.62 crore (~US$50 million) in FY 2025–2026,[41] highlighting the wide difference in investment on innovation.

In today's innovation ecosystem, nearly all frontier technologies are dual-use by nature, from foundational technologies to functional systems and integrated platforms.

[41] https://comptroller.war.gov/DIU budget ; https://www.pib.gov.in/PressReleasePage.IDEX budget ; Deloitte Analysis

Emerging technologies and future outlook

Technology is evolving rapidly. What is cutting-edge today will be obsolete in 5–10 years. India's space defence strategy must account for emerging trends, such as AI/ML, quantum technologies, advanced communications and directed energy weapons which will reshape military operations.

a. Technology convergence in space defence

i. **AI/ML revolution:** AI and ML are transforming space operations, from autonomous satellites to real-time intelligence analysis. AI enables satellites to process data on board, operate autonomously and coordinate as swarms. Traditional satellites downlink raw data to ground stations for processing (latency: hours). AI-enabled satellites process data on board and downlink only insights (latency: minutes). This reduces bandwidth requirements by 100 times while enabling real-time intelligence.

ii. **Advanced communications:** Satellite communications evolve from RF to optical/laser and terahertz (THz) frequencies, enabling 10–100 times higher data rates. Optical links are also jam-resistant (narrow beam vs broadcast RF)

iii. **Next-Generation ISR Sensors:** ISR sensors are evolving beyond visible light, long-wave infrared (LWIR) detects heat signatures, hyperspectral identifies materials and multi-phenomenology fuses multiple sensor types.

iv. **Quantum Technologies:** Quantum technologies promise unhackable communication, GPS-independent navigation and revolutionary sensing. China leads with operational quantum satellites; India must accelerate as well.

v. **Miniaturisation and proliferation:** Small satellites (<150kg) are revolutionising space operations with lower cost, faster deployment and resilience through proliferation. Constellation approach (50–100+ satellites) provides redundancy against ASAT attacks.

vi. **Multi-domain integration:** Future warfare is multi-domain. Space, air, ground, sea and the cyber space operate as an integrated system. Space is the glue connecting all domains through ISR, SATCOM and PNT.

b. Disruptive technologies

i. **On-orbit servicing and manufacturing (OOMR):** Represents a paradigm shift, instead of replacing satellites, it services them in-orbit. This extends satellite life by 5–10 years, enabling payload upgrades and repairing battle damage

ii. **Cyber and electronic warfare from space:** Software-defined payloads enable satellites to conduct electronic warfare. Jam adversary communications, spoof GNSS signals and conduct cyber operations. Cyber-hardened satellites resist attacks through onboard defence systems.

iii. **Directed energy weapons:** Space-based lasers and high-power microwave (HPM) systems enable non-kinetic ASAT operations, such as dazzle or destroy satellite sensors, disrupt electronics counter UAV swarms. No debris are generated by these, unlike kinetic ASAT.

iv. **Hypersonic tracking from space:** Hypersonic missiles travel Mach 5+ (5,000+ km/h), manoeuvre unpredictably and fly below radar coverage. Only space-based infrared sensors can track them continuously from launch to impact.

v. **Cislunar Operations:** Cislunar domain (Earth–Moon space) is an emerging strategic frontier. Lunar bases enable strategic surveillance of Earth, communications relay and resource utilisation. US and China are racing to establish a presence here.

c. India's Unmanned Aircraft Systems (UAS) sector

Over the last decade, UAS are no longer a niche enabler of routine operations of the armed forces but are closer to being central instruments of state powers, around which newer theatres of conflict are being shaped. The logical corollary to the global mainstreaming of UAS into modern warfare is the necessity of counter-UAS, which is further complicated by the diffusion of UAS capabilities to non-state actors, a reality that most countries must deal with. This has created additional pressure for investments in detection, interdiction and resilient infrastructure protection systems.

Various industry estimates peg that the global UAS military market can cross US$40 billion in the immediate future. Several recent conflicts, including but not limited to Russia–Ukraine, Israel–Iran, etc., are not only buttressing a growing market but are also indicating a future of warfare where mass manufacturing of systems with quick turnaround time, operational autonomy and optimal unit economics are set to be critical success determinants.

On the operational front, while India has integrated UAS into routine ISR operations, border surveillance, narcotics operations etc., Operation Sindhoor has changed the doctrines forever. Operation Sindhoor, perhaps, marks the advent of mainstream drone warfare into the South Asian neighbourhood, which has made the use of UAS a routine defence operation, preparedness to defend against incursions and protect vital interests and infrastructure an integral and central part of the future of warfighting.

India's military drone procurement for 2026–2030 is anchored by three major platform acquisitions.

i. The flagship programme is the MQ-9B SkyGuardian/ SeaGuardian deal signed in October 2024 for 31 high-altitude long-endurance- (HALE) armed drones valued at US$3.8–4 billion, with deliveries scheduled for 2029–2030.[42] To bridge the capability gap, India's DAC approved a three-year lease of two additional MQ-9B aircraft in December 2025 for INR1,600 crore (~US$184 million), covering 2026–2028.[43]

ii. The largest indigenous initiative is the Make in India MALE drone tender issued in November 2025 for 87 medium-altitude long-endurance platforms across all three services, valued at INR20,000–30,000 crore (US$2.3–3.4 billion) with deliveries estimated from 2027–2030, mandating technology transfer and local manufacturing.[44]

iii. In loitering munitions and tactical systems, India has secured multiple contracts totalling over INR2,500 crore. The Nagastra-1 programme delivered 480 munitions in December 2024 under an INR212 crore contract signed in April 2023,[45] followed by a June 2025 order for 450 Nagastra-1R systems worth INR199 crore for 2026 delivery.[46] The DAC granted AON in December 2025 for 850 kamikaze drones integrated with artillery units, valued at INR2,000 crore (US$16 million), which were placed in June 2025 for tactical ISR capabilities, with delivery expected in 2026.[47]

Despite the momentum, India's gaps vis-à-vis its peers are increasingly concentrated in a few subsystem-heavy areas that determine battlefield survivability and scalability, including sensors (especially EO & IR detection chains), propulsion, EW-hardened communications and navigation and an AI and autonomy layer that ties each of the critical systems together. This framing is consistent with the Government's own component prioritisation under the Drone PLI; eligible components include airframe, propulsion systems (engine and electric), power systems, cameras and sensors. The scheme also widens coverage to include software for drone and drone components/ drone-related IT products.

To that extent, India will focus on resilience in contested electronic environments, volume manufacturing and rapid iteration of UAS systems through a broader industrial base and counter-drone capabilities not only for all bases, but all critical infrastructure.

42. Reuters, "India signs deal with US to procure 31 MQ-9B drones," October 15, 2024; Deloitte Analysis
43. Times of India, "DAC approves Rs 1,600 cr lease of 2 more Predator drones," December 29, 2025; Deloitte Analysis
44. Economic Times, "India to fast-track Rs 20,000 crore 87 MALE drone project," July 9, 2025; AngelOne, "India to issue 30,000 crore tender for 87 MALE drones," November 4, 2025 ; Deloitte Analysis
45. The Defense Post, "Indian Army Loitering Munitions," December 6, 2024 ; Deloitte Analysis
46. Times of India, "Army drone deal: India orders 450 Nagastra-1R units," June 23, 2025 ; Deloitte Analysis
47. Economic Times, June 23, 2025 ; Deloitte Analysis

Space as the fourth domain

Space is no longer the final frontier; it is the first line of defence. As space assets became more integral to defence strategy planning and operations, the security of the assets have also started becoming more pronounced. Ranging from in-orbit dismemberment of assets and Anti-Satellite (ASAT) technologies to signal spoofing, jamming and interception security threats, space assets are proliferating exponentially. At the same time, from early warning systems for missile launches to round-the-clock on-demand high-resolution surveillance and high-throughput secure connectivity, the possibilities from space to defence are also rapidly expanding.

Exhibit 19: Space dependency in modern warfare[48]

Military function	Space dependency	Impact, if denied
Precision strike	GPS/GNSS for guidance	Accuracy degrades from meters to tens of meters; collateral damage increases
ISR	Satellite imagery, SIGINT	Blind to adversary movements; reactive instead of proactive
Command and control	SATCOM for beyond-line-of-sight	Communication breakdown; loss of coordination
Navigation	GPS/GNSS for positioning	Forces rely on inertial navigation (drift over time); autonomous systems fail
Timing	GPS/GNSS for synchronisation	Network timing fails; cyber-physical systems are disrupted

In the light of the above, India's opportunities and challenges for space defence ought to be viewed through two lenses: space for defence and defence for space.

The Two-Lens Framework

Space capabilities in modern military operations can be analysed through a two-lens framework that mirrors the doctrinal structure of air power, requiring both offensive strike capability and defensive air superiority to achieve operational effectiveness. Similarly, space power comprises two interdependent components: **Space for Defence** (utilising space assets to enable military operations) and **Defence for Space** (protecting space assets from adversary action). Each satellite deployed for military advantage becomes a potential target for adversary counter-space operations. Conversely, counter-space capabilities developed to protect indigenous assets also deter adversary aggression against them.

Case studies

The Kargil Lesson (1999): During the Kargil War, India requested GPS data from the US to guide artillery and air strikes. The US denied access, forcing India to rely on less accurate systems. This strategic vulnerability led directly to India's decision to build IRNSS (NavIC), its indigenous navigation constellation.

The Ukraine Conflict (2022–present): Russia's invasion demonstrated both the criticality and vulnerability of space assets. Ukraine relies on Starlink for military coordination while Russia repeatedly attempts to jam it. In February 2022, Russian hackers disabled 45,000 Viasat satellite modems in just 45 minutes, hours before the invasion. Russia jams GPS across Ukraine and neighbouring NATO countries. The conflict shows that space is not just an enabler, but a battlefield.

For India, this framework has relevance in the context of the ongoing transition to Integrated Theatre Commands, which

48. Analysis based on US Defence Space Strategy (2020) and UK Defence Space Strategy (2022) ; Deloitte Analysis

is a fundamental restructuring of military operations around joint warfighting concepts. The effectiveness of theatre commands is directly dependent on the space architecture that enables connectivity and coordination across services. Space capabilities function as joint warfighting enablers rather than service-specific assets. Without robust space infrastructure, India's northern, western, maritime and air defence commands cannot achieve the integrated, networked operations that characterise modern military doctrine

a. Lens 1: Space for Defence (utilising space assets)

This lens examines how space-based capabilities enable military operations across land, sea, air and cyber domains. Space assets provide three core military functions: intelligence collection, communications connectivity and precision navigation.

1. Intelligence, Surveillance and Reconnaissance (ISR)

Space-based ISR provides persistent, wide-area surveillance coverage that terrestrial systems cannot replicate at scale. Satellites equipped with electro-optical sensors, infrared detectors, synthetic aperture radar (SAR), and RF receivers can detect, identify and track targets across borders and contested territories. These multi-sensor platforms operate continuously, providing all-weather, day–night surveillance capability.

For India, with 7,516 km of coastline and 15,000 km of land borders, space-based ISR is a strategic necessity. Ground-based and airborne ISR platforms have limited range and endurance, making them unsuitable for persistent monitoring of border regions, maritime approaches and adversary military installations. Space-based systems address this gap by providing continuous coverage of areas of strategic interest.

Key insights

1. **Quantitative deficit:** India operates 15–20 ISR satellites compared to China's 200+, representing a 10x capability deficit. This quantitative gap translates to longer revisit times, reduced geographic coverage and the inability to monitor multiple theatres simultaneously. In operational terms, India cannot maintain persistent surveillance of high-priority targets while simultaneously monitoring secondary areas of interest.
2. **ELINT/SIGINT gap:** India's most critical capability gap exists in electronic intelligence. With only 2 ELINT/SIGINT satellites compared to China's 30 (15x deficit), India has limited ability to map adversary radar networks, communication systems and electronic order of battle. This gap constrains electronic warfare planning and limits situational awareness of adversary electronic capabilities.
3. **Resolution parity:** India has achieved near-parity in spatial resolution (25—30 cm compared to China's 30 cm commercial systems), demonstrating indigenous capability in optical system development. However, quantity remains critical. China can image more locations with greater frequency, providing operational advantage in time-sensitive scenarios.
4. **SAR deficit:** India operates approximately 5 SAR satellites compared to China's 50 (10x deficit). SAR capability is critical for all-weather surveillance, maritime domain awareness and foliage penetration along border regions. This gap limits India's ability to conduct persistent surveillance during monsoon seasons and in forested terrain.
5. **Revisit rate disparity:** China can revisit high-priority targets within hours; India requires days for equivalent coverage. In fast-moving operational scenarios, this temporal delay can be operationally decisive, limiting ability to detect and respond to adversary movements in near-real time.

2. Satellite Communications (SATCOM)

Satellite communications enable real-time command and control, beyond-visual-line-of-sight (BVLOS) operations and tri-service coordination. Modern network-centric warfare depends on high-bandwidth, low-latency and secure communications that only satellite systems can provide at the required scale and geographic coverage.

SATCOM enables critical military functions, including fleet coordination in the IOR, BVLOS drone operations along contested borders and secure strategic communications for national command authority. Terrestrial communication systems are limited by line-of-sight constraints and geographic obstacles, making satellite connectivity essential for distributed military operations.

Key insights

1. **8x satellite deficit:** US operates 40–50 military SATCOM satellites compared to India's 5–7, representing an 8x quantitative deficit. This translates to a bandwidth deficit (100+ Gbps vs 10–20 Gbps) and limited redundancy. Loss of a single Indian SATCOM satellite (e.g., GSAT-7R for the Navy) would severely degrade service-specific communications.
2. **ZERO LEO constellation:** India has ZERO LEO SATCOM satellites. This is India's most critical SATCOM gap. LEO constellations provide low-latency (20–40ms) tactical communications essential for:
   i. UAV BVLOS operations (real-time command and control)
   ii. Mobile forces (on-the-move connectivity)
   iii. Tactical edge (soldier-level communications)
3. China is deploying Guowang (13,000 satellites planned, 1,000+ by 2030). The US operates Starshield (military Starlink). India's absence from LEO SATCOM creates a significant tactical disadvantage.
4. **10x bandwidth deficit:** India's 10–20 Gbps total bandwidth (vs US's 100+ Gbps) constrains high-bandwidth applications:
   i. Real-time ISR dissemination (streaming video from satellites to operational commanders)
   ii. Network-centric warfare (shared situational awareness across services)
   iii. Multi-domain operations (coordinated air–land–sea operations)
5. **Regional coverage limitation:** India's GSAT constellation covers India and the IOR. For operations beyond this region (UN peacekeeping, anti-piracy in the Gulf of Aden, expeditionary operations), India relies on commercial SATCOM or has limited connectivity. This creates strategic dependency on foreign commercial providers who may deny access during crises.
6. **Operational Implications:**
   i. **UAV BVLOS Constraints:** Without LEO SATCOM, India's UAVs are limited to line-of-sight operations or must rely on GEO SATCOM with 250ms latency. This latency is unsuitable for real-time tactical operations, constraining UAV effectiveness in contested environments.
   ii. **Mobile force connectivity:** GEO SATCOM requires large, fixed antennas unsuitable for mobile operations. LEO SATCOM enables small, flat-panel antennas on vehicles and aircraft, providing on-the-move connectivity. India's lack of LEO SATCOM constrains mobile force operations.
   iii. **Bandwidth bottleneck:** Limited bandwidth constrains real-time ISR dissemination. ISR satellites collect high-resolution imagery and video, but limited SATCOM bandwidth delays transmission to operational commanders. This increases sensor-to-shooter timelines from minutes to hours.
   iv. **Strategic dependency:** Reliance on commercial SATCOM for expeditionary operations creates strategic dependency. Commercial providers may deny access during crises due to legal restrictions or business considerations, limiting operational autonomy.
   v. **Single point of failure:** With only 5–7 satellites, each satellite represents a critical node, loss of GSAT-7R would eliminate Navy fleet connectivity while loss of GSAT-7A would eliminate the Air Force's airborne connectivity. This vulnerability necessitates expanding the constellation for redundancy and resilience.

3. Position, navigation and timing (PNT)

Global Navigation Satellite System (GNSS) constellations provide precision positioning, navigation and timing services that enable modern military operations. PNT capabilities support precision-guided munitions, autonomous systems, coordinated multi-domain operations and secure communications (which require precise timing synchronisation).

India's regional navigation system, NavIC (Navigation with Indian Constellation), provides positioning services over India and surrounding regions, reducing dependence on foreign GNSS systems such as GPS. NavIC enables precision-guided munitions to achieve sub-10-meter accuracy, autonomous systems to navigate without external reference and military networks to maintain timing synchronisation.

Key Insights:

1. **Coverage Gap:** NavIC provides regional coverage (India + 1,500 km) while adversaries have global coverage. Indian forces operating beyond South Asia (e.g., UN peacekeeping, anti-piracy in the Gulf of Aden) must rely on GPS, which is a foreign-controlled system.
2. **Constellation size:** NavIC operates seven satellites, whereas BeiDou operates 35 (5x deficit). Smaller constellations mean fewer satellites visible at any time, reducing accuracy and resilience. If one NavIC satellite fails, coverage degrades significantly.
3. **Resilience gap:** GPS, GLONASS, Galileo and BeiDou have 24–35 satellites, providing redundancy. NavIC's seven-satellite constellation is vulnerable. The loss of two to three satellites could lead to degraded service.
4. **Commercial adoption:** GPS is ubiquitous (4+ billion devices). NavIC has limited commercial adoption, with only a few smartphones, vehicles, or drones supporting it. This limits dual-use benefits (civilian applications subsidising military capability).
5. **S-band advantage:** NavIC's S-band signal (2492 MHz) penetrates foliage and buildings better than L-band (GPS/GLONASS/Galileo/BeiDou). This is advantageous for urban/forested operations—but only within NavIC's regional coverage.

b. Lens 2: Defence for Space (protecting space assets)

Space is no longer considered a sanctuary domain. Adversary nations have developed capabilities to deny, degrade or destroy space assets through kinetic and non-kinetic means. Protection of space assets is therefore as strategically important as their deployment.

1. Threat taxonomy

Threats to space assets can be categorised into five primary types:

Exhibit 20: Space threat taxonomy[49]

Threat category	Attack mechanism	Reversibility	Escalation level	Real-world example
Kinetic physical	Direct-ascent ASAT missiles, co-orbital ASAT satellites	Irreversible (creates debris)	High (act of war)	China SC-19 (2007), Russia Nudol, India Mission Shakti (2019)
Electronic	Jamming (uplink/downlink), Spoofing (false signals)	Reversible (ceases when jamming stops)	Low–medium (deniable)	Russia GPS jamming in Ukraine (2022–present), Iran RQ-170 capture (2011)
Cyber	Ground station hacking, satellite command compromise, malware injection	Reversible (if detected early)	Low–medium (deniable, attribution difficult)	Viasat hack (2022),30,000+ terminals disabled
Supply Chain	Hardware backdoors, component vulnerabilities, firmware exploits	Irreversible (if undetected until activation)	Low (covert, difficult attribution)	Component-level backdoors, firmware exploits
Environmental	Space debris collision, solar storms, orbital congestion	N/A (natural/ accidental)	N/A	27,000+ tracked objects, 130M+ fragments <1cm

[49] EU Space Strategy Factsheet (2024), CSIS Space Threat Assessment (2024, 2025), UK Defence Space Strategy (2022) ; Deloitte Analysis

2. Protection strategies

Defence of space assets requires a multi-layered approach:

1. **Space Situational Awareness (SSA):** Tracking and cataloguing objects in orbit to detect threats, predict collisions and monitor adversary space activities.
2. **Cyber hardening:** Implementing encryption, zero-trust architectures and secure software development practices for ground stations and satellite systems.
3. **Redundancy and resilience:** Deploying satellite constellations rather than single satellites to eliminate single points of failure and enable graceful degradation under attack.
4. **Manoeuvrability:** Equipping satellites with propulsion systems to enable orbit changes for threat evasion and collision avoidance.
5. **Counter-space capabilities:** Developing offensive capabilities (electronic warfare systems, ASAT weapons) to deter adversary attacks through credible retaliation threat.

Exhibit 21: Global space protection capabilities[50]

Protection pillar	US	China	Russia	India
DETECT (SSA)	Mature: 27,000+ objects tracked, ground + space-based sensors, global coverage	Mature: 10,000+ objects tracked (estimated), ground + space-based sensors, regional focus	Mature: 5,000+ objects tracked (estimated), ground-based sensors, global coverage (degraded)	Nascent: 2,000 objects tracked, ground-based only (NETRA), regional coverage
PREVENT (Hardening)	Advanced: Zero-trust infrastructure, quantum-resistant encryption (R&D), advanced anti-jam (GPS M-code)	Advanced: Comprehensive cyber defence, Anti-jam capability, indigenous supply chain	Mature: Strong cyber defence, anti-jam capability, indigenous supply chain	Nascent: Basic encryption, limited anti-jam, high import dependence
SURVIVE (Resilience)	Mature: 40-50 SATCOM, 150-200 ISR, 31 GPS satellites, rapid reconstitution capability	Mature: 20-30 SATCOM, 200+ ISR, 35 BeiDou satellites, Guowang LEO constellation (13,000 planned)	Degraded: 15-20 SATCOM, 50-70 ISR, 24 GLONASS satellites, limited reconstitution	Limited: 5-7 SATCOM, 15-20 ISR, 7 NavIC satellites, 18–36 months reconstitution
DETER (Counter-space)	Mature: Historical ASAT tests, GSSAP co-orbital, Advanced EW, Cyber offensive	Mature: SC-19/DN-3 ASAT, SJ-21 co-orbital, full-spectrum EW, cyber offensive, ground lasers	Mature: Nudol ASAT, cosmos co-orbital, dominant EW (Ukraine), cyber offensive	Developing: Mission Shakti (LEO ASAT), No co-orbital (SPADEX 2025-2026), limited EW, nascent cyber

[50] CSIS Space Threat Assessment (2024, 2025), DIA Challenges to Security in Space (2022) ; Deloitte Analysis

Exhibit 22: India's five critical gaps

Gap		Description
Gap 1	SSA Deficit (13x)	India tracks 2,000 objects while US tracks 27,000. It cannot track GEO satellites and cannot predict collisions with high confidence or detect co-orbital threats in GEO.
Gap 2	Cyber Vulnerability (Critical)	India has no zero-trust infrastructure, no on-board defence and only basic encryption. Ground stations are vulnerable to hacking and satellites are vulnerable to malware. There is a high risk of compromise during conflict.
Gap 3	Supply Chain Vulnerability (Very High)	India has import dependence on China, Europe and US. No comprehensive security protocols are in place. Adversaries could insert dormant backdoors activated during conflict, and there is a systemic vulnerability across the entire infrastructure.
Gap 4	Constellation Deficit (8-10x)	5–7 SATCOM with 8x deficit, 15-20 ISR with 10x deficit and 7 NavIC with 5x deficit exists. Single points of failure. The loss of one satellite results in significant degradation. Reconstitution is also slow at 18–36 months.
Gap 5	Limited Counter-Space Capability	Mission Shakti provides LEO ASAT deterrence only (no GEO capability). No co-orbital (SPADEX planned 2025–2026) exists. EW is limited and cyber offensive is at a nascent stage. Also, it cannot hold adversary GEO satellites at risk because of asymmetric vulnerability.

Critical gaps across all five pillars create a strategic vulnerability, allowing adversaries to deny India's space capabilities faster than India can reconstitute them. Loss of two to three critical satellites would severely degrade military operations across all domains. Protection is as critical as deployment. India's space assets face diverse threats ranging from electronic warfare to kinetic destruction. Protection requires a multi-layered approach spanning detection (SSA), prevention (cyber hardening, anti-jam, supply chain security), resilience (constellations, redundancy) and deterrence (counter-space capabilities).

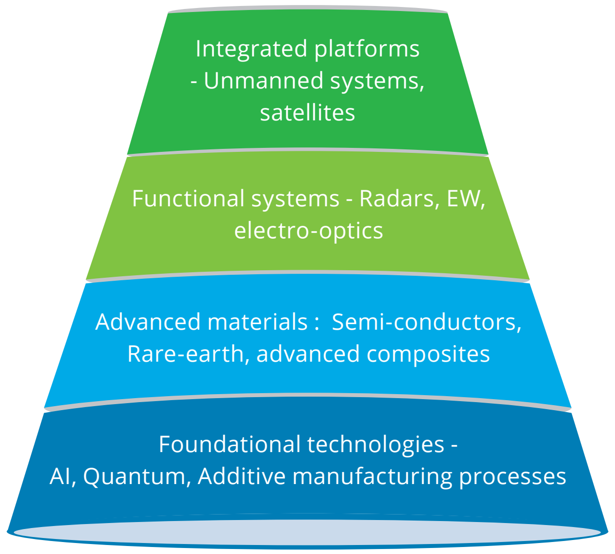
India's current protection posture is nascent, with critical gaps across all five pillars. TPCR 2025, India's 15-year technology roadmap aims to close these capability gaps and achieve strategic autonomy in space.

b. Strategic Interdependence of both lenses

1. **Mutual dependency:** The two lenses are strategically interdependent. Deploying space assets without adequate protection creates vulnerability to adversary counter-space operations. Both capabilities must be developed in parallel to achieve strategic autonomy in the space domain.
2. **Offensive–defensive balance:** The offence–defence balance in space favours offensive operations. Satellites orbit predictably, enabling adversaries to track and target them with relative ease. A single ASAT missile can destroy a satellite worth hundreds of millions of dollars. Defence, therefore, requires multiple layers, namely, SSA to detect threats, cyber hardening to prevent intrusion, redundancy to survive attacks and counter-space capabilities to deter adversary action.
3. **Strategic autonomy requirements:** Strategic autonomy in space requires both offensive and defensive capabilities. India cannot achieve strategic autonomy solely through satellite deployment. It must also develop capabilities to protect indigenous satellites and hold adversary space assets at risk. This dual requirement is reflected in TPCR 2025, which includes not only ISR satellites and SATCOM terminals but also GPS jammers, cyber-hardening systems and on-orbit servicing capabilities.
4. **Deterrence framework:** Credible counter-space capabilities serve a deterrence function. If adversaries assess that attacking Indian space assets will result in retaliation against their own satellites, they are less likely to initiate conflict in the space domain. This deterrence logic underpinned India's Mission Shakti ASAT test in 2019, which demonstrated the capability to hold adversary LEO satellites at risk.

Key priority dual-use technologies that have gained importance in the current scenario of warfighting

Exhibit 23: Dual-use innovation ecosystem (Non-exhaustive)



UAVs can be used for both civil purpose such as logistics, agriculture, disaster management and defence applications such as surveillance, target identification etc. Satellites technologies for surveillance and communication can also be widely used in civilian applications for weather forecasting, GPS navigation etc.

Radar technologies designed for civilian surveillance, weather tracking, navigation can also be deployed for military purpose by aligning the development requirements of the military.

Advanced light weight, high strength composites for military aircraft or protective gears for soldiers can also be deployed for automotive industry or creation of advanced medical devices.

AI powered systems for healthcare diagnostics, traffic management etc can also be deployed for enhancing battlefield intelligence

i. **Foundational technologies:** These are inherently application-agnostic and can be adapted for both civilian and military purposes
   a. AI is transforming modern warfare by enabling real-time data analysis, faster decision-making and seamless multi-domain coordination. It enhances battlefield awareness by processing sensor and drone data in real time, supports autonomous systems such as drones and robots, enables predictive maintenance of military platforms to improve readiness and strengthens training and simulation through adaptive, data-driven operational scenarios.
   b. Modern defence operations face overwhelming complexity from multi-domain coordination, swarm attacks or cyber-attacks. Quantum technologies offer the computational edge needed to make sense of massive data sets, simulate dynamic threats in real-time and guide fast, high-stakes decision-making. The Quantum Key Distribution technology helps in creating unhackable encryption for cyber defence. Quantum-safe cryptographic tools are designed to withstand attacks from quantum computers.
   c. Additive manufacturing (3D printing) enables complex parts to be created on demand, accelerating prototyping and reducing both costs and lead times.

ii. **Advanced materials:** Advanced materials form critical building blocks for dual-use systems. Rare Earth Elements (REE) and critical minerals are vital to the manufacturing of advanced materials that help reduce weight while improving durability. Semiconductors are also an integral part of new-age electronics, such as Radar and EW.

iii. **Functional systems:** Technologies include radar systems, electronic warfare, electro-optics etc where dual use convergence becomes most visible. These technologies often evolve from commercial innovations but lack the resilience and standards compliance required for military use. Bridging this gap requires collaborations between the government and companies in R&D. The aim is not to fully develop the technology from scratch, but to align customisation and ruggedised requirements for defence use. These technologies form the backbone of modern defence, enabling surveillance, target detection, communication and navigation.

iv. **Integrated platforms:** These include integrated platforms such as UAVs and satellites. Government and industry can prioritise dual-use certification frameworks, facilitate interoperability testing and modular design approaches to ensure platforms meet both civil and defence requirements. Unmanned Systems such as UAV, UGV or UUV have revolutionised modern warfare by enabling precision strikes, surveillance, intelligence gathering and logistics for mission-critical supplies without risking human lives.

Dual-use technologies present a transformative opportunity for India to emerge as a significant global player in the defence industry. The growing importance of these technologies is reflected in the MOD's TPCR 2025, which highlights key technological domains expected to shape future conflicts and operational requirements of the armed forces. DIA-CoE also focuses on cutting-edge research in strategically important dual-use areas, and iDEX focuses on challenges in the dual-use domain. This strategic emphasis is further reinforced through various government initiatives, underscoring a sustained national focus on advancing dual-use capabilities.

v. **Understanding TPCR 2025**[51]

a. **The 77-23 Rule:** The domination of ground segments

The massive ground-segment (terminals, receivers, infrastructure) opportunity (77 percent) enables private-sector participation on scale. Terminal manufacturing requires lower capital investment than satellite manufacturing, shorter development cycles (12–24 months vs 36–48 months) and higher production volumes (thoUSnds of units vs dozens of satellites). Only 23 percent belong to the space segment i.e., satellites.

Exhibit 24: Core vs enabled distribution

Category	Requirements	Percentage	Opportunity type
Core (Space segment)	19	23%	High-complexity, strategic
Enabled (Ground segment)	63	77%	High-volume, lower barriers
TOTAL	82	100%	Balanced investment

b. **Service distribution: Air-space integration imperative**

IAF dominance (43 percent) reflects the operational reality that air operations are most space-dependent. Fighter jets require real-time ISR for targeting, SATCOM for network-centric warfare and PNT for precision navigation. Joint requirements (33 percent) emphasize cost-effective shared infrastructure (LEO constellation, SSA, OOMR).

Exhibit 25: Service-wise requirements

Service	Requirements	Percentage	Strategic Focus
Indian Air Force	35	43%	ISR satellites, airborne SATCOM, GPS jammers, air–space integration
Joint (tri-service)	27	33%	LEO constellation, multi-INT fusion, shared infrastructure
Indian Navy	13	16%	Maritime ISR (SAR), ship connectivity, submarine communications
Indian Army	7	8%	Tactical terminals, border surveillance
TOTAL	82	100%	Balanced across services

[51] https://www.mod.gov.in/dod/sites/default/files/FINAL-TPCR-2025_0.pdf; Deloitte Analysis

Indian aerospace and defence sector – From import dependence to export powerhouse

c. **Breakdown of the technology pillar**

ISR and SATCOM are co-equal priorities (32 percent each), as modern warfare requires both eyes (ISR) and voice (SATCOM) to function simultaneously. PNT shifts focus from satellites (NavIC operational) to integration (10,000+ receivers) and counter-PNT (jammers, spoofers).

Exhibit 26: Requirements of the capability pillar

Pillar	Requirements	Percentage	Core	Enabled	Strategic gap
ISR	26	32%	16	10	10x deficit vs China (200+ vs 15–20 satellites)
SATCOM	26	32%	1	25	8x deficit vs US, ZERO LEO satellites
PNT	11	13%	0	11	NavIC exists—focus on integration + counter-PNT
Others	19	23%	2	17	OOMR (game-changer), SSA (13x deficit)
TOTAL	82	100%	19	63	Comprehensive capability development

India's journey towards defence self-reliance has reached an inflexion point with notable achievements in production, exports and policy reforms. **TPCR 2025 envisions a technologically advanced, self-reliant force by the 2040s.** Yet, intent alone cannot deliver transformation. Muted R&D investment, supply chain risks, import dependence on critical raw materials and rare earths and skills deficit constrain progress towards self-reliance.

The current state of the sector and its dynamically evolving trends present the challenge of addressing the shortcomings to India's defence space ecosystem, securing the future and translating the challenges into opportunities. The TPCR 2025, India's 15-year blueprint for military space capabilities consolidates requirements from the Army, Navy, Air Force and joint commands, identifying critical technology gaps and guiding a timeline for indigenous development.

India's next phase growth and value proposition

Global defence supply chains are undergoing a structural realignment. Geopolitical uncertainty, concentration risks and increasing demand for resilient, cost-effective production bases are prompting defence OEMs and tier 1 suppliers to reassess their global manufacturing footprints. OEMs are seeking diversified production bases that can balance cost competitiveness with political stability, workforce availability, infrastructure support and regulatory transparency.

In this context, **India is emerging as a credible and increasingly competitive destination for defence manufacturing under a "Build for the World" strategy.** India's expanding defence export footprint serves as proof-of-concept and the rise in exports signifies improving quality standards, compliance with international requirements and growing confidence among foreign buyers. This creates a virtuous cycle: exports justify scale investments, which in turn reduce unit costs and enhance global competitiveness. For global players seeking to establish resilient multi-hub manufacturing strategies, India offers a combination of scale, affordability and strategic alignment with the nation's future vision.

i. Alignment of policy and industry:

a. The challenges faced by the defence industry to plan at scale, invest in technology and R&D, pursue long-term international opportunities and export-oriented product lines and source capital effectively is significantly mitigated by **coordination and alignment between MOD, Indian Armed Forces, DPSUs and private companies,** especially given the monopolistic, specialised and sensitive nature of this sector.

b. Significant efforts are already underway to align government regulations, procurement priorities, R&D funding and diplomatic efforts to enable domestic manufacturers to compete globally.

c. Platforms are often designed primarily for domestic requirements, with export considerations addressed only after induction. As a result, cost structures, configurations, certification requirements and lifecycle sustenance may not align with global market needs. Hence, the **platforms developed for Indian Armed Forces should incorporate exportability at the concept stage.**

d. **Involvement of DRDO, DPSUs and private companies at the planning stage would help in identification of exportable platforms** and allow companies to align design, development (including manufacturing and supply chain), sustainment support and investments with long term export opportunities.

e. The need for co-ordination is reinforced by the absence of a **single-point agency that is responsible for coordinating between all stakeholders, executing plans and meeting the targets for defence exports.** Israel, one of the major export hubs has established a dedicated directorate responsible for promoting, marketing and exporting Israeli defence technologies.

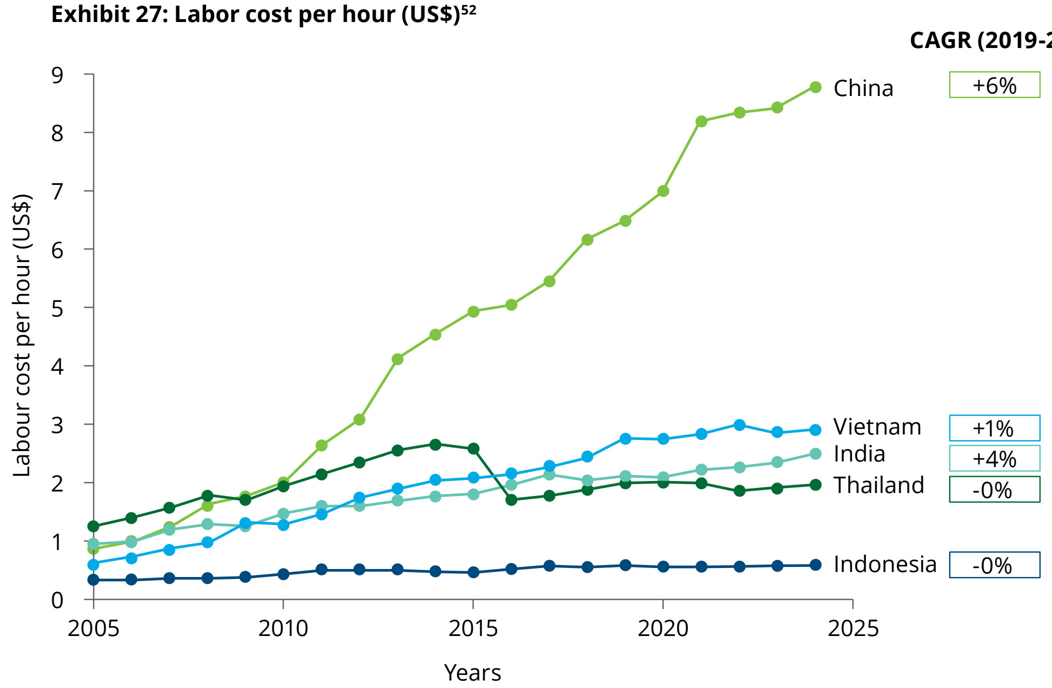
f. Defence procurement decisions are often guided by technical specifications, trials and testing and adherence to global standards. While **India's robust testing and acceptance procedures are globally recognised,** Indian platforms have faced challenges due to lack of a proven track record in combat. This perception has changed with Operation Sindoor which has provided battlefield validation for various indigenous platforms including capabilities in emerging technology such as AI, UAVs and command-and-control systems.

g. While India's testing ecosystem has seen marked improvement, it must adhere to stringent global standards, streamlined testing processes at various stages of production and certifications necessary to ensure seamless market entry for complex platforms. To address these challenges, **R&D test facilities of 24 DRDO laboratories have been opened to industry vide the Defence Testing Portal (DTP)** that provides MSMEs and startups access to test infrastructure in a transparent manner.

ii. Using cost-competitive manufacturing economics:

a. Cost competitiveness remains a critical driver for global manufacturing location decisions, particularly for sub-systems, components and labour-intensive processes. India offers substantial advantages in this dimension through relatively low manufacturing labour costs and competitive power and land costs, supplemented by a strong potential in industrial automation.

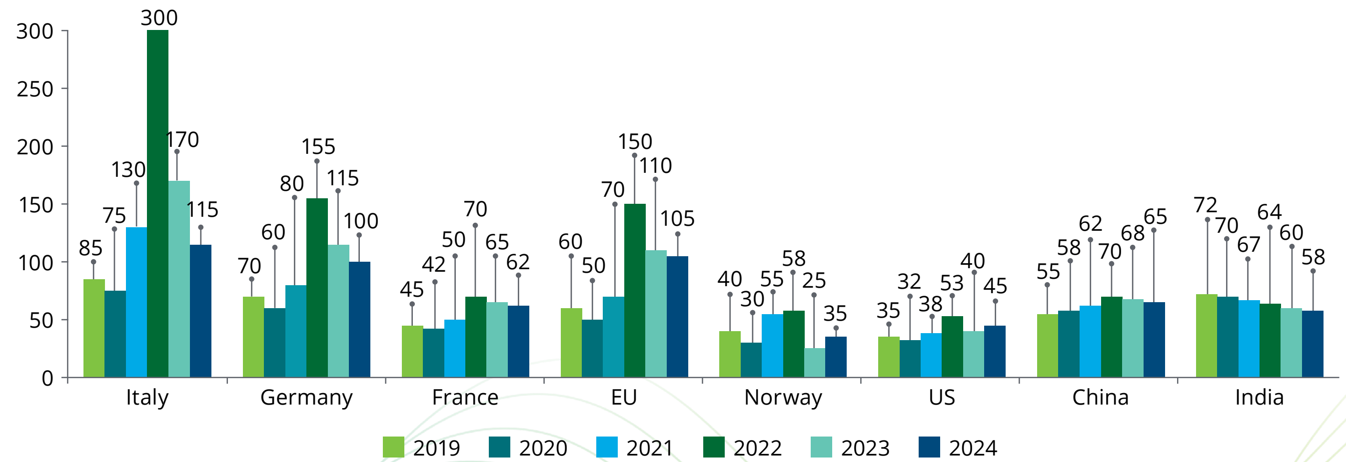
Exhibit 27: Labor cost per hour (US$)[52]



Labor rates in China have **increased** by **>90%** in the last decade while in India they have **increased** only by **43%**, making it more cost-competitive and in line with other low cost countries (LCCs)

b. **India remains lower than advanced economies on manufacturing wage costs.** Recent estimates put India's manufacturing hourly wages at roughly US$2 per hour vs single-digit US$ in many Asia-Pacific competitors (e.g., Vietnam ~US$2–3/hr; China rising toward US$8–9/hr) and much higher hourly labour costs in the EU and US. Moreover, the rates in India have stayed stable for a long time, unlike China, which has undergone about 90 percent growth in the last decade.

Exhibit 28: Electricity price for large industrial customers in energy-intensive industries, 2019-2024 (US$/megawatt-hour (MWh))[53]



52. International trade center, EIU, Deloitte Analysis ; Deloitte Analysis
53. IEA, Deloitte publications; Deloitte Analysis

c. Beyond labour, **industrial electricity in India is substantially cheaper than the most expensive European markets and broadly competitive with China;** the cost of power in India is around US$60–70/MWh for large industrial users, compared with China, which is around US$70–88/MWh.

d. **Sustainability considerations are becoming integral to defence supply chains, particularly for global OEMs subject to environmental, social, and governance (ESG) commitments.** India's rapidly expanding renewable energy capacity, supported by policy initiatives and the growing maturity of captive renewable and power-purchase agreement models, allows defence manufacturers in India to progressively decarbonise operations while improving energy security. This transition aligns with India's long-term climate commitments, with the Ministry of New and Renewable Energy outlining a vision to achieve net-zero emissions by 2070 and to meet 50 percent of the country's energy requirements from non-fossil sources by 2030.

e. The defence manufacturing industry is getting revolutionised by the integration of AI, innovative technologies such as additive manufacturing, automation and robotics and digital twin technology. India provides a level playing field for defence tech. **It is rapidly enhancing its defence capabilities by investing in, developing, and deploying AI-driven, autonomous and robotic systems. The development of "Ekam AI" and surveillance platforms such as "Netra" demonstrate growing AI capabilities.** These capabilities, supported by Government initiatives such as Draft National Strategy on Robotics, DAP 2020 and DPM 2025, collectively aim to strengthen indigenous innovation and technology-driven modernisation within India's defence ecosystem.

f. The increasing adoption of advanced defence technologies, coupled with cost-competitive labour and power, provides India the advantage of delivering high-precision, scalable manufacturing at globally competitive costs, positioning it as a trusted "Build for the World" defence hub.

iii. Creating a future-ready defence workforce:

a. Warfare is becoming increasingly technology-driven, which is reflected directly in hiring trends. The demand for Defence Technology hiring has nearly doubled over the last three years, rising from approximately 3,500 roles in 2022 to nearly 7,000 roles in 2026. Compensation to high technology defence roles has increased by 30 percent since 2022. To manage rising demand for specialised skills, approximately 20–25 percent of defence organisations increasingly rely on internal mobility and structured lateral movement.

b. India's advantage as a manufacturing hub lies in its human capital. It produces a large number of engineering, science and technically-trained graduates every year, supported by a dense ecosystem of engineering institutions, applied research centres and vocational training programmes.

   1. **Around 900,000 engineering graduates pass out annually in India, with around 600,000 relevant experienced engineers concentrated in seven engineering hubs.** Additionally, under India's Skill India mission, more than 16,000,000 candidates have been trained under the flagship Pradhan Mantri Krishi Vikas Yojana (PMKVY) scheme since 2015 to 2025 across technical streams, including defence-relevant streams such as electronics and hardware, automotive, mechanical, etc. Apart from PMKVY, there are other major Government skills development programs which support vocational training, including National Apprenticeship Program scheme (NAPS) and Craftsmen Training Scheme (CTS) via ITIs.

   2. This talent base enables India to support both ends of the defence manufacturing spectrum, from high-precision electronics and systems integration to labour-intensive fabrication, machining and assembly. **Defence-relevant skills are concentrated in established industrial clusters such as Bengaluru, Hyderabad, Pune, Chennai and the western and eastern shipbuilding corridors.** These clusters combine public-sector defence undertakings, private manufacturers, MSMEs, start-ups and R&D institutions, creating localised ecosystems capable of supporting complex production programmes.

c. India's defence-tech ambitions are facing persistent skill gaps in key technology domain areas despite efforts on capability building.

   1. **AI/ML & advanced software**

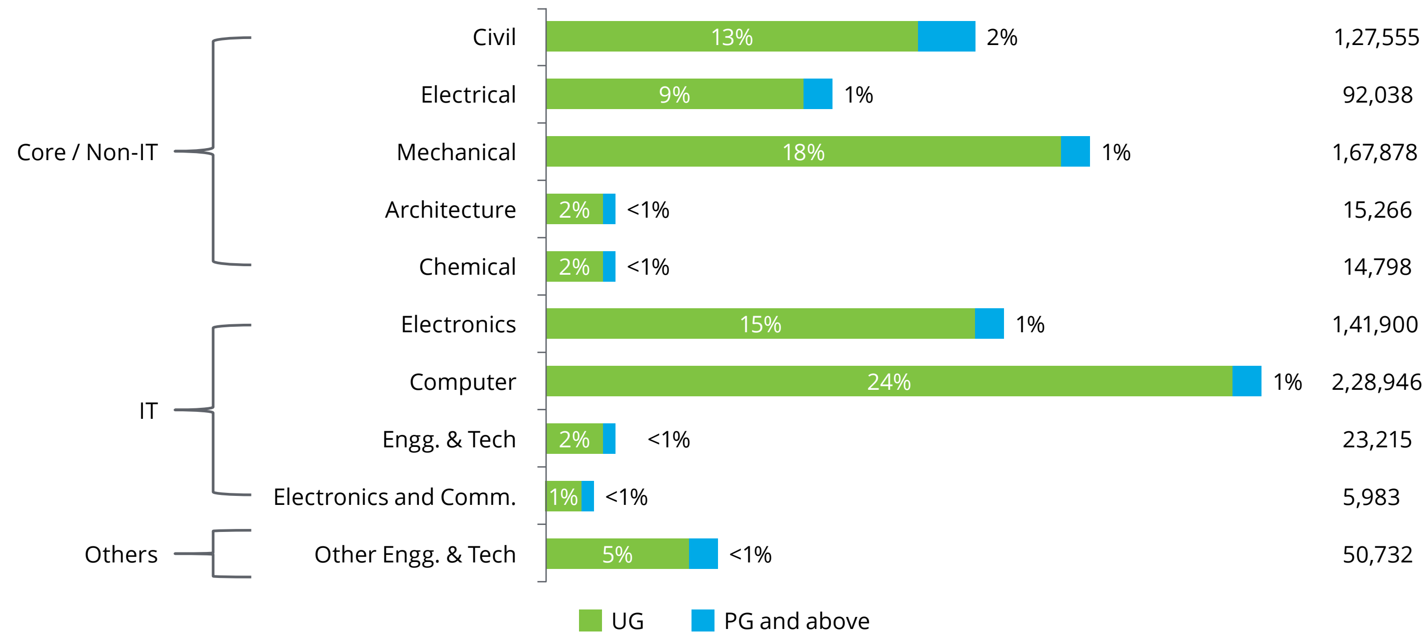
      a. India is far behind the US and China in AI talent competitiveness, due to under-skilled mid-career engineers and lack of emerging tech leaders

      b. Only one qualified engineer for every 10 GenAI openings shows acute AI/GenAI scarcity. There is an AI/GenAI talent gap of ~40–53 percent, with enterprises shifting to AI-first teams and paying salary premiums[53]

[53] https://economictimes.indiatimes.com/jobs/hr-policies-trends/indias-ai-boom-1-qualified-engineer-for-every-10-open-genai-roles-says-teamlease-report/articleshow/123562001.cms

Indian aerospace and defence sector – From import dependence to export powerhouse

Exhibit 29: Top 10 engineering disciplines and percent of graduates (2021-2022)[54]



- Undergraduates represent 90% of all engineering graduates
- 70:30 male-to-female ratio
- Core engineering disciplines (Mech., Electical., Civil, Electronics) constitute ~55% of all engineering pass outs

      c. India's def-tech software, AI & data roles account for ~18 percent, with AI-driven avionics and autonomous systems among the fastest-growing skill clusters (+17% YoY)[55]

      d. Defense-specific programs indicate a ~16–28 percent gap depending on cluster (e.g., C4ISR ~16–18 percent, EW ~18–22 percent; Unmanned Systems sub-clusters ~20–28 percent for autonomy/AI roles)[56]

   2. **Cybersecurity**

      a. India has a 25–30 percent cybersecurity talent deficit, especially at mid-senior levels[57]

      b. Defence digitalisation (C4ISR, secure comms, DCN) is expanding SOC automation, threat-intel, cryptography, zero-trust and secure-comms roles; YoY growth in cyber postings estimated at ~25 percent within defence programmes[58]

      c. Defence-tech demand signals Electronic Warfare (EW), C4ISR, secure communications and cyber roles as a key demand category within defence-tech hiring

   3. **Quantum technologies**

      a. Deep tech talent shortage, especially in quantum, where India lags significantly behind global leaders such as the US and China[59]

      b. India's National Quantum Mission (NQM) acknowledges that the specialist workforce is insufficient, especially for roles such as quantum algorithm developers, hardware engineers and quantum communication specialists

   4. **UAV and counter-UAV**

      a. India's UAV ecosystem faces critical skill gaps, especially in electronics, autonomy and control systems, not in assembly roles which dominate the current workforce

      b. Unmanned Systems is one of the top demand clusters, requiring high-end mechatronics, RF engineering and autonomous navigation skills

[54] AISHE report 2021-22, Secondary research, Michael Page salary 2024 report, Deloitte publications; Deloitte Analysis
[55] India's defence tech workforce: Trends, Skill Gaps and Market Outlook Report by CIEL workforce; Deloitte Analysis
[56] India's defence tech workforce: Trends, Skill Gaps and Market Outlook Report by CIEL workforce; Deloitte Analysis
[57] India's defence tech workforce: Trends, Skill Gaps and Market Outlook Report by CIEL workforce; Deloitte Analysis
[58] India's defence tech workforce: Trends, Skill Gaps and Market Outlook Report by CIEL workforce; Deloitte Analysis
[59] https://www.business-standard.com/industry/news/ai-cloud-cybersecurity-talent-gap-india-digital-economy-125082800570_1.html; Deloitte Analysis

5. Sensors, radars, RF & EW engineering

a. Radar and RF roles comprise 36 percent of all defence-tech hiring, the largest single demand cluster across the sector (reflecting C4ISR, air defence, and EW requirements)[60]

b. Communication systems roles account for an additional 22 percent, meaning ~60 percent of defence-tech demand is in RF, sensors, signal processing and related domains[61]

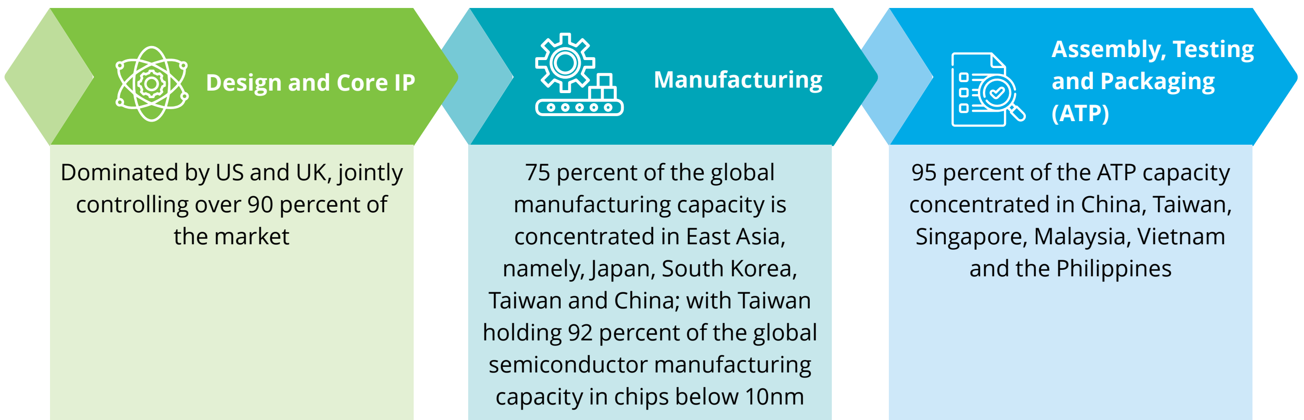
c. The rapid pace of technological advancement necessitates continuous skills development of the workforce

d. A crucial aspect of skills development is aligning academic curricula and research with the evolving needs of the defence industry. Academic institutions have started establishing advisory boards with industry representatives to provide regular feedback on curriculum content, skill gaps and emerging technologies

e. Conducting surveys among defence companies can help identify their specific skill requirements and preferred candidate profiles enabling universities to tailor their programmes accordingly

f. Facilitating student internships within defence companies provides practical experience and allows students to contribute to ongoing research projects. The combined expertise of academia and industry enables faster development and implementation of new technologies, a model being adopted by startups and SMEs

Exhibit 30: Semiconductor value chain



iv. Using technology and supply chain resiliency:

a. From raw material shortages to logistic challenges due to geopolitical issues, defence companies are facing heightened fragility and operational uncertainty. These disruptions are no longer just a cost concern, they directly affect delivery timelines and customer confidence.

b. India is largely dependent on imports for critical raw materials, including rare earth elements and critical minerals such as cobalt, copper, graphite, lithium, and nickel, which are vital to produce advanced composites, electronics and other technologies.

c. The supply chain for critical minerals is volatile due to the monopoly of supplies. China is responsible for more than 90 percent of global rare earth processing, 95 percent of graphite processing and 79 percent of refined cobalt production. India is not among the top three producers of many of these critical minerals.[62]

d. The GOI has launched several initiatives, such as the Rare Earth Permanent Magnet Manufacturing Scheme and the creation of Dedicated Rare Earth Corridors in Odisha, Kerala, Andhra Pradesh and Tamil Nadu.

e. Further, the defence industry has become highly dependent on semiconductors, which are an integral part of new age electronics powering navigation, communication and control systems. Like critical minerals, the semiconductor value chain is also highly concentrated. The semiconductor value chain can be divided into three stages: (i) design and core IP, (ii) manufacturing and (iii) assembly, testing, and packaging (ATP).

[60] https://hr.economictimes.indiatimes.com/news/trends/defence-technology-jobs-surge-in-india-hiring-doubles-in-three-years/127752514#:~:text=Trends,Services%20said%20in%20a%20report; Deloitte Analysis
[61] https://hr.economictimes.indiatimes.com/news/trends/defence-technology-jobs-surge-in-india-hiring-doubles-in-three-years/127752514#:~:text=Trends,Services%20said%20in%20a%20report; Deloitte Analysis
[62] https://www.ceew.in/sites/default/files/ceew-making-india-a-hub-for-critical-minerals-processing-web-file.pdf; Deloitte Analysis

f. In FY24, India's semiconductor imports rose by 18.5 percent as compared to FY23, highlighting a heavy dependence on imports. GOI has launched India Semiconductor Mission 2.0 (ISM) in February 2026 to expand India's role in chip design and IP.US based semiconductor company is establishing a semiconductor ATP plant in Sanand, Gujarat, with an investment of ~INR91,000 crore expected to be operational in February 2026. These initiatives are shaping a resilient domestic semiconductor ecosystem.

g. Another area where India is highly import-dependent is jet engines. While India has been working on the development of an indigenous engine, the programme has faced significant delays. It is estimated that India's requirement is over 700–1,100 engines over the next few years for current and future aircraft, with a potential market value of more than INR60,000 crore. India already has around 80 percent of the infrastructure needed to develop indigenous engines, but must bridge critical gaps in turbine blade design, high-temperature materials and airborne testing.

h. Defence companies are increasingly implementing strategies such as nearshoring, diversification, localisation, strengthening relations with supplier and investing in digital solutions that address dynamic supply chain challenges, such as efficiency, visibility and compliance.

i. Technologies such as AI/ML can assist in improved supplier visibility, data analytics and identify the vulnerabilities in the supply chain. Defence supply chains face unique vulnerabilities, such as counterfeit parts and non-compliant suppliers. The US Defence Logistics Agency (DLA) used AI systems to analyse 43,000 vendors and identified over 19,000 as potentially high-risk, demonstrating unprecedented supply chain screening capability. It led to the successful prosecution of a supplier providing falsely certified parts made in Turkey for US weapon systems.[63]

j. Digital twins can be used to model the interaction between physical and digital processes all along the supply chain, providing a 360-degree view of an optimal end-to-end supply chain process. A digital twin paired with predictive AI can foresee future scenarios to suggest areas for improvement and growth.

A leading defence company is using digital twins to simulate weather effects on its fighter jet performance, model and simulate its missile defence systems and develop a model for its supply chain and customer support operations to track the movement of parts and materials through the supply chain and identify potential disruptions.

v. Boosting R&D investments:

a. One critical factor in developing new technologies and their integration in the design and manufacture of defence platforms is investment in R&D. India's R&D investment lags that of global peers with limited private sector participation.

b. Currently, **India's Gross Expenditure on R&D (GERD) is ~0.7 percent of its GDP, which is much lower than the world average of 1.8 percent.**[64] In 2024, countries such as Israel, US and China spend about 6.33 percent, 3.48 percent and 2.43 percent of their GDP respectively on R&D.[65] Considering the GDP of China and US is respectively ~5 and 8 times that of India, therefore the asymmetry in R&D spending can be comprehended.

c. Furthermore, per the **Global Innovation Index 2025, India's global ranking is at 38th (among 133 global economies).**[66]

d. A comparison for GERD spending can be made with South Korea, a country that, like India, was also an agricultural economy. However, in the 1970s, Korea shifted gears, investing heavily in R&D. Today, its GERD is~5 percent of its GDP.[67]

e. Further, there is a lack of private sector participation in R&D in India. **Private sector contribution in R&D in the US, China and South Korea is 75 percent, 77 percent and 79 percent respectively, compared to India, where 41 percent comes from the private sector.**

f. Over time, imports have often been used to address immediate capability requirements and urgent operational needs, while indigenous programmes continue to evolve within constraints. A positive reform by GOI is the establishment of the ANRF in 2023. ANRF has been established to promote research and development throughout India's academic institutions. It also forges collaborations among the industry, academia, and government departments and research institutions. DRDO has also established 15 Industry–

[63] https://www.dla.mil/About-DLA/News/News-Article-View/Article/4186367/utilization-of-artificial-intelligence-ai-to-illuminate-supply-chain-risk/
[64] https://www.pib.gov.in/PressReleasePage.aspx?PRID=2153547&reg=3&lang=2; Deloitte Analysis
[65] World Intellectual Property Organisation (WIPO) ; Deloitte Analysis
[66] World Intellectual Property Organisation (WIPO) ; Deloitte Analysis
[67] World Intellectual Property Organisation (WIPO); Deloitte Analysis

Academia Centres of Excellence (DIA-CoEs) to focus on accelerating indigenous, high-end, and futuristic technology development.

g. **R&D is inherently uncertain, capital-intensive and slow to yield results.** The US's Defence Advanced Research Projects Agency (DARPA) serves as the central R&D organisation of the Department of Defence. DARPA focuses on narrowly defined mission problems and accepts very high risk, with equally high consequence projects typically lasting three to five years. It forms research teams that include members of academia and the private sector **DARPA has a sanctioned budget of US$4.91 billion for CY2026 while DRDO's budget for FY 2025-2026 was INR26,816 crore (~US$2.97 billion).**[68]

h. Another challenge faced in R&D startups in India is funding hurdles. R&D is characterised by technical uncertainty, distant revenue timelines and high capital intensity. This leads to a lack of venture capital interest or bank financing. **One such initiative by the GOI to address this challenge is the Research, Development and Innovation (RDI) Fund, an independent unit under ANRF announced in July 2025 with a total corpus of INR1 lakh crore over six years and INR20,000 crore allocated for FY2026–2027.** [69] The RFI Fund will channel capital to second-level fund managers which can be Alternative Investment Funds (AIF), Development Finance Institutions (DFI), Non-banking Finance Companies (NBFCs), to provide financing to the private sector in the form of long-term low/NIL interest loans or equity. Contribution to Deep-Tech Fund of Funds (FoF) or any other FoF may also be considered. Priority areas include energy security and transition, climate action, quantum technologies, robotics, AI and its application in agriculture, biotechnology, health, space and the digital economy.

i. Further, R&D in India has historically been just reverse engineering, with industries engaged in indigenously developing technologies that have matured elsewhere but cannot be accessed either due to strict export control restrictions or the strategic considerations of the counterparty country. While India is rapidly advancing in the development of UAVs, AI-enabled systems, and satellites supported by government initiatives such as iDEX, DIA-COE, IN-SPACe, etc, critical gaps still exist in niche technology areas such as propulsion systems (jet engines, submarines), advanced sensors (AESA radars), stealth technology and hypersonic weapons.

vi. DRDO–industry–academia collaboration:

a. Enhanced collaboration among the public and private industries, research institutes such as DRDO and academia is the need of the hour to increase the operational capabilities of the Armed Forces in today's constantly evolving technological landscape.

b. Developing complex defence systems is a capital- and time-intensive process, and collaboration allows the sharing of resources and expertise, leading to faster and more cost-effective development. It can strengthen India's manufacturing base and create job opportunities while utilising capacities developed.

c. Partnerships between academia and industry often take time to bear fruit, but such collaborations have the potential to transform the country into a major global exporter of defence equipment.

d. The development of the Light Combat Aircraft (LCA) is a prominent example of a successful collaboration between academia and industry in India's defence sector. The DPSU and the DRDO collaborated with IIT and IISC, which designed and developed critical flight control systems, avionics and materials for the LCA while the DPSU took the responsibility of manufacturing the aircraft.

e. Initiatives such as DIA-CoE enhance industry–academia collaboration. DIA-CoE synergises DRDO, academia and industry for advanced tech development, with 15+ centres focused on multi-disciplinary projects across 82+ verticals.

f. Expanded access to DRDO testing ranges and service-led trial environments is reducing validation timelines that historically constrained induction.

vii. Nurturing startups and the dual-use ecosystem:

a. **India's defence and space startup ecosystem has entered a phase of visible acceleration.** From a small set of innovators, the ecosystem has evolved into a connected, maturing network of hardware companies, MSMEs, component manufacturers, autonomy and AI firms, R&D labs, accelerators and clear procurement pathways. Together, they are building technologies that span UAVs and counter UAS platforms, radars and EW systems, secure communication suites, simulation tools, robotics, materials, sensors and a wide range of satellite and payload capabilities.

[68] https://comptroller.war.gov/Portals/45/Documents/defbudget/FY2026/budget_justification/pdfs/03_RDT_and_E/RDTE_Vol1_DARPA_MasterJustificationBook_PB_2026.pdf; Deloitte Analysis
[69] https://rdifund.anrf.gov.in/; Deloitte Analysis

A similar transformation is unfolding in India's emerging space economy. **Regulatory liberalisation has enabled private players to participate in satellite manufacturing, launch vehicles, ground systems and downstream applications such as earth observation analytics and satellite communication services.** This has opened the market beyond traditional state-led programmes and attracted deep-tech entrepreneurs, including those building dual-use capabilities for both civilian and defence customers.

Supply-chain depth is also improving. An ATMP facility at Sanand, Gujarat by a US based semiconductor company, expected to become operational in phases by 2026, strengthens India's semiconductor backend packaging ecosystem.[70] While advanced semiconductor fabrication remains globally distributed, domestic assembly and testing capabilities enhance supply-chain resilience for electronics used in radars, electronic warfare systems, sensors and satellite payloads.

The growth of defence and space startups is not accidental; it is powered by structural shifts such as *procurement openness, growing demand visibility, geopolitical realignment, supply-chain sovereignty and the availability of patient capital.* Policy changes have made it easier for startups to enter defence programmes. The Draft DAP 2026 signals a stronger emphasis on Indian-owned intellectual property, including greater control over source code and digital design artefacts. While still under consultation, this direction improves clarity around IP ownership, an area that historically created uncertainty for startups navigating defence programmes.

India's procurement cycles and procurement reforms have become more welcoming to new-age solutions, including structured innovation pathways and indigenisation measures that have created clearer entry points for new-age solutions. While procurement timelines remain rigorous, startups increasingly see pathways not only to Indian orders but also to international markets, as India strengthens its position as a cost-effective and reliable supplier in selected defence segments.

The need for trusted, **China+1 supply chains has become a global priority, and India is positioning itself as a dependable alternative.** High credibility moves, French OEM's MRO hub near Noida and, a French company's engine MRO facility in Hyderabad and a British aero-engine manufacturer's plans for India as a third home base signal long-term commitment by global aerospace leaders. These facilities enhance fleet readiness, deepen local supplier networks and strengthen India's positioning within global aerospace value chains.

India's defence-tech sector historically struggled to attract growth capital, but this has changed. Larger rounds, such as an Indian UAV company's US$100 million Series B led by a global VC firm, show that global investors now believe Indian companies can scale manufacturing, compete internationally and build sustainable revenue models. Together, these indicate that the ecosystem is stabilising and expanding.

Startups are **transitioning from proof of concept to production, and increasingly from build-to-print to build-to-spec and even build-to-system,** so they can deliver complete solutions rather than isolated components.

Exhibit 31: Space and defence tech startups segments funded in India[71]

Business description of the startup	Year of founding	Funding (US$ millions)
Carbon fibre composites and unmanned aviation vehicles	2025	154.0
Multi-sensor imaging satellites providing all-weather EO capabilities	2021	14.0
Space traffic monitoring and space situational awareness solutions	2020	66.5
Hyperspectral imaging satellites	2019	95.7
Unmanned aerospace systems	2018	73.2
Combat weapon systems	2018	35.5
EO analytics and AI-based decision intelligence solutions	2017	27.7
Drone solutions for industries, including agriculture and defence	2015	49.5
Quadcopter drone	2015	30.1

[70] Economic Times
[71] Tracxn: Deloitte Analysis

b. **Importance of dual-use technologies**
Dual-use technologies, which serve both civilian and defence markets, offer a compelling model for Indian startups. Civilian deployments in logistics drones, industrial automation and earth observation can provide early revenue and field validation before platforms are adapted to military-grade specifications, reducing initial technical and commercial risk.

While defence certification remains rigorous, dual-use architectures can lower redesign complexity when transitioning between markets. In price-sensitive markets across the Global South, demand for affordable, modular and maintainable systems creates space for competitively positioned Indian firms, particularly as domestic MRO capabilities expand.

Dual-use components such as electronics, sensors and RF modules are foundational to strategic autonomy and backend semiconductor investments such as US based semiconductor company's ATMP facility strengthen supply-chain resilience, even as advanced fabrication remains globally distributed.[72] **By scaling technologies beyond defence budgets and retaining control over core intellectual property, dual-use strategies align with India's broader goals of strategic autonomy, higher-value manufacturing and export-led growth.**

viii. Focus on building global markets

a. Currently, India's defence exports are dominated by components or subsystems such as airframe components, engine components, fuselage assemblies, avionics sub-assemblies, electrical components, etc. Major exporting countries, such as US, Russia, France, Israel and other European countries are seeking to diversify their supply chains near-shore or to friendly countries that offer lower cost of manufacturing, assured quality and reliability and strong aftermarket support capabilities. India has a potent opportunity to position itself as a reliable manufacturing hub and scale the exports of components and subsystems.
b. IOR and Global South countries have limited domestic defence manufacturing capabilities and rely heavily on imports to meet their defence requirements. Proven indigenous systems such as Nagastra-1 UAV, Akashteer Air Defence System and other indigenously developed platforms such as Tejas, Akash, Dhanush and Integrated Air Defence Weapon System have significant export potential for countries seeking cost effective and reliable platforms.

ix. Leveraging diplomatic relations

a. In global defence trade, government-to-government frameworks play a pivotal role, where leveraging diplomatic ties to open new markets and secure export contracts is a crucial area for growth.
b. India's expanding defence diplomatic network through attachés, missions and strategic partnerships can help in aligning strategic objectives with industry offerings and identifying long-term capability gaps. As mentioned earlier, in Israel a specific directorate, acts as a facilitator for marketing Israeli products by identifying specific global requirements through the network of defence attachés positioned with various Israeli embassies around the world. It also works through diplomatic and G2G channels to promote Israeli defence exports.

x. Lifecycle support and sustainment

a. In the global defence market, the export of a platform or system marks the beginning of a long-term, possibly multi-decade relationship. Defence platforms typically operate for 25–40 years or more, during which operational availability, upgrades and sustainment become the decisive determinants of customer satisfaction.
b. 60–70 percent of a defence platform's total lifecycle cost is incurred after induction, such as spares and consumables, MRO, software upgrades, training, simulators and documentation, mid-life upgrades and extensions. As a result, lifecycle support has emerged as the single most critical differentiator in defence exports.
c. MRO for exported defence platforms is a critical component of defence strategy of major export hubs such as France, Israel and Russia.
d. **France MRO model:** A French OEM's multirole fighter aircraft has been exported to eight countries: Croatia, Greece, Egypt, India, Indonesia, Qatar, UAE and Serbia.
    1. **OEM-driven lifecycle support:** The aircrafts are covered under operational maintenance contracts which covers management of operations, training pilots, training mechanics, maintenance and upkeep of aircrafts with its primary MRO hub in France.
    2. **Regional MRO hubs:** Rather than flying the aircraft back to France, the OEM has set up a regional airframe MRO in India near Noida International Airport to support the Indian and Indonesian fleet of the fighter aircrafts.
    3. **Diversification of supply chain:** French OEM and a leading Indian defence company have formed a partnership to manufacture fuselages for fighter aircraft in Hyderabad to support both the Indian and global fleet.
    4. **Training:** The OEM is also planning to open a CoE near Noida Airport that will house MRO training operations. It is collaborating with India's ministries of skill development and defence to establish the aeronautical training syllabus, which will include a three-year diploma course and an apprenticeship at its MRO facility, a Bachelor of Science course in aircraft maintenance and avionics systems and a short six-month course in aircraft maintenance.
    5. **Dual use: Using the same MRO facility for both civil and military aircraft:** A French company has set up a LEAP engine MRO facility in Hyderabad, powering the 320neo and 737 Max aircraft. It also announced MRO for the M88 engine in Hyderabad, adjacent to the LEAP engine MRO facility.
    6. **Use of digital technologies:** The OEM leverages a fully-integrated digital platform to enhance collaboration and efficiency in MRO, reduce unplanned maintenance with predictive analytics, product lifecycle management to boost fleet availability and safety and harness the benefits of virtual twin technology to cut turnaround time.

e. **Israel MRO model:**

A major Israeli player is providing an integrated "one-stop-shop" MRO of aircraft, engines and components for both military and civilian aircraft. It operates a global MRO network based at key market locations. For example, they have set up an MRO facility in Hyderabad, specialising in maintaining and repairing radar modules and sub-systems such as power systems, cooling systems, radar testing and calibration. As part of its comprehensive aerospace MRO services, it also offers engine leasing and trading. It also provides "Power by the Hour" arrangements in components MRO, offering flexible hourly rates for customers.

f. **Russian MRO model:**

Sole state intermediary agency is responsible for exports and support including spares, modernisation, licensed production, training and offsets. It closely coordinates with other state entities for specific support and after-sales services. Its model has a unified after-sales support system where a technology partnership with the customer country includes licensed production, local JVs, local depots, joint R&D and training to anchor through life support in the customer country. Examples include licensed Su 30MKI, T90S, Ka-226T and other lines in India. In the last few years, sanctions and wartime priorities have delayed Russian spares, prompting customers (including India) to indigenise spares and re scope overhaul plans.

India's export strategy would require, among other things, strong lifecycle support and sustainment ecosystem (including creation of overseas maintenance hubs), a resilient supply chain for spare parts and upgrades, incorporation of digital technologies such as predictive analytics and preventative maintenance to reduce turnaround time (TAT) and downtime for long-term export success.

[72] Economic Times

Indian aerospace and defence sector – From import dependence to export powerhouse

Investment in defence companies in India

Historically, wars were supported by powerful private banks as the government lacked the institutional capacity to sustain the prolonged conflicts. In the current era, defence funding is largely driven by government procurement cycles, government-supported R&D, and provisions for emergency procurements. India's defence sector has gained significant momentum over the last few years with sustained policy reforms, rising defence budgets, indigenisation efforts and a strong pipeline for procurement orders driven by the MoD.

Today, the changing character of warfare marked by autonomous systems, cyber capabilities, space, AI-driven decision making and the growing importance of critical dual-use technologies is reshaping how non-government, private investors perceive the sector.

Exhibit 32: Deal volumes and deal values in the defence industry in India[73]

Financial year	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023	2023–2024	2024–2025	2025–2026	Total
Total number of deals	27	40	44	79	67	81	118	91	67	65	36	715
Amount (INR Cr)	203	179	299	625	1,033	1,025	1,279	2,396	3,776	3,695	2,307	16,817

Note: While the analysis is based on public disclosures on deal conclusion and deal value, deals announced or where deal value has not been disclosed are not included in the analysis

Over the past decade (2016–2026), India's defence sector has witnessed 700+ transactions with cumulative funding of more than INR168 billion. The investment activity has been cyclical in nature reflecting the sector's dependence on geopolitical situations and policy momentum.

The evolution of India's defence industry is clearly mirrored in the progression of its deal landscape, reflecting how policy reforms, technological shifts and ecosystem maturity have shaped investor behaviour over.

i. **Emergence stage (Pre-2018):** India's defence sector remained heavily import-dependent and was dominated by manufacturing models focused on BTP, licensed production and joint manufacturing arrangements. Startup activity was limited, largely focused on R&D, early prototyping and small-scale UAV assembly. The investment activity was primarily driven by angel investors (High net-worth individuals and family offices) and a limited number of early-stage venture capital funds. Long development and procurement cycles, regulatory uncertainty and dependence on government procurement and the "negative" connotation of defence companies constrained investment by VC, private equity and institutions.

ii. **Early stage (2018–2020):** This phase marked a structural inflexion point. A wave of policy reforms was initiated, such as the launch of iDEX (2018), the introduction of DAP 2020, prioritising indigenous procurement, the first PIL (2020), an increase in the FDI limit up to 74 percent under the automatic route (2020) and an increased focus on exports. These reforms increased investor confidence and began attracting increasing Angel and VC interest.

iii. **Growth and diversification stage (2021–2023):** With increasing focus of the government to support IDDM and exports, defence companies started focusing on indigenous manufacturing, innovation and development of dual use technologies and export led growth strategies. A visible procurement pipeline and reforms in the procurement procedures also improved revenue predictability and velocity. This period witnessed a sharp rise in the transactions with more active participation from VC firms, PE firms and institutional investors. This period also witnessed multiple defence IPOs. Consolidation has also emerged as a notable trend with mature players pursuing acquisitions or JVs to expand into adjacent domains such as electronics, UAVs or components. Conglomerates also entered the defence sector through strategic acquisitions and partnerships.

iv. **Maturity stage (2024 to Present):** As the defence ecosystem matures and focus on dual-use technologies deepens, defence companies have diversified revenue streams, making them less dependent on government procurement cycles and more resilient to demand fluctuations. Further, MoD payment cycles have also matured with better reliability and regularity in line with contracts, thus providing better monetisation cycles and liquidity to defence companies. This evolution has strengthened investor confidence by positioning defence businesses as commercially scalable, technology-driven opportunities rather than purely policy-led plays. Investments are gradually shifting towards larger VC, PE and institutional investments to support scaling up manufacturing operations, diversification across the value chain, innovation and exports. While the overall number of deals has moderated primarily due to a decline in smaller angel-stage transactions, the aggregated funding value has increased, indicating higher ticket size transactions.

Exhibit 33: Deal volumes and deal values in the defence industry by stage[74]

Investment type (Number)	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023	2023–2024	2024–2025	2025–2026	Total
Angel/Promoter/ Parent/Seed VC	21	33	37	66	51	65	80	54	21	22	10	**460**
Venture capital	2	6	4	6	10	10	26	27	32	28	20	**171**
Private equity/ Institutions	3	0	2	3	2	3	6	4	12	10	5	**50**
Debt	0	1	0	0	2	1	0	1	1	0	0	**6**
M&A, JV	1	0	1	4	2	2	6	5	1	4	0	**26**
Undisclosed										1	1	**2**
Investment Amount (INR Crore)	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**	**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**	**2023-2024**	**2024-2025**	**2025-2026**	**Total**
Angel/Promoter/ Parent/Seed VC	33	76	81	157	196	375	457	686	282	533	168	**3,044**
Venture capital	12	102	185	11	807	76	671	1,093	701	1,416	804	**5,878**
Private equity/ Institutions	152	-	24	23	-	555	56	501	2,093	1,590	1,334	**6,327**
Debt	-	1	-	-	3	15	-	60	20	-	-	**99**
M&A, JV	6	-	10	435	26	4	96	56	680	156	-	**1,468**
Undisclosed										59	7	**66**

Notes:

- FY 2025–2026 includes transaction information available till 31 January 2026.
- Excluded sub-sectors: airlines, airport, charters, ground handling, consultancy firms, software development companies, corporatisation of DPSUs.
- Data includes only completed transactions (not announced) and disclosed deal values.
- Each investment round is recorded as a separate transaction. For instance, if a company completed three funding rounds within a financial year, all three rounds are counted individually.

[73] MergerMarket, Private Circle; Deloitte Analysis

[74] MergerMarket, Private Circle; Deloitte Analysis

Further, investment allocation across the value chain/segments also reflects that investor confidence is more aligned towards dual-use technologies such as space and autonomous systems, which have together attracted 54 percent of the total funding since 2016 due to their strong commercial applicability alongside defence.

Exhibit 34: Category-wise deal volumes[75]

Value chain categories	Deal volume	Deal amount (INR Crore)	% of total funding
Arms & ammunition	15	564	3%
Components	126	2,383	14%
Electronics	110	3,048	18%
MRO	26	951	6%
Simulators	11	350	2%
Space	76	3,469	21%
UAV,UGV, UUV, Counter-UAV	332	5,596	33%
Shipbuilding/repairing	19	523	3%
Total	**715**	**16,883**	**100%**

Notes:
- FY 2025–2026 includes transactions information available till 31 January 26.
- Excluded sub-sectors: airlines, airport, charters, ground handling, consultancy firms, software development companies, corporatisation of DPSUs.
- Each company is assigned a to a single primary value chain category based on core offerings even if it operates across multiple segments.
- Data includes only completed transactions (not announced) and disclosed deal values.
- Each investment round is recorded as a separate transaction. For instance, if a company completed three funding rounds within a financial year, all three rounds are counted individually.

Radars, electronic warfare, communication etc. have together attracted 32 percent of the capital invested since 2016. These segments often have relatively predictable revenue due to recurring procurement cycles and replacement demand, integration into both domestic and international supply chain, relatively stable margins and aftermarket potential, which enhances customer confidence.

MRO is an emerging segment supported by India's ambition to become an MRO hub and inherent dual use nature of servicing both commercial and defence aircrafts. MROs have attracted 6 percent of the total capital invested since 2016.

Attracting 2 percent of the total capital since 2016 remains a niche segment with limited number of players, but a strategically important segment focusing on training and skill development.

Overall UAV, UGV, UUV and counter drone segment recorded 332 transactions across 87 unique companies between FY 2016 to FY 2026. Transactions in the UAV segment are accelerating, driven by the push for indigenisation with a focus on non-Chinese components and development of end-to-end capabilities. What began as a sector driven by experimentation and early adoption quickly shifted to real operational demand. Battlefield use cases have validated the strategic importance of UAVs for surveillance, precision targeting, logistics and swarm operations going forward. Commercial use cases of UAV in agriculture, disaster relief etc have also expanded significantly.

[75] MergerMarket, Private Circle; Deloitte Analysis

Indian aerospace and defence sector – From import dependence to export powerhouse

Exhibit 35: Year and investor wise deals in unmanned systems and counter-drone systems segment (Number of transactions)[76]

UAV, UGV, UUV, UMSV, Counter Drone	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023	2023–2024	2024-2025	2025–2026	Grand Total
Angel/promoter/ parent/seed VC	1	7	11	21	22	41	37	32	11	8	4	**195**
Venture	1	6	3	5	6	9	17	20	24	18	10	**119**
PE/institution	0	0	1	1	0	1	1	1	2	4	1	**12**
M&A JV				1			1	1		1		**4**
Debt		1				1						**2**
Total	**2**	**14**	**15**	**28**	**28**	**52**	**56**	**54**	**37**	**31**	**15**	**332**

In the early years, funding was largely angel and VC-led, supporting assembly and integration of hardware. Over the last few years, PE firms have started supporting startups that specialise in end-to-end capabilities. A drone startup has recently raised US$100 million Series B round led by a global VC firm. The UAV segment is also witnessing M&A and JV activities. A leading conglomerate has formed a JV with an Israeli weapons company to manufacture UAV in India.

UGV and UUV are relatively niche segments currently with few transactions. But these segments are expected to gain importance as they become critical assets in modern military operations by enhancing situational awareness, autonomous logistics in difficult terrain and reducing risks to personnel in high threat environments. A company engaged in development of Unmanned Marine Surface Vehicles (UMSV), has raised funds in multiple rounds from PE and VC funds. A precision components manufacturer has acquired 60.3 percent stake in a niche UGV company to enhance its defence portfolio.

The components segment within India's defence value chain has witnessed an evolution in transaction trends over the past decade. Overall components segment recorded 126 transactions across 52 unique companies between FY 2016 to FY 2026. Between FY2016 and FY2020, deal activity was largely driven by VC investments, as many companies in this space were engaged in BTP manufacturing with limited proprietary IP.

Exhibit 36: Year and investor wise deals in components segment (Number of transactions)[77]

Components	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023	2023–2024	2024–2025	2025–2026	Grand total
Angel/promoter/ parent/seed VC	7	9	9	10	15*	12	15	7	5	2	4	**95**
Venture									1	1	4	**6**
PE/Institution	0	0	0	1	1	1	3	0	3	3	0	**12**
M&A JV	1		1	1	1		3	2	1	1		**11**
Debt					2							**2**
Total	**8**	**9**	**10**	**12**	**19**	**13**	**21**	**9**	**10**	**7**	**8**	**126**

Notes: A number of companies have seen multiple rounds of investment from promoters/HNIs/angel/VC

[76] MergerMarket, Private Circle; Deloitte Analysis
[77] MergerMarket, Private Circle; Deloitte Analysis

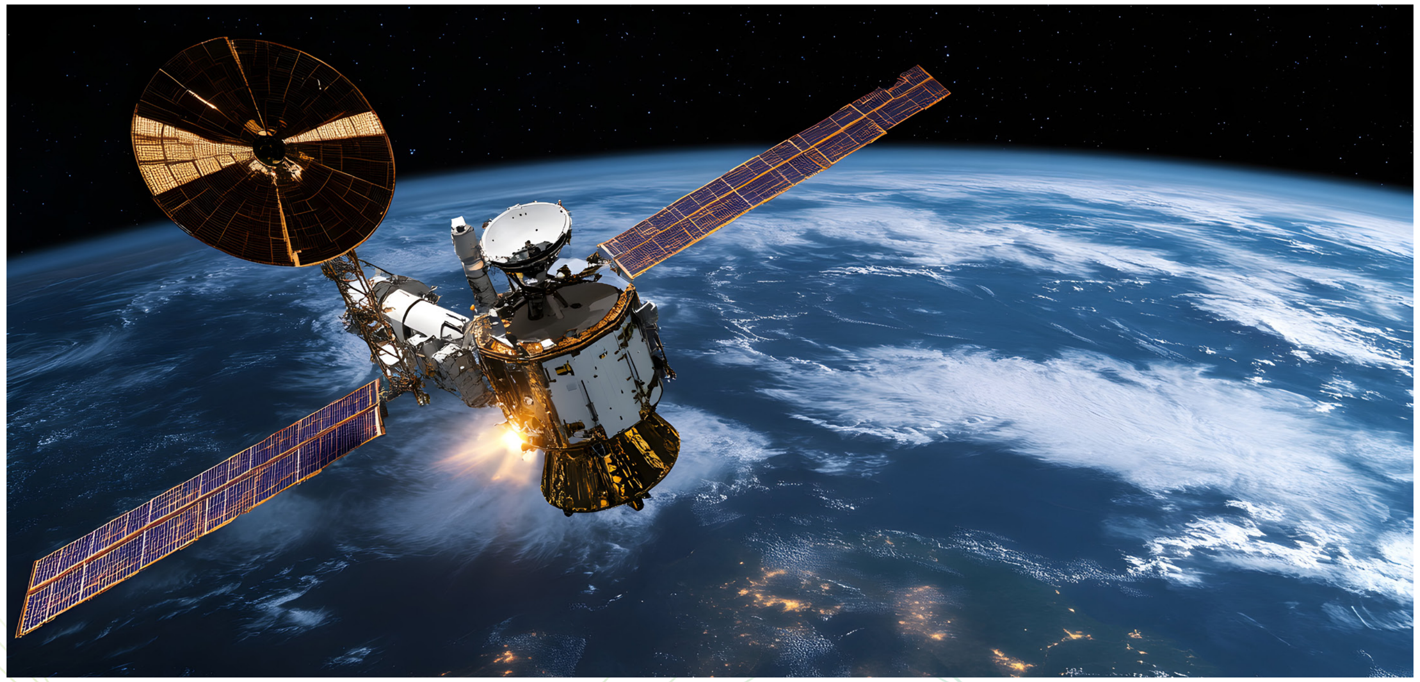
From FY2020–2021 onwards, transaction activity accelerated, supported by structural policy reforms. The components segment started maturing with export capabilities, Build to Specification (BTS) manufacturing with complex precision engineering led to increased participation from PE investors. This segment has also seen M&A and JV activities. Defence players manufacturing sub-systems have acquired components companies as part of backward integration strategy seeking supply chain control.

Components segment has relatively lower entry barriers as compared to subsystems and systems, hence companies looking to diversify in the defence segment have acquired companies in the component segment. For example, a diversified conglomerate with strong presence in apparel, realty and engineering has acquired 59.25 percent stake in a defence precision engineering company, marking its entry into defence manufacturing.

The overall electronics segment recorded 110 transactions across 33 unique companies between FY 2016 to FY 2026. Electronics have relatively seen higher angel and VC transactions since companies were early stage focusing on R&D and prototyping. Over the last few years PE and institutional transactions, which have started seeing momentum signalling transition from innovation play to scalable, export driven segment.

Exhibit 37: Year and investor wise deals in electronics segment (Number of transactions)[78]

Electronics	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023	2023–2024	2024–2025	2025–2026	Grand Total
Angel/promoter/parent/seed VC	8	6	7	13	6	4	18	12	3	4		**81**
Venture	1		1			1	3	3	2	1	3	**15**
PE/Institution	0	0	1	1	0	0	1	0	3		3	**9**
M&A JV				1	1	1		1		1		**5**
Debt												**0**
Total	**9**	**6**	**9**	**15**	**7**	**6**	**22**	**16**	**8**	**6**	**6**	**110**



[78] MergerMarket, Private Circle; Deloitte Analysis

Indian aerospace and defence sector – From import dependence to export powerhouse

The dual-use nature of many electronics technologies, spanning aerospace, space, homeland security, industrial automation and weather, has enhanced their attractiveness to investors. This segment has also seen strategic M&A/JV transactions driven by capability expansion. For example, a conglomerate has acquired 25 percent stake in an electronics company to enhance its capabilities in defence electronics and avionics. A defence player has acquired 8 percent stake in an electronics company focusing on AI powered avionics.

Overall space segment recorded 76 transactions across 23 unique companies between FY 2016 to FY 2026. The space segment has witnessed VC and PE transactions post 2021 driven by structural reforms with IN-SPACe, easing of FDI norms in satellite manufacturing etc. Despite a relatively lower number of transactions, space segment has attracted 21 percent of the total funding in the aerospace and defence sector.

Exhibit 38: Year and investor wise deals in the space segment (Number of transactions)[79]

Space	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023	2023–2024	2024–2025	2025–2026	Grand total
Angel/promoter/parent/seed VC		2	3	14*	5#	4	5	1		3	1	**38**
Venture				1	5		5	4	5	8	3	**31**
PE/institution								1	2		1	**4**
M&A JV							1	1				**2**
Debt												**0**
Undisclosed											1	**1**
Total	**0**	**2**	**3**	**15**	**10**	**4**	**11**	**7**	**7**	**11**	**6**	**76**

* There have been 11 rounds in 3 companies hence deal volume is higher in FY 2018–19.
# There have been 4 rounds in 1 company in FY 2019-20.

Early-stage funding has supported downstream segment such as earth observation, satellite communications, and positioning, navigation and timing (PNT). In the past few years, growth capital has started flowing into the midstream and upstream segment such as satellite manufacturing, launch vehicle development etc.

The defence sector has also seen robust liquidity opportunities for early-stage backers. Secondary market activity has given exits to early investors and angels in multiple startups. For example, a defence-focused venture fund has exited a company engaged in development of Unmanned Marine Surface Vehicles (UMSV).

Further, strategic acquisitions have also given exits to investors as mature players or conglomerates have partnered with defence companies to bolster their capabilities. A defence player have acquired 100 percent stake in a precision engineering company providing full exit to previous shareholders. A defence company specializing in counter-drone solutions and simulators has acquired 100 percent stake in 2 companies specialising in simulation and assessment tools.

[79] MergerMarket, Private Circle; Deloitte Analysis

Exhibit 39: Category-wise defence IPOs in India (2016–2026)

Value chain categories	2018	2020	2021	2022	2023	2024	2025
Counter UAV							
Electronics	1		2	2			
Components			1			1	1
Shipbuilding	1	1					
UAV				1	1		
Platforms	1						
Arms and ammunitions	1						
Grand total	**4**	**1**	**3**	**3**	**1**	**1**	**1**

Notes:

- Includes only companies which have core focus on defence. For example, auto component companies also manufacturing defence precision components have been excluded.
- Each company is assigned to a single primary value chain category based on core offerings even if it operates across multiple segments.
- Includes IPO of DPSUs in 2018.

There has been selective IPO activity in the defence sector in the past decade, unlike the consumer or technology sector. With the sector transitioning into a more mature, technology-driven ecosystem, the future deal landscape in India's defence industry is expected to see increased participation from private equity and institutional investors, particularly in dual-use technology segments and export-ready businesses with scalable models. As defence companies continue to mature and demonstrate stronger revenue visibility, the market is likely to witness significant activity across the transactions landscape.

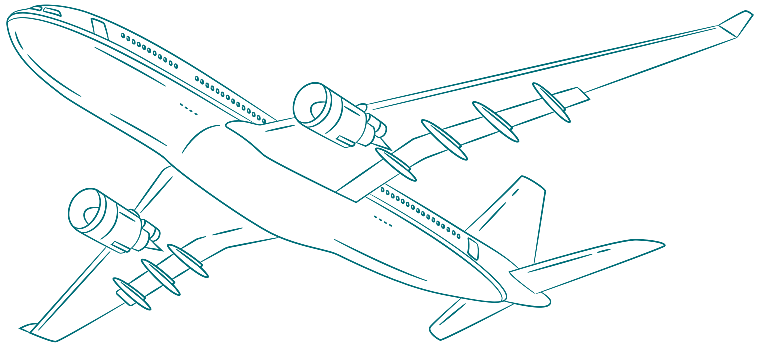
Overall, the next phase of investment is expected to prioritise sustainable value creation, long-term capability development and the creation of globally competitive defence technology.

Conclusion

India's defence sector stands at a pivotal moment , transitioning from historical import dependence towards export competitiveness, technological ownership and strategic autonomy. The confluence of sustained policy reforms, rising defence budgets, maturing industrial capabilities and the emergence of a vibrant dual-use innovation ecosystem has created a strong forward momentum.

As India moves from "Make in India" to "Owned by India," the way forward lies in strengthening the structural national R&D framework, given the dual character of emerging technologies, addressing the gaps in our technology forecasting and development frameworks in the journey towards tech sovereignty. Areas of focus would continue to be building globally competitive platforms with agile design and development technology, supported by rapid innovation sprints at the operational edge in the tactical battle area, strengthening our lifecycle sustenance support capabilities through indigenous MRO models, accelerating workforce skilling and deepening supply chain resilience in critical technologies and raw materials.

With cohesive and coordinated effort across all stakeholders - the GOI, the Armed Forces, industry, academia and investors, India is poised not only to secure its defence future but also to emerge as a trusted player in the global defence landscape.



Annexure

Key initiatives for taken by the GOI for advancing dual-use technologies[80]

Artificial intelligence

TPCR 2025	Government Initiatives	iDEX Challenges	DIA-COE Research Areas
• AI-enabled target recognition and deepfake detection software • AI/ML predictive maintenance for systems • Autonomous AI-based driver-less ground vehicles to lay mines and detect unexploded bombs • AI-based Comprehensive Framework for Security Operation Centre to automatically prevent, detect and respond to cybersecurity incidents • AI-based Integrated Platform Management System for the Navy • AI/ML-enabled Maritime Data Analytics Tool • Next Generation Radar Warning Receiver with AI-based processing • Multi-Phenomenology Multi-Sensor Algorithm for fusion of data from various sensors • AI / ML-based Change Detection for Multi Payload fused Imagery Data • AI-based Self-Healing Networks • Data-Fusion Project for AI/ML-based Automation of Training Activities • UAV-Based ELINT System with AI-enabled Analysis Capability	• Defence AI Council (DAIC) and the Defence AI Project Agency (DAIPA), to provide strategic oversight and drive the integration of AI-based processes in defence organisations. • DRDO Centre for Artificial Intelligence and Robotics (CAIR) serving as a central R&D hub for AI projects. • Allocation of INR20,000 crore to the Research, Development, and Innovation (RDI) scheme, intended to catalyse private sector-led innovation in AI, deep-tech and biotechnology. A tax holiday for global data centres until 2047 aimed at positioning India as a global AI computing hub	30 challenges under AI/ML technology domain with 35 startups working on it.	• Artificial Intelligence for Missile and Missile Defence (IIT Hyderabad); • Artificial Intelligence and Autonomous Systems (IISc Bangalore) • AI For Information Warfare and War Gaming Technologies (IIT Jodhpur)

[80] TPCR 2025, iDEX, DIA-COE, Official PIB announcements, Budget 2026

Quantum technology

TPCR 2025	Government Initiatives	iDEX Challenges	DIA-COE Research Areas
• Free Space Quantum Communication System for secure communication between ships and shore establishments • Indigenous Quantum Key Distribution, Quantum Random Number Generator & Post-Quantum Cryptography protocols • Quantum based EW capability • Quantum sensors for jam resistant PNT along with celestial navigation • Quantum computing	• National Quantum Mission (NQM) : A major initiative to drive cutting-edge advancements in quantum technology. The mission is set to span FY2023–2024 to FY2030–2031, with a budget allocation of INR6,003.65 crore over eight years. • Military Quantum Mission Policy Framework : A roadmap to integrate quantum technology across the tri-services to achieve future battlefield superiority and secure communications.	• One challenge under Quantum Technology with one startup working on it. • 14 challenges under Cybersecurity with 17 startups working on it.	• Quantum Communication (IIT Delhi) • Quantum Phenomena and Device Technology (IISc Bangalore)

Additive manufacturing processes

TPCR 2025	Government Initiatives	iDEX Challenges	DIA-COE Research Areas
• Miniaturisation of On-board Antenna system using Additive Manufacturing Techniques • On Demand Spares through Additive Manufacturing for aircraft • Modular 3D Printed Field Defences	• IAF signed an MoU with IIT Palakkad at 9 Base Repair Depot, Pune, to drive indigenous research in Additive Manufacturing for aviation components. • DIA-COE IIT Hyderabad, indigenously designed Large Area Additive Manufacturing (LAAM) System, which is one of the largest additive manufacturing machines for fabrication of Rocket components.	-	Additive Manufacturing (AM)

Advanced materials: Advanced composites, rare earth elements and semiconductors

TPCR 2025	Government Initiatives	iDEX Challenges	DIA-COE Research Areas
• Heliportable Bridge made of composite material • Hardened Flexible Composite Material for Protection against Small Arms • Sonar Transducer with Polyurethane Element (composite material) • Ultra-light Weight, Sub-Meter Resolution Monolithic SiC Telescope as Optical Payload with Silicone Carbide as a preferred material • Advanced materials for Aerospace Structures like Graphene/ carbon nanotubes	• Rare Earth Permanent Magnet Manufacturing Scheme in November 2025 with a financial outlay of INR7,280 crore over five years to create 6,000 MTPA manufacturing capacity of REE. • The Union Budget 2026–2027 announced the creation of Dedicated Rare Earth Corridors in Odisha, Kerala, Andhra Pradesh and Tamil Nadu. • Union Budget 2026-2027 launched India Semiconductor Mission 2.0 (ISM) which shifts focus from merely attracting ATP (ISM 1.0) to developing the entire ecosystem, with the aim to indigenously produce equipment and materials along with critical inputs, research and industry led training, strengthening supply chains and expand India's role in chip design and intellectual property with a provision of INR1000 crore for FY 2026–2027.	13 challenges under Material Sciences (advanced and light-weight materials) with 14 startups working on it.	• Advanced Rare Earth Materials (IIT Madras) • Aerospace Structural Materials (IISc Bangalore) • High Temperature Materials for Aero Engines (IISc Bangalore) • Ultra- High Temperature Materials for Hypersonic Applications (IIT Hyderabad) • Compound Semiconductor Technologies (IIT Bombay)

Functional systems: Radars, electronic warfare and electro-optics

TPCR 2025	Government Initiatives	iDEX Challenges	DIA-COE Research Areas
• Integrated EW System • Multi-functional dual-band radar • Doppler Weather radar 'X' band • Airborne AESA radar for Fighter aircraft with Swash Plate- Field of View • Next Generation Radar Warning Receiver (NG RWR) for Transport Aircraft • VHF Surveillance Radars • Special Optical Payload • Long Range Electro Optical Sensors • Ultra-light Weight, Sub-Meter Resolution Monolithic SiC Telescope as Optical Payload	• Increased outlay in Union Budget 2026–2027 for Electronics Components Manufacturing Scheme (ECMS) (PLI scheme) from the initial outlay of INR 22,919 crore.	• 9 challenges under Radar Systems with 12 startups working on it. • 5 challenges under Electro-Optical with 5 startups working on it. • 3 challenges under Surveillance Systems with 4 startups working on it. • 4 challenges under Sensor Technology with 3 startups working on it.	Advanced Electro Optic Technologies (IIT Roorkee)

Unmanned systems

TPCR 2025	Government Initiatives	iDEX Challenges	DIA-COE Research Areas
• Autonomous AI based Unmanned System for Detection of Unexploded Bombs / Ordnance / IEDs • CBRN Mini-Unmanned Ground Vehicle • Lightweight AUV • Stealth RPAs • Remotely Piloted Aircraft (HALE, VTOL, Ship-borne) • Integrated Surveillance and Targeting System (ISAT-S) for Mechanised Forces – Surveillance and Loitering	Drone Rules 2021 simplifying licensing and permission requirements, Digital Sky Platform for online registration Drone (Amendment) Rules 2022 abolishing pilot licensing requirements	10 challenges under Autonomous Systems with 14 startups working on it.	• Advanced Unmanned Aerial Vehicle (IISc Bangalore) • Artificial Intelligence and Autonomous Systems (IISc Bangalore)

Space

TPCR 2025	Government Initiatives	iDEX Challenges	DIA-COE Research Areas
• EO and SAR Satellites • Development of Multiband Programmable RF Sensor Satellite • High Throughput Communication Satellite in LEO With User Terminals • Advanced Extremely High Frequency (AEHF) GEO Satellite for Secured Communications • Miniaturised Multi-Payload Satellite (EO, IR, SAR, Hyper Spectral) up to 150 Kgs	• Allocation of INR13,705.63 crore budget in FY 2026–27, with capital outlay at 46.5% to Department of Space . • Small Industries Development Bank of India (SIDBI) launched a dedicated Space VC fund to channel early-stage capital into the ecosystem. • IN-SPACe is enabling PPP-led Earth observation constellations where private firms own and operate satellite assets worth ₹1,200+ crore with the government as anchor customer.		Space Systems for Defence (IIT Hyderabad)

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