Atmanirbhar Bharat in Defence

Progress and Challenges in Building a Resilient Defence Industrial Ecosystem

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India's longstanding dependence on foreign defence imports has constrained strategic autonomy, exposed supply-chain vulnerabilities, and limited indigenous technological depth. 'Atmanirbhar Bharat', launched in 2020, sought to alter this structure by linking procurement preference, indigenisation, innovation, industrial reform, and selective international collaboration. This article evaluates whether those instruments have generated durable defence-industrial capability rather than remaining as policy announcements or treating aggregate output growth as evidence of self-reliance.

The study combines official production, export, procurement, budget, indigenisation, innovation and investment data with recent research and policy analysis. It evaluates reforms through four criteria: implementation; industrial additionality; technological depth and design authority; and resilience. This framework is applied to the Strategic Partnership Model, Positive Indigenisation Lists, foreign direct investment (FDI), defence industrial corridors, procurement reform, public–private restructuring, and the innovation ecosystem. The study is complemented by comparison with data from the United States and China.

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The evidence points to substantial but uneven progress. Defence production reached Rs 1.78 lakh crore in FY 2025–26 and exports amounted to Rs 38,424 crore, wherein the private sector accounted for 24 per cent of production. Yet India remained the world's second-largest recipient of major arms in 2021–25, with an 8.2 per cent share of global imports. Therefore, the central finding is that higher domestic output and exports coexist with persistent dependence in critical technologies. Durable self-reliance requires deeper indigenous design capability, more predictable acquisition, greater contestability, stronger private R&D incentives, and selective partnerships that transfer know-how and design authority rather than merely manufacturing workshare.

Keywords: *Defence Industrialisation; Atmanirbhar Bharat; Strategic Autonomy; Defence Procurement; Multipolar Order*

Introduction

Background

India's pursuit of strategic autonomy has historically been constrained by a high degree of dependence on foreign defence imports. Until the mid-2010s, more than 60–70 per cent of India's major defence equipment was sourced from external suppliers, placing the country among the world's largest arms importers.[1] This import-intensive model exposed India to strategic vulnerabilities, including supply disruptions, technology denial regimes, cost escalations and operational constraints during crises. Past experiences, most notably sanctions following the 1998 nuclear tests, and subsequent delays in critical defence acquisitions reinforced the risks associated with excessive reliance on external defence suppliers.

The launch of 'Atmanirbhar Bharat' (Self-Reliant India) in May 2020 marked a decisive shift in India's defence industrial and strategic policy. Embedded within a broader national vision articulated by Prime Minister Narendra Modi, the initiative sought to leverage indigenous capabilities, strengthen domestic manufacturing, promote innovation, and systematically reduce import dependence in critical sectors, with defence identified as a core priority.[2] While defence indigenisation had featured in earlier policy initiatives such as 'Make in India' (2014), 'Atmanirbhar Bharat' elevated self-reliance from an aspirational goal to a strategic imperative closely linked to national security.

This policy shift must also be understood against a transforming international system. Intensifying great-power rivalry, weaponised

interdependence, supply-chain disruption, and rapid technological change have elevated secure production networks and technological control as instruments of state power. Global networks can create asymmetric vulnerabilities that states exploit through sanctions, export controls, and restrictions on critical technologies.[3] For import-dependent defence establishments, industrial resilience has therefore become integral to strategic autonomy rather than exist as a secondary economic objective.

For India, these developments have reinforced the urgency of building an indigenous, resilient and technologically advanced defence industrial base. Global disruptions during the COVID-19 pandemic, alongside geopolitical shocks such as the Ukraine conflict, further highlighted the fragility of global supply chains and the strategic risks of external dependence.[4] In this context, 'Atmanirbhar Bharat' represents India's response to a broader global turn towards industrial and techno-strategic reforms. Rather than pursuing autarky, India's defence industrial strategy reflects an attempt to reconcile self-reliance with global integration, i.e., seeking autonomy without isolation in a competitive multipolar order.

A resilient defence industrial ecosystem is central to strategic autonomy, technological leadership, economic growth, employment generation and crisis preparedness. In contemporary international politics, defence industrial capacity increasingly functions as a multiplier of national power, shaping states' ability to deter adversaries, sustain military operations, and adapt to technological change.[5] For India, achieving self-reliance in defence is therefore not merely an industrial or economic objective, but a foundational pillar of national security strategy.

India's pursuit of 'Atmanirbhar Bharat' in defence marks a structural shift in the country's strategic and industrial policy orientation. Historically characterised by fragmented production capabilities, limited private-sector participation, and heavy reliance on imports, India's defence preparedness has faced persistent constraints. Since 2014 and more precisely, following the launch of 'Atmanirbhar Bharat' in 2020, defence manufacturing has emerged as a central pillar of India's self-reliance agenda, supported by procurement reforms, indigenisation lists, industrial corridors, and expanded space for private and start-up participation.[6]

By FY 2025–26, defence production had reached a record Rs 1.78 lakh crore and exports amounted to Rs 38,424 crore; private firms contributed towards 24 per cent of production and 45.16 per cent of exports.[7] These figures demonstrate industrial expansion, but they do not by themselves establish technological autonomy. SIPRI's latest data simultaneously place

India as the world's second-largest recipient of major arms in 2021–25, accounting for 8.2 per cent of global imports.[8] The co-existence of record domestic output with continued import dependence in high-end systems, is the principal analytical tension examined in this article.

Against this backdrop, the article assesses India's evolving defence self-reliance agenda under 'Atmanirbhar Bharat'. It asks three related questions: *first*, which reforms have produced measurable industrial and technological outcomes; *second*, where do implementation, institutional, or technological constraints continue to weaken resilience; and *third*, which policy changes can deepen indigenous design capability without substituting one external dependency for another. The objective is therefore not to catalogue initiatives but to distinguish policy intent, implementation and capability outcomes.

Analytical Approach and Evaluation Criteria

To move beyond a descriptive inventory of schemes, this article evaluates major reforms against four criteria. Implementation asks whether the announced instrument produced contracts, investment, production, or induction. Industrial additionality inquires whether the reforms enlarged domestic value creation, private and MSME participation, supplier depth and export capability. Technological depth investigates whether India acquired indigenous design authority, intellectual property, systems-integration skills, critical sub-system competence, and the ability to modify or upgrade without external permission. Resilience checks whether the reform diversified sources, strengthened lifecycle support, and reduced vulnerability to sanctions or supply disruption.

The analysis triangulates Ministry of Defence and budget data with SIPRI, parliamentary and policy research, recent *Journal of Defence Studies* scholarship, and analyses by Indian think tanks. It also treats official indicators with caution: production value and export value capture industrial activity but not necessarily indigenous design content; an item in the indigenisation list may range from being a raw material to a complex system; and an investment commitment is not equivalent to an operating plant. The framework therefore separates policy inputs, implementation outputs and capability outcomes.

Historical Context: From Import Dependence to the Self-Reliance Imperative

India's defence industrial ecosystem evolved under significant structural and strategic constraints in the post-independence period. From the outset, India adopted a state-led model of defence production, premised on the belief that

strategic industries should remain under public control to safeguard national security. Consequently, Defence Public Sector Undertakings (DPSUs) and the Ordnance Factory Board (OFB) emerged as the dominant producers of military equipment, while research and development functions were centralised within the Defence Research and Development Organisation (DRDO), established in 1958. This framework enabled the creation of foundational manufacturing and research capacities in aerospace, armaments and ordnance production.[9]

However, while the public-sector-dominated model ensured sovereign control over critical assets, it also produced structural inefficiencies. Limited competition, weak incentives for innovation, prolonged development timelines, and inadequate integration with the private sector characterised India's defence industrial base for decades.[10] The absence of a competitive ecosystem resulted in cost overruns and technological stagnation, particularly in complex platforms requiring systems integration and advanced electronics.

India's early military conflicts exposed the risks of weak domestic supply capacity. The 1962 Sino-Indian War and the conflicts with Pakistan in 1965 and 1971 were followed by expansion of DRDO laboratories and strengthening of public sector producers such as Hindustan Aeronautics Limited (HAL) and Bharat Electronics Limited (BEL). Yet state-led capacity expansion did not by itself create sufficient technological depth, competitive supplier networks, or reliable pathways from research to production in complex systems; limitations that continue to shape the contemporary R&D ecosystem.[11]

By the early 2000s, India's defence industrial limitations had become increasingly apparent. Despite sustained investments, indigenous flagship programmes such as the Light Combat Aircraft (LCA) *Tejas* and the *Arjun* Main Battle Tank experienced prolonged delays, cost escalations and repeated design revisions. While often framed as programme-specific shortcomings, these outcomes reflected deeper systemic issues related to fragmented procurement processes, insufficient industry R&D collaboration, and limited private sector participation.[12] As a result, India continued to rely heavily on foreign suppliers for critical combat platforms, advanced avionics, propulsion systems and precision-guided munitions.

By the 2010s, India had become one of the world's largest arms importers, reflecting enduring dependence on foreign combat platforms, propulsion, sensors and specialised sub-systems. The problem has not disappeared: SIPRI estimates that India remained the second-largest recipient of major arms in 2021–25, with an 8.2 per cent share of global imports, even though imports

fell by 4 per cent compared with 2016–20.[13] The trajectory is therefore better understood as partial diversification and growing domestic capacity rather than an accomplished transition away from external dependence.

These cumulative challenges laid the groundwork for a gradual rethinking of India's defence industrial policy. Initial reforms under the 'Make in India' (2014) initiative sought to open defence manufacturing to private players and foreign investment. However, it was the launch of 'Atmanirbhar Bharat' in 2020 that marked a decisive break from the past, elevating defence indigenisation from an industrial aspiration to a national security imperative.[14]

Under 'Atmanirbhar Bharat', the government strengthened demand-side and supply-side instruments: Positive Indigenisation Lists restricted future imports of specified items; DAP 2020 prioritised Buy (Indian-IDDM) and other indigenous categories; defence FDI was liberalised to 74 per cent under the automatic route and up to 100 per cent through the government route in specified cases; and innovation, testing and supplier-development mechanisms were expanded. These instruments created stronger incentives for domestic manufacture, but their effectiveness varies substantially when judged by implementation, technology absorption, and design control rather than by formal notification alone.[15]

Institutional responsibility for indigenisation is distributed rather than concentrated in a single agency. The Department of Defence Production (DDP) frames production and indigenisation policy and oversees DPSUs and supplier-development mechanisms, while the Department of Military Affairs (DMA) and Service Headquarters identify user requirements and service-specific items for indigenisation. Service design and indigenisation directorates and bureaus connect users with industry; DRDO anchors defence R&D and administers the Technology Development Fund (TDF); and the Defence Innovation Organisation (DIO) is the legal entity that manages Innovations for Defence Excellence (iDEX). This distributed architecture is important because indigenisation depends on coordination among the purchaser, user, developer, certifier and producer rather than on DDP alone.[16]

These reforms are closely aligned with India's evolving security environment, particularly in the Indo-Pacific region. China's rapid military modernisation, growing technological sophistication, and assertive posture along India's northern borders have reinforced the strategic necessity of assured domestic defence capabilities. In this volatile context, 'Atmanirbhar Bharat' reflects India's attempt to build a defence industrial base that enhances strategic autonomy while remaining selectively integrated into

global technology networks, a balance that is increasingly central to defence industrial strategies in a multipolar world.

Policy Framework and Institutional Landscape

'Atmanirbhar Bharat' and Defence

The Atmanirbhar Bharat Abhiyan, announced in May 2020, represents a watershed moment in India's defence industrial policy by explicitly linking self-reliance in defence manufacturing with national security, economic resilience and strategic autonomy. While earlier initiatives such as 'Make in India' (2014) sought to attract investment into defence manufacturing, 'Atmanirbhar Bharat' marked a qualitative shift by embedding indigenisation within procurement rules, institutional mechanisms, and long-term capability planning.[17] Defence was identified as a priority sector not only because of its fiscal significance but also due to its centrality to India's strategic posture in an increasingly contested security environment.

A core element of the framework is the Strategic Partnership (SP) Model, introduced in 2017 to create long-term private sector capacity in complex platforms through partnerships with foreign original equipment manufacturers (OEMs). Its implementation, however, illustrates the gap between institutional design and industrial outcome. The first proposed SP project for naval utility helicopters did not fructify, and Project 75(I) submarines, the second major project under the model, has experienced prolonged tendering and technology-transfer, liability and eligibility difficulties. MP-IDSA therefore assessed in 2024 that the policy had not seen success yet.[18] The SP Model remains potentially valuable, but after nearly a decade, its contribution must be judged by concluded production programmes, domestic design learning, supplier development, and lifecycle capability rather than by the existence of the procurement category itself.

DAP 2020 gives preference to Buy (Indian-IDDM), which places indigenous design, development and manufacture at the top of the acquisition hierarchy, alongside Make and Innovation routes, that are intended to expand domestic participation.[19] The key evaluative issue is no longer whether a formal preference exists but whether requirements remain stable enough for firms to invest, for transition of prototypes into orders, and for development of indigenous content, including critical know-how, rather than assembly-intensive, local value addition.

Positive Indigenisation Lists (PILs) have become the most visible demand-assurance instrument. By July 2026, five lists of the Defence Forces covered

509 items and five DDP lists covered 5,012 items. On 18 August 2026, DDP notified a sixth list of another 405 strategically important items with an estimated business potential of Rs 3,070 crore.[20] The sixth list brings the DDP total to 5,417 items, in addition to the five service-specific lists. Official data also indicate that more than 15,700 defence items had been indigenised over the preceding five years, including 3,204 items from the earlier PILs, with DPSUs placing domestic orders worth Rs 9,782 crore.[21] These are meaningful implementation indicators, but item counts can combine raw materials, spares, sub-assemblies and high-technology systems. Hence, PIL performance should also be reported in terms of technological criticality, value, indigenous design content, supplier concentration and successful serial production.

The Uttar Pradesh and Tamil Nadu Defence Industrial Corridors provide a second test of whether announced investment becomes production capability. By April 2026, the Uttar Pradesh corridor had attracted commitments of Rs 42,057 crore but grounded investment came to Rs 4,409 crore; Tamil Nadu had commitments of Rs 32,699 crore and realised investment of Rs 6,446 crore.[22] The gap between commitments and realised investment does not negate the corridor strategy, but it shows that land allotment and memoranda of understanding are inadequate measures of maturity. A capability-based assessment should track functioning anchor plants, common test and certification facilities, Tier-2 and Tier-3 supplier density, skilled labour, logistics, and the proportion of corridor firms receiving repeat defence orders.

FDI liberalisation similarly shows mixed results. The automatic-route ceiling was raised to 74 per cent, with up to 100 per cent possible through the government route where access to modern technology is expected. Yet cumulative FDI reported by defence-sector companies was only Rs 6,670.59 crore by March 2026,[23] which is modest when considered relative to the scale and capital intensity of the sector. S.K. Jaini and N. Varma[24] identify regulatory constraints, procurement-access rules, technology availability, and an uneven competitive environment as continuing deterrents. FDI liberalisation has therefore improved formal entry conditions, but it should not be treated as synonymous with technology transfer: the relevant outcomes are new production capacity, domestic engineering teams, Indian-owned intellectual property, critical sub-system localisation, and integration into export supply chains.

Taken together, these instruments represent a substantial policy shift, but their outcomes are differentiated. PILs have produced measurable substitution and domestic orders; corridors have created infrastructure and

investment pipelines but show a sizeable commitment–realisation gap; FDI reform has not yet generated capital inflows commensurate with policy ambition; and the SP Model has struggled to translate its architecture into concluded production programmes. The evidence therefore supports a more qualified claim of institutional transition rather than a linear movement from import dependence to autonomy.

Institutional Architecture

India's institutional architecture is deliberately distributed across policy, user, R&D, production and innovation bodies. The Ministry of Defence sets the overall framework, but the DDP is principally responsible for defence production policy, DPSUs, licensing facilitation and indigenisation mechanisms such as SRIJAN, whereas the Department of Military Affairs and the individual Services shape capability requirements and service-specific indigenisation priorities. Service design and indigenisation organisations provide user-industry interfaces, while DRDO develops strategic technologies and administers the TDF. DIO, a not-for-profit company, manages iDEX as the principal challenge-based innovation platform. The institutional problem is thus not an absence of organisations but coordination across requirement-setting, R&D, trials, certification, procurement and serial production.[25]

Historically, DPSUs have formed the backbone of India's defence industrial base. Entities such as Hindustan Aeronautics Limited (HAL), Bharat Electronics Limited (BEL), Bharat Dynamics Limited (BDL), and Mazagon Dock Shipbuilders Limited (MDL) have been responsible for producing aircraft, electronics, missiles and naval platforms. While DPSUs have played a crucial role in sustaining indigenous production and absorbing transferred technologies, they have also faced criticism for limited innovation, cost overruns and insufficient responsiveness to user requirements.[26] Recent reforms including enhanced autonomy, listing on stock exchanges, and performance-linked incentives aim to improve efficiency and competitiveness.

The Ordnance Factory Board (OFB), which historically managed India's ammunition and armaments production, represented another pillar of the public sector model. However, persistent concerns regarding quality, productivity and financial performance led to its corporatisation in 2021 into seven separate defence companies.[27] This restructuring was intended to introduce accountability, enable market-oriented operations, and attract partnerships with private firms, though its long-term impact remains under evaluation.

India's defence R&D ecosystem remains anchored by DRDO, whose laboratories span aeronautics, missiles, electronics, materials, naval systems and life sciences. Alongside in-house programmes, DRDO has expanded external collaboration through the TDF, technology transfers, industry interaction groups, and DRDO Industry–Academia Centres of Excellence. TDF is especially relevant to the self-reliance agenda because it funds industry-led development of defence technologies and thereby provides a route distinct from traditional laboratory-centred development. By late 2025, DRDO reported 26 successfully developed TDF technologies and an additional Rs 500-crore corpus for deep-tech and cutting-edge projects.[28]

Private firms, MSMEs, start-ups and academic institutions now participate through multiple routes rather than through a single innovation platform. iDEX is managed by DIO, while TDF is administered by DRDO; they are complementary mechanisms with different institutional locations. As of March 2026, iDEX had engaged 676 start-ups and innovators and signed 551 contracts; procurement worth more than Rs 2,400 crore from start-ups and MSMEs had been approved, and projects worth more than Rs 1,500 crore had been sanctioned for new technologies.[29] These figures show a much larger innovation pipeline than in the early years of the initiative, although the decisive metric is the proportion of funded prototypes that transition into repeat orders, scale production, and become operationally sustained capabilities.

The architecture is therefore more pluralistic than the earlier state-dominated model, but institutional density does not automatically produce coherence. The critical interface is the transition from an identified operational problem to funded R&D, trials, certification, procurement and lifecycle support. Fragmentation at any of these stages can leave technically successful prototypes without scale. The next phase of reform should consequently emphasise programme-level accountability across organisations rather than the creation of additional institutional layers.

Progress in Defence Self-Reliance

India's defence self-reliance agenda has generated measurable gains in output, exports, domestic sourcing, innovation participation and public sector restructuring. This section distinguishes those gains from indicators that can overstate technological depth. Production value measures economic activity, exports measure market reach, and indigenisation lists measure procurement

restriction and substitution; none, on its own, establishes indigenous design authority over critical technologies.

Expansion of Domestic Defence Production

Domestic defence production reached an all-time high of Rs 1.78 lakh crore in FY 2025–26, which is 15.6 per cent above the previous year and 110 per cent above the FY 2020–21. DPSUs and other public sector entities accounted for about 76 per cent of the total, while the private sector's share rose to 24 per cent, which amounts to approximately Rs 42,000 crore.[30] The scale-up is substantial and indicates a broader production base. At the same time, the dominance of public sector output and continuing imports of high-end platforms and sub-systems caution against equating production value with indigenous technological content.

Key indigenous platforms such as the Light Combat Aircraft (LCA) *Tejas*, Advanced Light Helicopter (ALH) *Dhruv*, *Akash* surface-to-air missile systems, and indigenous naval vessels have transitioned from limited induction to scaled production. Importantly, the focus has shifted from licence manufacturing towards higher levels of indigenous design and systems integration, particularly in missiles, radars, electronic warfare systems and naval platforms.[31] While India continues to import certain high-end sub-systems such as aero-engines and advanced sensors, the overall production ecosystem has become more diversified and capable.

PILs have strengthened demand certainty by restricting imports after specified dates, and official data show more than 15,700 items indigenised over five years, including 3,204 items from earlier PILs, with domestic DPSU orders of Rs 9,782 crore.[32] The policy has therefore produced verifiable substitution. Its next evaluative stage should move beyond aggregate item counts to disclose the value and criticality of substituted items, the share based on Indian design, the number of qualified domestic suppliers per item, and whether critical components remain dependent on imported materials, software, tooling, or intellectual property.

Growth in Defence Exports

Defence exports reached Rs 38,424 crore in FY 2025–26, which is 62.66 per cent above the preceding year. DPSUs accounted for 54.84 per cent and the private sector for 45.16 per cent of the export value.[33] When compared with the very small export base of the mid-2010s, this appears to be a significant change in market reach and demonstrates that a larger set of Indian products and components can meet overseas demand.

India's export portfolio includes missiles, naval patrol vessels, radars, electronic systems, artillery and small arms. Notably, platforms such as the BrahMos missile system, coastal surveillance radars and offshore patrol vessels have found buyers in Southeast Asia, the Middle East and Africa. Defence exports have also benefitted from procedural reforms, including simplified export licensing, dedicated defence export promotion cells, and greater involvement of Indian embassies in market access.[34]

Export growth is strategically useful because it can enlarge production runs, improve supplier economics, and deepen security partnerships. It is nevertheless an imperfect proxy for self-reliance. Exports can include components, protective equipment, ammunition and platforms with imported sub-systems; consequently, rising export value does not necessarily imply control over propulsion, seekers, engines, high-end sensors, semiconductors, or source code. Export performance should therefore be analysed together with indigenous design share, imported content, after-sales capability, and the ability to upgrade systems without external approval.

Increased Private Sector and MSME Participation

Private participation has expanded, but the data point to diversification rather than displacement of the public sector. Private firms supplied 24 per cent of total defence production in FY 2025–26 and 45.16 per cent of export value.[35] Their role is also growing through iDEX, TDF, Make projects, licensed manufacturing, systems integration and tiered supply chains. The policy challenge is to convert participation into scale by ensuring predictable order books, fair access to testing and certification, workable intellectual-property arrangements, and opportunities to become design owners rather than perpetual sub-contractors.

The principal procurement routes should be distinguished more carefully. Buy (Indian-IDDM) is a procurement-preference category and does not provide development funding by itself. Make-I permits government-funded development assistance subject to the applicable rules; Make-II is primarily industry-funded; and innovation financing is also provided through mechanisms such as iDEX and DRDO's TDF.[36] Their common contribution is not a single funding model but the creation of multiple pathways through which domestic firms can enter design, development and procurement.

The effect on competition is therefore uneven. Entry opportunities have increased, but long development cycles, qualification costs, uncertain follow-on orders, and the concentration of large system-integration work continue to constrain private scale. A resilient supplier base requires not simply more

registered vendors but several qualified sources for critical components and a credible path from prototype to serial production.

Innovation, R&D and Start-up Ecosystem

Innovation has become a distinct pillar of self-reliance, but the institutional distinction between programmes matters. DIO is the legal entity that manages iDEX, which uses challenge statements and grant-supported development to connect start-ups, MSMEs and innovators with Service requirements. DRDO separately administers the TDF for industry-led technology development. Together with DRDO's academic centres and technology-transfer mechanisms, these programmes have widened the set of actors participating in defence R&D.[37]

Current data indicate material expansion: by March 2026 iDEX had engaged 676 start-ups and innovators and concluded 551 contracts, while approved procurement from start-ups and MSMEs exceeded Rs 2,400 crore; DRDO had reported 26 successfully developed TDF technologies and an additional Rs 500-crore deep-tech corpus.[38] These are stronger indicators than programme counts alone because they capture contracting and development. Even so, the system still needs a transparent transition metric showing how many funded solutions complete trials, enter regular procurement, scale to multiple Services, and receive lifecycle support.

Institutional and Structural Reforms

Institutional reform has also altered the public sector landscape. The OFB was corporatised into seven new defence companies in 2021, while existing DPSUs have been encouraged to increase exports, use private supply chains, and operate under more commercial performance disciplines. Recent scholarship nevertheless cautions that the policy objective should not be to treat public and private ownership as substitutes; rather, it should improve contestability, supplier development, and incentives for technological upgrading across both sectors.[39]

There is clearer evidence of alignment between acquisition and domestic capacity-building than the earlier text suggested, but it should be stated with qualification. The 2025–26 modernisation budget reserved 75 per cent for domestic procurement, while DPM 2025 introduced provisions including longer assured orders for indigenised items and a dedicated chapter on innovation and indigenisation. In 2026, revised delegations of financial power doubled or more than doubled several decision thresholds, including powers related to indigenisation and R&D.[40] These measures align demand

with domestic industry, however, their effectiveness must still be tested by actual procurement time, order continuity and technology outcomes.

Progress is therefore best described as broadening industrial capacity without complete technological autonomy. Record production and exports, more domestic orders, a larger innovation pipeline, and stronger procurement preference are genuine achievements. Yet the persistence of major arms imports and critical-technology gaps demonstrates that the next phase must shift the metric of success from 'Made in India' value towards indigenous design authority, reliable scale-up, supplier depth and lifecycle control.

Structural and Systemic Challenges: Barriers to Resilience

Despite measurable progress under 'Atmanirbhar Bharat', India's defence self-reliance agenda continues to confront deep-seated structural and systemic constraints. These challenges are not merely transitional frictions but reflect enduring institutional path dependencies, technological gaps, and governance weaknesses that limit the pace and depth of transformation. Addressing them is essential for converting incremental gains into a resilient and globally competitive defence industrial ecosystem.

Procurement Complexity and Bureaucratic Delays

The central procurement problem is not the absence of timelines or delegated powers. DAP-2020 already contains acquisition timelines and delegated decision-making. DPM-2025 simplified revenue procurement and introduced industry-oriented provisions, and the revised financial delegations in June 2026 further increased authority at Service and DRDO levels.[41] The recurring difficulty lies in implementation: changing qualitative requirements, repeated trials, sequential rather than concurrent approvals, risk aversion, and weak programme ownership. These factors can still extend the period between Acceptance of Necessity, development, contract and induction. Project 75(I) illustrates how technology-transfer, liability and eligibility issues can delay a strategically important programme despite an elaborate procedural framework.[42]

For firms, the relevant risk is therefore schedule uncertainty rather than a formal absence of procedure. Capital-intensive suppliers invest against expected quantities and dates; when specifications or contracting schedules shift, the cost of idle capacity rises and private R&D becomes harder to justify. Procurement reform should consequently measure compliance with existing stage-wise timelines, publicly record reasons for slippage at programme level,

stabilise user requirements after defined design gates, and create empowered cross-functional programme teams that are able to resolve technical, financial and legal issues concurrently.

Inadequate R&D Investment and Technological Gaps

India's R&D constraint also requires more precise measurement. The frequently cited figure of roughly 0.6–0.7 per cent of GDP refers to India's economy-wide gross expenditure on R&D and should not be presented as defence R&D. For the FY 2026–27, DRDO received Rs 29,100.25 crore, while PRS estimates that defence R&D accounts for about 3.7 per cent of total defence expenditure, which is down from about 4.7 per cent in 2014–15.[43] Therefore, the issue is not only absolute funding but the declining budget share, the allocation of resources between laboratory programmes and external performers, and the capacity to move high-risk research into production.

The earlier claim that a fixed percentage of DRDO projects meet objectives within schedule has been removed because a comparable, verifiable public series is not available. A more defensible diagnosis emerges from recent Indian research: limited user-developer-industry integration, long development and qualification cycles, technology denial in critical areas, and weak transition mechanisms can prevent technically promising projects from reaching scaled operational capability.[44] The aborted Project Beta is particularly instructive: technological success without sustained adoption can still produce institutional failure.[45]

However, the ecosystem is becoming less siloed. Since 2022, 25 per cent of the defence R&D budget has been opened to industry, start-ups and academia; DRDO uses TDF, grants-in-aid, industry–academia centres, and testing access to widen participation.[46] The remaining challenge is absorptive and commercial: private actors need predictable follow-on demand, access to test infrastructure and systems data, workable IP terms, and milestone finance if they are to invest their own balance sheets in long-horizon defence technologies.

Public Sector Dominance and Efficiency Deficits

DPSUs remain foundational to India's defence-industrial base, but the policy question is no longer whether they should exist; it is whether public sector scale is combined with contestability, productivity, technological upgrading and supplier development. Earlier audit findings documented procurement

and production weaknesses, while recent analysis emphasises that DPSUs remain pivotal to 'Atmanirbhar Bharat' but they must adapt through greater efficiency, collaboration and integration of private suppliers.[47] Public sector performance should therefore be assessed through delivery schedules, quality, indigenous design content, export competitiveness, and the extent to which prime contractors deepen domestic supply chains.

The corporatisation of the OFB into seven DPSUs in 2021 represented an attempt to address these shortcomings by introducing financial accountability and market discipline. However, early assessments suggest that structural rigidities such as legacy workforce practices, limited managerial autonomy, and weak incentives for innovation, continue to constrain performance.[48] In the case of HAL, production delays in aircraft and helicopter programmes have raised concerns about capacity constraints and systems integration challenges, despite improvements in output levels.

The relevant public sector problem is therefore not simply ownership but incentives and contestability. DPSUs retain indispensable systems-integration, production and lifecycle capabilities, while private firms increasingly supply sub-systems and complete platforms. Reform should benchmark cost, delivery, quality, indigenous design content, export performance and supplier-development outcomes across both public and private entities, and should allocate work competitively where security considerations permit.[49] This avoids unsupported generalisations about governance while focusing on measurable performance.

Limited Private Sector Scale and MSME Constraints

Private firms and MSMEs continue to face structural constraints despite wider entry. Defence production requires patient capital, expensive testing and certification, specialised skills and confidence that successful development will lead to orders. The limited cumulative FDI inflow despite liberalised ceilings and the continued concern over procurement access and technology terms illustrate that formal openness is insufficient.[50] Smaller suppliers additionally face cash-flow and qualification pressures, making common test infrastructure and multi-year demand visibility especially important.

Quality compliance with military standards imposes disproportionately high costs on smaller firms, while delayed payments strain cash flows further. Without targeted financial instruments and risk-sharing mechanisms, MSMEs remain vulnerable, limiting the depth and resilience of the domestic supply chain.

Strategic Dependence in Critical Technologies

External dependence remains concentrated in technologically difficult domains such as aero-engines, some advanced sensors and seekers, specialised materials and electronics, and selected propulsion systems. SIPRI's 2021–25 data confirm that India remains a major arms recipient despite growing domestic production.[51] This is why technology transfer must be assessed by the ability to understand, modify, upgrade and reproduce technology rather than by licensed manufacture alone. A.K. Srivastava similarly finds that past transfers of technology have produced only limited success in generating indigenous high-technology capability.[52]

Taken together, these challenges underscore that defence self-reliance is not merely a function of policy intent or procurement mandates but requires sustained institutional reform, technological investment and governance transformation. While 'Atmanirbhar Bharat' has altered incentives and expanded participation, structural bottlenecks particularly in procurement efficiency, R&D capacity and public sector reform continue to constrain India's industrial evolution in the defence sector.

Comparative Global Analysis: United States, China and India

A comparative assessment of defence industrial ecosystems in the United States, China and India reveals how differing political economies, institutional capacities and investment patterns shape military-industrial outcomes in a multipolar international system. While all three states recognise defence industrial capability as a core pillar of national power, their pathways towards military modernisation and technological autonomy diverge significantly, highlighting both the constraints and opportunities confronting India's 'Atmanirbhar Bharat' agenda.

United States: Market-led Innovation with Strategic State Direction

The United States combines large, mission-oriented, public R&D with a predominantly private production base and dense links among defence agencies, firms, universities and commercial technology ecosystems. Rather than using total military expenditure as a proxy for defence R&D, the relevant lesson is institutional: sustained public demand and diversified research performers support experimentation, while procurement pathways can be tailored to technology maturity. The model also benefits from civilian spillovers and the capacity of private firms to invest heavily alongside government programmes.[53]

Recent US acquisition reforms provide concrete examples. The Middle Tier of Acquisition pathway is designed for rapid prototyping and rapid fielding, generally within a two-to-five-year horizon, while the Software Acquisition Pathway supports iterative software delivery. By August 2024, the Department of Defense reported 168 Middle Tier programmes and 78 Software Acquisition Pathway programmes, with three-quarters of software programmes delivering on cadences shorter than six months.[54] These pathways do not eliminate oversight problems, as GAO has cautioned, but they institutionalise differentiated processes for speed and iteration rather than forcing all technologies through a single acquisition rhythm.

DARPA complements these acquisition pathways by organising high-risk, high-payoff research around empowered programme managers who set technical milestones, fund competing performers, and typically work on short, fixed terms. Its institutional value lies less in any single technology than in combining autonomy, technical expertise, milestone discipline, and networks across government, universities and industry. India need not replicate DARPA, but TDF, iDEX and DRDO's external research mechanisms can draw a relevant lesson: high-risk programmes require empowered technical leadership and a clearly financed transition route from experiment to procurement.[55]

China: State-led Integration and Scale-Driven Capability

China represents a contrasting model of defence industrialisation rooted in centralised control, state-owned conglomerates and civil–military fusion. Over the past two decades, Beijing has transformed its defence industrial base into a near-peer competitor in domains such as missiles, naval platforms, space assets and unmanned systems.[56]

China represents a different model based on state direction, large defence conglomerates, civil–military integration, and systematic absorption of civilian and foreign technology. Precise defence R&D figures are not transparently comparable with US or Indian budget data, so the earlier estimate of defence R&D as a percentage of GDP has been removed. The more defensible comparative point is organisational: China's scale, state-backed long-term planning, and integration of civilian manufacturing and technology networks have supported rapid capability accumulation, even as opacity limits independent assessment of costs and effectiveness.[57]

India: Hybrid Aspirations, Fiscal Constraints and Incremental Transformation

India's defence industrial ecosystem occupies an intermediate position between the US market-driven model and China's state-led system. Historically shaped by public sector dominance and chronic import dependence, India is now attempting a gradual transition towards a hybrid model combining state direction, private sector participation, and selective global integration under the 'Atmanirbhar Bharat' framework.

India's contemporary defence ambitions are anchored in a strategic pivot from being one of the world's largest arms importers towards becoming a self-reliant and globally competitive defence manufacturing hub. This shift is being facilitated by policy reforms, expanding strategic partnerships, and an emphasis on indigenous capability development through co-production, licensed manufacturing and technology-transfer arrangements with the United States, Israel, Russia and France.[58] These partnerships aim to strengthen domestic supply chains and stimulate innovation without pursuing complete autarky.

India's FY 2026–27 Ministry of Defence allocation is Rs 7.85 lakh crore, which is a 15.19 per cent increase over the FY 2025–26 Budget Estimate (BE) and approximately 2 per cent of estimated GDP. While capital expenditure is Rs 2.19 lakh crore, Rs 1.39 lakh crore has been earmarked for procurement from domestic defence industries.[59] These current budget figures replace the earlier, uncorroborated discussion of a proposed supplementary allocation. The policy issue is less the headline total than how effectively capital, sustainment and R&D resources create design capability and timely induction.

Within this envelope, DRDO's allocation rises to Rs 29,100.25 crore in FY 2026–27 from Rs 26,816.82 crore in FY 2025–26.[60] PRS nevertheless notes that defence R&D's share of total defence expenditure is about 3.7 per cent in 2026–27, below its mid-2010s share (PRS Legislative Research, 2026).[61] At the same time, a quarter of the defence R&D budget has been opened to industry, start-ups, and academia. This combination suggests that the policy problem is both quantum and structure: India must raise the quality and continuity of mission-oriented R&D while ensuring that external performers have enough demand, IP opportunity, and programme authority to co-invest.

India's defence budget has increased substantially in absolute terms over the past decade, but a larger budget does not automatically reduce technological dependence. The strongest evidence of progress lies in domestic

procurement, production, export, and innovation outcomes; the strongest evidence of incompleteness lies in continuing imports of major arms and critical subsystems. The analytical focus should therefore remain on the conversion efficiency of expenditure into indigenous design, production scale, and lifecycle autonomy rather than on budget growth alone.

Comparative Insights and Strategic Implications

Four comparative insights emerge. First, mission-oriented R&D needs stable funding and institutional routes that tolerate technical risk while enforcing milestones. Second, acquisition systems must differentiate between mature procurement, rapid prototyping, software, and long-horizon technology development. Third, industrial scale depends on predictable orders and contestable supplier networks. Fourth, self-reliance is compatible with international collaboration only when partnerships deepen domestic design authority and absorptive capacity. The United States illustrates networked public-private innovation, China illustrates state-directed scale and civil-military integration, and India is constructing a hybrid model whose principal weakness remains the transition from policy preference and prototype to sustained indigenous capability.

Atmanirbhar Bharat should therefore be understood as an effort to improve India's bargaining position within global defence production networks, not as a programme of autarky. The appropriate test is whether international engagement reduces vulnerability over time by increasing domestic design knowledge, alternative suppliers, repair and upgrade autonomy, and control over critical interfaces.

Table 1 Comparative Defence Industrial Models

Dimension	United States	China	India
Model	Networked private production with strategic state direction.	State-led scale with civil-military integration.	Hybrid, state-directed and increasingly plural.
Innovation / R&D system	Large mission-oriented public R&D; DARPA; private and university performers.	State-backed, long-term programmes; civilian technology absorption; limited transparency.	DRDO-centred but diversifying through TDF, iDEX, academia and private performers.

Industry structure	Private primes with dense supplier networks.	Large state conglomerates.	DPSU-led output with a growing private and MSME role.
Acquisition logic	Multiple pathways, including Middle Tier and software acquisition.	Centralised and directive.	Rule-rich system with indigenous preference; implementation and transition remain uneven.
Global integration	Alliance and supply-chain based.	Selective external acquisition plus domestic absorption.	Selective partnerships, co-production and technology transfer.
Principal strength	Innovation networks and demand scale.	Industrial scale and coordination.	Policy momentum, expanding domestic market and innovation base.
Principal constraint	Cost growth and industrial concentration.	Opacity and uncertain external assessment.	Design depth, procurement execution and critical-technology dependence.

Source: Cheung (2009); U.S. Department of Defense (2024); U.S. Government Accountability Office (2023); SIPRI (2026a, 2026b); Ministry of Defence (2026a); PRS Legislative Research (2026).

The comparative evidence reinforces the paper's central distinction between output and capability. India has developed a much larger industrial base, but the next threshold of maturity is the ability to originate, integrate, modify, and sustain critical technologies at scale. That requires not copying the institutional form of the United States or China but adapting their underlying lessons on mission-oriented R&D, procurement differentiation, supplier depth, and long-term demand certainty.

Policy Recommendations and Strategic Way Forward

India's defence industrial transformation has produced measurable gains, but the analysis above also shows where policy instruments are underperforming. A second-generation reform agenda should therefore target identified

implementation gaps rather than recommend measures that already exist. The priorities below build on DAP 2020, DPM 2025, revised financial delegations, iDEX, TDF, SRIJAN, PILs, and the defence industrial corridors, and specify how those mechanisms can be made more effective.

Recalibrating Defence R&D and Innovation Financing

R&D has not scaled as rapidly as India's technological requirements for several reasons: defence resources compete with personnel, pensions, operations, and near-term modernisation; high-risk technologies involve long and uncertain development cycles; private firms face uncertain order books and limited incentives to finance research whose principal customer is the state; and weak transition mechanisms can leave successful prototypes without serial orders. PRS estimates that defence R&D's share of total defence expenditure has fallen from about 4.7 per cent in 2014-15 to about 3.7 per cent in 2026-27, even though the absolute R&D budget has risen (PRS Legislative Research, 2026).[62] The constraint is therefore fiscal, institutional, and incentive-based rather than a single funding shortfall.

Instead of prescribing an arbitrary defence-R&D target as a share of GDP, India should adopt multi-year mission portfolios for a limited set of critical technologies—such as aero-engines, seekers, electronic warfare, trusted electronics, autonomous systems, advanced materials, and space-enabled capabilities—with protected milestones and transparent transition plans. The existing policy already opens 25 per cent of the defence R&D budget to industry, start-ups, and academia; the priority is to make that window investable through co-funded programmes, milestone payments, access to government test facilities, clear IP and export rights, and anchor procurement when performance thresholds are met.[63] TDF and iDEX should be used as feeders into larger acquisition programmes rather than as stand-alone innovation competitions.

Private R&D should be crowded in rather than being treated as a substitute for government research. Co-investment is most plausible where the state provides a credible market: multi-year demand signals, milestone-based matching funds, access to test ranges and laboratories, and procurement options after successful trials. The government can retain sovereign control over sensitive technologies while allowing firms to own or share commercially valuable IP in agreed domains. This reduces the risk of public laboratories bearing the entire development burden and gives private firms a reason to build enduring design teams.

Reforming Procurement to Enable Speed, Scale and Predictability

DAP-2020 already provides acquisition timelines, while financial powers have been repeatedly delegated and were expanded again in 2026. DPM-2025 also simplifies revenue procurement and permits assured orders for indigenised items for up to five years and beyond in specified circumstances.[64] The reform need is therefore enforcement and programme management, not the creation of another nominal timeline. Each major acquisition should have a single accountable programme leader, a digitally visible baseline schedule, stable requirements after defined design gates, and mandatory recording of the authority and reason for every material slippage.

India should also institutionalise differentiated acquisition pathways. For mature equipment, fixed milestones and competitive contracting should dominate; for uncertain technologies, spiral development and incremental user trials should be built into the programme from the outset; and software-intensive capabilities should use short update cycles. The US Middle Tier and Software Acquisition Pathways illustrate how process can be matched to technological uncertainty, though GAO's oversight concerns show that speed must be paired with test evidence and cost discipline.[65] Existing Indian delegated powers should be used to resolve decisions concurrently across user, acquisition, finance, legal and quality-assurance functions rather than sequentially.

Rebalancing the Public–Private Defence Ecosystem

DPSUs and the seven corporatised ordnance companies remain indispensable to strategic production and lifecycle support, but public sector capability should not translate into protected workshare where competitive domestic alternatives exist. The objective should be a mixed ecosystem in which system-integration responsibility is allocated by demonstrated capability and performance, and both public and private primes are required to develop Indian Tier-2 and Tier-3 suppliers. Benchmarking should compare delivery, quality, indigenous design content, export performance and supplier development across ownership forms.[66]

The earlier reference to replacing 'cost-plus contracting' has been removed because most acquisition contracts are not appropriately characterised that way. A more relevant reform is to improve contestability and incentives within existing fixed-price and negotiated procurement: publish performance benchmarks, use transparent workshare criteria, reward early indigenisation of critical sub-systems, and make repeat orders conditional on delivery and quality outcomes. Private firms should receive non-discriminatory access to

government test facilities, standards and interface data, while DPSUs should be encouraged to source competitive sub-systems from Indian MSMEs and specialised technology firms.

Deepening Defence Industrial Corridors and Supply-Chain Resilience

The defence industrial corridors should now be managed as capability clusters rather than as investment destinations primarily. The commitment–realisation gap—Rs 42,057 crore committed versus Rs 4,409 crore grounded in Uttar Pradesh, and Rs 32,699 crore versus Rs 6,446 crore in Tamil Nadu by April 2026—provides a measurable baseline.[67] Corridor authorities should publish annual cluster scorecards covering operational plants, defence order value, tier-2/3 supplier density, common testing capacity, skilled workers, patents and design centres, and export orders. Common facilities should be organised around specific capability families such as propulsion, electronics, unmanned systems, ammunition, aerospace structures and naval systems so that firms obtain shared test, metrology, certification and prototyping infrastructure.

Supply-chain resilience also requires more specificity than generic 'mapping'. SRIJAN DEEP already contained more than 41,000 vendors and 2.7 lakh products by May 2026.[68] The next step is to use that database for risk analytics: identify single-source and foreign-source dependencies at sub-system and material level; classify them by operational criticality and lead time; develop at least two, qualified, Indian or trusted sources for the most critical items where feasible; maintain strategic stocks for inputs with long replenishment cycles; and link long-term procurement agreements to suppliers that invest in domestic tooling and qualification. This converts an existing digital repository into a resilience instrument rather than duplicating an activity that is already underway.

Leveraging Strategic Partnerships

Strategic partnerships and technology-transfer agreements should be assessed by whether they create indigenous design authority, not only local content. Technology transfer contributes to indigenous design only when Indian engineers gain the 'know-why' needed to modify a system and when contractual rights permit such modification. Evaluation should therefore cover access to design documentation and source code where relevant; ownership or durable rights over interfaces, tooling, test data, and configuration control; the share of engineering work performed in India; transfer of manufacturing processes for critical sub-systems; joint problem-solving and resident engineering;

Indian participation in upgrades and next-generation derivatives; and rights to maintain, modify and export agreed variants. Without these elements, transfer of production know-how can increase local manufacture while leaving design dependence intact.[69]

These criteria should be written into programme milestones and payment schedules. Co-development projects should include measurable technology-absorption deliverables, an Indian design team with defined work packages, joint intellectual-property arrangements where feasible, and a roadmap showing which foreign-dependent subsystems will be indigenised in subsequent blocks. This approach guards against replacing a legacy supplier with a new technological lock-in while still allowing India to use global partnerships to accelerate capability acquisition.

Strengthening Institutional Coordination

Institutional coordination should focus on accountable programme governance rather than on the creation of another apex council. For major indigenous programmes, MoD should establish empowered cross-functional teams linking the user Service, acquisition wing, DDP, DRDO or other developer, quality and certification agencies, finance, and the lead industrial partner. Each team should own a capability right from requirement definition through trials, contracting, production and lifecycle support. A common digital dashboard should record design maturity, trial status, indigenous-content risks, supplier bottlenecks, schedule variance and transition decisions. This would use existing institutions more coherently while reducing the diffusion of responsibility identified across the paper.

Human capital remains a parallel constraint. Deep self-reliance depends on design engineers, systems architects, materials scientists, software and electronics specialists, programme managers, quality professionals and skilled technicians. Defence-oriented university programmes and DRDO Industry–Academia Centres of Excellence should therefore be linked to live mission problems and industry placements, while corridor clusters should support apprenticeship and certification pipelines. The objective is to create absorptive capacity: without teams able to understand and redesign imported technology, even generous technology-transfer clauses will produce limited indigenous learning.

Conclusion

India's pursuit of defence self-reliance under the 'Atmanirbhar Bharat' initiative represents a structural shift in procurement preference, industrial

policy and the organisation of defence innovation. The revised evidence, however, supports a more differentiated conclusion than a simple narrative of success. The policy has expanded domestic output, exports, supplier participation and innovation mechanisms, but these achievements co-exist with persistent dependence in high-end technologies and major platforms.

The scale of progress is measurable. Defence production reached Rs 1.78 lakh crore in FY 2025–26, exports amounted to Rs 38,424 crore, and private firms accounted for 24 per cent of production and 45.16 per cent of export value.[70] Five service-specific PILs and, after the notification of 18 August 2026, six DDP PILs now restrict imports across thousands of items; while iDEX, TDF, SRIJAN DEEP, and the defence industrial corridors have widened the industrial and innovation base.[71] These are not merely declaratory changes.

At the same time, the paper's four-part evaluation—implementation, industrial additionality, technological depth and resilience—reveals important limits. The Strategic Partnership Model has yet to establish the production record envisaged at its creation; FDI inflows remain modest relative to policy ambition; corridor investment realisation trails commitments; and India remained the world's second-largest recipient of major arms in 2021–25.[72] The strongest remaining constraints are therefore, not the absence of policy instruments but a result of uneven execution, insufficient design depth, transition failures between R&D and procurement, and continued dependence on critical sub-systems.

Self-reliance should consequently be defined as selective strategic autonomy rather than autarky. A system is more self-reliant when India can design or understand critical architectures, diversify suppliers, sustain and repair equipment during external disruption, modify and upgrade systems without prohibitive foreign dependence, and bargain for technology from a position of industrial strength. Co-production and technology transfer can advance that objective only when they build Indian engineering capability and design authority.

The policy implications follow directly from this diagnosis. R&D reform should prioritise multi-year mission portfolios and crowd in private and academic investment through the existing 25 per cent external R&D window; procurement reform should enforce existing timelines and delegated powers through accountable programme management; corridors should be measured as capability clusters rather than by memoranda of understanding; SRIJAN DEEP should be used for critical-supply risk analytics; and technology-transfer agreements should include explicit design, modification, IP and absorption milestones.

The comparison with the United States and China also suggests that there is no universal institutional template. US's strength rests on mission-oriented public R&D, private performers, DARPA-style high-risk experimentation and differentiated acquisition pathways; China's advantage lies in scale, state coordination and civil–military technological integration. India's viable model is necessarily hybrid. Its success will depend on combining state demand with greater contestability, private investment, academic research and selective external collaboration while ensuring that critical knowledge and lifecycle capability accumulate domestically.

'Atmanirbhar Bharat' should therefore be judged by a progressively harder standard. The first phase demonstrated that India can expand domestic production, exports and the number of industrial participants. The next phase must demonstrate that it can convert those gains into indigenous design authority, repeatable innovation, resilient supply chains and timely operational induction. The decisive metric is not how many items are labelled indigenous, but whether India can originate, integrate, modify, produce and sustain the critical military capabilities on which strategic autonomy ultimately depends.

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