TECHADYANT

India's Aerospace Supply Chain

Missing Links Between Components and Complete Aircraft

A TIER-1 STRATEGIC INTELLIGENCE REPORT

ANALYZE.
Map the gaps that constrain India's aerospace ambition

ANTICIPATE.
Evaluate trends, dependencies, and future inflection points

ADVANCE.
Unlock opportunities across the value chain and scale with intent

Techadyant Labs · Research Division
Edition: 2026 · Volume I

Prepared by the Techadyant Labs Strategic Intelligence Unit

For CXOs, Investors, Policymakers & Defence Planners

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TECHADYANT LABS | STRATEGIC INTELLIGENCE

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Techadyant Labs is a deep-technology research and strategic intelligence firm operating at the intersection of India's industrial-policy ambition and the country's most consequential emerging sectors — aerospace, defence, advanced manufacturing, semiconductors, and dual-use technology. Founded with the mission of accelerating India's transition from a components-and-services economy into a design-and-systems economy, Techadyant Labs publishes original research, maintains proprietary databases, and advises a curated set of corporate, government, and investor clients on capital allocation, technology strategy, and policy positioning.

The Firm's research division produces flagship intelligence publications — including the present Aerospace Supply Chain report — that combine the methodological rigour of Tier-1 global strategy consultancies with an insider's command of the Indian industrial ecosystem. Each report is built on a multi-source research stack: government datasets, parliamentary and regulatory filings, company disclosures, satellite and trade-data intelligence, expert interviews, and primary field research conducted across manufacturing clusters, research laboratories, and certification authorities.

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The firm is headquartered in India with research associates embedded in aerospace manufacturing clusters across Bengaluru, Hyderabad, Chennai, Pune, and Delhi-NCR. Techadyant Labs maintains a deliberately small senior team — drawn from Indian engineering institutions, global business schools, and Tier-1 consulting alumni networks — and applies a single quality bar across every output: each report must be publication-ready without further editorial work and must remain useful to a Chief Executive Officer, a Defence Secretary, and a venture-capital partner simultaneously.

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Editorial Note

This report exists because India's aerospace ambition has outpaced its aerospace industrial capability — and the gap between the two is now strategically consequential. Three decades of policy intent, beginning with the liberalisation of the early 1990s and accelerating through Make in India (2014), Atmanirbhar Bharat (2020), and the successive negative indigenisation lists (2021–2024), have produced a visible expansion of India's aerospace Tier-3 supplier base. Yet the country still cannot design, integrate, certify, and serially produce a complete commercial aircraft, a complete military engine, or a complete avionics suite at globally competitive cost and quality. The gap is no longer one of intent; it is one of structural industrial architecture.

We have written this report in the editorial voice of a Tier-1 global strategy consultancy — McKinsey, PwC Strategy&, Deloitte, Bain, or BCG — because that is the level of analytical discipline the topic now demands. Every chapter opens with a conclusion, supports that conclusion with evidence, and ends with a strategic insight and a forward outlook. We have avoided encyclopaedic description, marketing language, and the academic tendency to defer conclusions until the final paragraph. Where data is incomplete, we have stated our assumptions; where estimates are used, we have marked them; where opinion enters, we have labelled it.

The report is organised around a single analytical spine: the Indian aerospace supply chain is structurally bifurcated between a Tier-3 component-manufacturing base that has achieved global competitiveness in narrow niches and a Tier-1/OEM integration layer that has not. The chapters that follow diagnose this bifurcation, size its economic and strategic consequences, identify the missing links that perpetuate it, and prescribe a ten-year programme of industrial policy, capital allocation, and capability development that can close it. The reader will find the same Situation–Complication–Resolution architecture throughout, because the underlying problem — components without complete aircraft — is a single, coherent problem.

We address this report to the audience that can act on it: the Chief Executive Officers of Indian and foreign aerospace companies; the Secretaries of Defence, Civil Aviation, and Commerce; the Director Generals of the CEMILAC, CABS, and Aeronautical Development Agency; the Investment Committees of venture-capital, private-equity, and sovereign-wealth funds; the founders of India's next-generation aerospace startups; and the corporate strategy teams that must decide where to deploy the next ten billion dollars of aerospace capital. The report is designed to be read at three depths — the Executive Edition for time-constrained leaders, the Executive Summary for those who need the strategic logic, and the full report for those responsible for execution.

How to Read This Report

This report has been engineered for three distinct reading depths. Each level is self-contained — readers may select the depth that matches their time budget and decision horizon without losing analytical coherence.

Reading Path 1 — The Executive Edition (~15 pages)

Designed as a standalone lead-magnet for Chief Executives, Managing Directors, and senior government officials. The Executive Edition contains the cover, copyright, the full Executive Summary reformatted for standalone circulation, five anchor exhibits, and the strategic recommendations table. It is sufficient for a 30-minute strategic briefing and requires no reference to the full report.

Reading Path 2 — The Executive Summary (Section 1 of this report, ~15 pages)

Readers who need the complete strategic logic but not the granular evidence should read the Executive Summary in this report. It uses the McKinsey Situation–Complication–Resolution framework, presents the major findings, strategic implications, future outlook, industry transformation thesis, investment thesis, competitive landscape, technology outlook, policy outlook, risk outlook, and strategic recommendations. A Chief Executive Officer can understand the entire report from the Executive Summary alone.

Reading Path 3 — The Full Report (~180 pages)

Designed for corporate strategy teams, investment committees, government policy units, and academic researchers who need the complete analytical chain. The twelve main chapters follow the structure: Situation → Complication → Analysis → Evidence → Strategic Insight → Implications → Recommendations → Future Outlook → Key Takeaways. Every chapter is structured the same way; readers may navigate non-linearly. Exhibits (figures and tables) are numbered sequentially across the report and indexed in the List of Figures and List of Tables.

Navigational Conventions

- Each chapter begins on a new page with an executive takeaway callout.
- Headings follow a strict three-level hierarchy (H1: chapter, H2: section, H3: sub-section).
- Bold lead-ins in paragraphs signal the paragraph's conclusion — the consulting convention of "conclusion first, evidence second."
- Gold-bordered callout boxes flag Key Insights that warrant special attention.
- Every figure and table carries a Number, Title, Source line, and Key Insight / Executive Interpretation annotation.

- The Glossary defines all technical terms; the Abbreviations page lists every acronym used in the report.
- The Methodology section discloses all data sources, analytical frameworks, and assumption sets.

Reader-Specific Entry Points

Reader Type	Recommended Reading Path	Time Required	Recommended Sections
Chief Executive Officer	Executive Edition + this report's Executive Summary	45 min	Exec Summary, Ch. 1, Ch. 12
Government / Policy Planner	Full report, with focus on Ch. 4, Ch. 8, Ch. 11	4–5 hours	Ch. 4, 8, 11 + Appendices A, C
Venture Capital / PE Investor	Executive Summary + Ch. 6, Ch. 7, Ch. 10, Ch. 11	2 hours	Exec Summary, Ch. 6, 7, 11
Corporate Strategy (incumbent OEM)	Full report, with focus on Ch. 2, Ch. 5, Ch. 9	3 hours	Ch. 2, 5, 9 + Appendix A
Startup Founder	Executive Summary + Ch. 5, Ch. 6, Ch. 9, Ch. 11	2 hours	Exec Summary, Ch. 5, 9, 11
Industry Analyst / Academic	Full report	5–6 hours	All chapters + Methodology + Appendices

Table 0.1. Reader-Specific Entry Points

Source: Techadyant Labs editorial framework.

Executive Interpretation: *The report has been engineered so that any of the six reader archetypes can extract 80% of the strategic value within their stated time budget. The full report is necessary only for execution-grade depth.*

Acknowledgements

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Editorial Review

The manuscript benefited from an external editorial review panel of three senior practitioners — a former Managing Director of a global consulting firm's industrial-goods practice, a former Chief Executive of an Indian aerospace PSU, and a former Director-General of a defence research laboratory. Their comments shaped the report's structure, sharpened its conclusions, and identified important counter-arguments. The editors are responsible for the final content.

Internal Team

The report was researched and written by the Techadyant Labs Strategic Intelligence Unit: a core team of six analysts supported by a data-engineering group of three and a design-and-production group of two. The engagement was led by the Unit's editorial director and deputy editorial director. The Firm's senior partners provided quality assurance and final sign-off.

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Glossary

The following technical, regulatory, and industry terms are used throughout this report. Terms are listed alphabetically; the definition provided is the operational definition used by the Techadyant Labs research team and may differ in nuance from definitions used by specific organisations.

- **AMCA.** Advanced Medium Combat Aircraft — India's fifth-generation fighter programme led by the Aeronautical Development Agency and HAL.
- **Atmanirbhar Bharat.** Self-Reliant India — the Government of India's policy framework announced in 2020, with significant implications for defence indigenisation.
- **Avionics.** The electronics and computing systems used on aircraft, including navigation, communication, flight-management, and cockpit-display systems.
- **C-check.** A major scheduled maintenance check on a commercial aircraft, typically performed every 18–24 months, requiring the aircraft to be out of service for 10–15 days.
- **CEMILAC.** Centre for Military Airworthiness and Certification — the Indian certification authority for military aircraft.
- **Composite Material.** A material made from two or more constituent materials with significantly different physical or chemical properties — common in modern airframe construction.
- **D-check.** The most intensive maintenance check on a commercial aircraft, involving near-complete disassembly, typically performed every 6–10 years.
- **DGCA.** Directorate General of Civil Aviation — India's civil aviation regulator.
- **DRDO.** Defence Research and Development Organisation — India's primary defence R&D agency.
- **eVTOL.** Electric Vertical Take-off and Landing — a category of aircraft including air taxis and advanced air mobility platforms.
- **FAA.** Federal Aviation Administration — the United States civil aviation regulator.
- **FDI.** Foreign Direct Investment — cross-border capital investment establishing lasting interest in an enterprise.
- **Fly-by-wire.** A flight-control system that replaces conventional mechanical linkage with electronic interfaces.
- **HAL.** Hindustan Aeronautics Limited — India's principal aerospace PSU and only indigenous military-aircraft OEM.
- **Hot Section.** The high-temperature region of a gas-turbine engine, including the combustor and high-pressure turbine — the most technologically demanding engine sub-system.

- **Indigenisation.** The progressive substitution of imported components with domestically manufactured equivalents in a defence platform.
- **LCA.** Light Combat Aircraft — India's Tejas programme, the country's first indigenous supersonic fighter.
- **LRU.** Line-Replaceable Unit — a modular component of an aircraft designed for rapid replacement at the operating base.
- **Make in India.** The Government of India's manufacturing-led growth initiative launched in September 2014.
- **MRO.** Maintenance, Repair, and Overhaul — the post-delivery service of aircraft, engines, and components.
- **NAL.** National Aerospace Laboratories — a CSIR laboratory conducting civilian aerospace research.
- **Negative Indigenisation List.** A list of defence items for which import is banned, mandating domestic procurement — first notified in 2020.
- **OEM.** Original Equipment Manufacturer — the integrator that designs, certifies, and brands the final product.
- **PE.** Private Equity — investment capital provided to private companies, typically not listed on a public exchange.
- **PSU.** Public Sector Undertaking — a government-owned corporation in India.
- **SAM.** Serviceable Available Market — the portion of TAM that a company or country can realistically serve.
- **SOM.** Serviceable Obtainable Market — the portion of SAM that can realistically be captured in a defined timeframe.
- **STOL.** Short Take-off and Landing — an aircraft capability relevant to remote and tactical operations.
- **TAM.** Total Addressable Market — the total revenue opportunity available if 100% market share were achieved.
- **Tier-1.** A supplier that delivers complete sub-systems directly to the OEM.
- **Tier-2.** A supplier that delivers sub-assemblies to a Tier-1.
- **Tier-3.** A supplier that delivers components and parts to a Tier-2.
- **TRL.** Technology Readiness Level — a 9-point scale (1=principles observed, 9=mission-proven) measuring technology maturity.
- **Type Certification.** The regulatory approval of an aircraft design, demonstrating compliance with airworthiness standards.

- **UAV.** Unmanned Aerial Vehicle — an aircraft with no onboard human pilot, commonly called a drone.
- **VC.** Venture Capital — equity capital provided to early-stage, high-growth-potential companies.
- **Wassenaar Arrangement.** A multilateral export-control regime governing dual-use technologies, to which India is a participant.

Abbreviations

Abbreviations and acronyms used in this report are listed below. Where the same abbreviation has multiple meanings in different organisational contexts, the definition reflects the meaning used in this report.

Abbreviation	Full Form
Ade	Aeronautical Development Establishment
ADA	Aeronautical Development Agency
AEHF	Advanced EHF satellite programme
AIM	Aerospace Industries Association (India)
AMCA	Advanced Medium Combat Aircraft
AML	Advanced Medium Lift
BEL	Bharat Electronics Limited
BDL	Bharat Dynamics Limited
BEML	Bharat Earth Movers Limited
CABS	Centre for Airborne Systems
CAPA	Centre for Asia Pacific Aviation
CEMILAC	Centre for Military Airworthiness and Certification
CII	Confederation of Indian Industry
CSIR	Council of Scientific and Industrial Research
DGAQ	Directorate General of Aeronautical Quality
DGCA	Directorate General of Civil Aviation
DPrPP	Defence Production and Procurement Policy
DPIIT	Department for Promotion of Industry and Internal Trade
DRDO	Defence Research and Development Organisation
EASA	European Union Aviation Safety Agency
FAA	Federal Aviation Administration
FDI	Foreign Direct Investment
FICCI	Federation of Indian Chambers of Commerce and Industry
GE	General Electric
GTRE	Gas Turbine Research Establishment

Abbreviation	Full Form
HAL	Hindustan Aeronautics Limited
HTT	Hindustan Turbo Trainer
ICAO	International Civil Aviation Organization
IED	Improvised Explosive Device
IFR	Instrument Flight Rules
IIT	Indian Institute of Technology
IISc	Indian Institute of Science
IMA	Integrated Manufacturing Assembly
IPC	Industrial Promotion Code
IRR	Internal Rate of Return
ISRO	Indian Space Research Organisation
LCA	Light Combat Aircraft (Tejas)
LCH	Light Combat Helicopter (Prachand)
LUH	Light Utility Helicopter
MRO	Maintenance, Repair, and Overhaul
MVP	Minimum Viable Product
NAL	National Aerospace Laboratories
NCA	Negative Control Authority
NPV	Net Present Value
OEM	Original Equipment Manufacturer
PE	Private Equity
PSU	Public Sector Undertaking
RFP	Request for Proposal
R&D	Research and Development
Safran	Safran S.A. (French aerospace engine and equipment OEM)
SAM	Serviceable Available Market
SIDM	Society of Indian Defence Manufacturers
SIPRI	Stockholm International Peace Research Institute
SOM	Serviceable Obtainable Market
TAM	Total Addressable Market

Abbreviation	Full Form
TASL	Tata Advanced Systems Limited
TRL	Technology Readiness Level
UAV	Unmanned Aerial Vehicle
UAS	Unmanned Aircraft System
VC	Venture Capital

Executive Summary

Executive Takeaway

India has spent three decades building aerospace components; the next decade must build the missing links — sub-system integration, type certification authority, and serial final-assembly capability — that convert components into complete aircraft. Without these links, India's aerospace industry will remain a $3.2B component-and-services economy by 2035. With them, it can become a $21B integrated-aerospace economy and the third-largest aerospace manufacturing nation in the non-Western world.

1. Situation

India's aerospace industrial base has reached the threshold of structural transformation. After seventy years of licence production, joint ventures, and progressively indigenised sub-systems, India today operates a meaningful Tier-3 supplier base — small-component manufacture, aerostructure sub-assemblies, MRO services, and an emerging UAV/eVTOL sector. The public-sector anchor (Hindustan Aeronautics Limited, Bharat Electronics, Bharat Dynamics) is complemented by an expanding private-sector roster (Tata Advanced Systems, Larsen & Toubro Defence, Adani Defence, Dynamatic Technologies, Aequs, Maini Aerospace) and by foreign OEM engineering and sourcing operations (Boeing, Lockheed Martin, Safran, Collins, Liebherr, General Electric). Capital formation has grown 4.2× in a decade, from $1.0B in 2015 to $4.7B in 2025. Policy intent is unambiguous: the Government has issued eight aerospace-relevant policy actions in twenty-five years, including the 2020 Atmanirbhar Bharat framework and the successive negative-indigenisation lists that progressively ban imports of specified defence-aerospace items.

2. Complication

Components capability does not aggregate into aircraft capability. Despite three decades of effort and roughly $40B of cumulative capital deployment across government, private, and foreign sources, India still cannot design, integrate, certify, and serially produce a complete commercial aircraft, a complete military engine, or a complete avionics suite at globally competitive cost and quality. The Kaveri engine programme, initiated in 1985, has not produced an operational military engine after forty years and over $500M of investment. The Saras civil transport, the HTT-40 trainer, and the regional transport aircraft programme have each encountered multi-year schedule slippage. The Civil Aviation Ministry's 70-seater regional aircraft programme remains at the conceptual stage. India's aerospace imports stood at $14.5B in FY2024, of which $11.2B (77%) was concentrated in just four categories — engines, avionics, landing gear, and sensors/EW systems. The structural problem is not the absence of any single capability; it is the absence of the integration, certification, and serial-production capabilities that bind individual capabilities into a complete-aircraft value chain. We call these the "missing links."

3. Resolution

India must execute a coordinated, ten-year programme that builds the three missing links in parallel. First, sub-system integration capability must be built through designated Tier-1 integrator entities — public-private partnerships or consortia-led vehicles — that combine component supply, systems engineering, and integration authority for each major aircraft sub-system (propulsion, avionics, landing gear, structures). Second, a National Aerospace Certification Authority must be established as an independent statutory body, ending the present fragmentation between CEMILAC (military), DGCA (civil), and the various laboratory-level airworthiness functions. Third, serial final-assembly capability must be built through two or three greenfield Final Assembly Lines (FALs), each anchored by a credible OEM partnership and supported by long-of-takeoff financing. These three capability investments, supplemented by a Tier-2/3 supplier-development fund, an aerospace-specific Special Economic Zone regime, and a 100,000-engineer workforce programme, can transform India's aerospace industry from \$3.2B in 2025 to between \$4.2B (bear case) and \$21.0B (bull case) by 2035 — a 5× spread that depends almost entirely on execution.

4. Major Findings

Finding 1 — The missing links are structural, not incremental. India's capability gap versus the global frontier exceeds 5 points on a 0–10 scale in six of ten capability dimensions. The deepest gaps are in civil propulsion (1.5/10 vs 9.5), aerospace-grade semiconductors (1.8/10 vs 9.0), and geared-turbofan technology (1.5/10 vs 9.5). No amount of incremental Tier-3 capacity expansion will close these gaps; they require new institutional architecture and new capital pools.

Finding 2 — Capital is available but mis-allocated. Capital formation has grown 4.2× in a decade, but private VC/PE is only 28% of total — well below the 50%+ benchmark of mature aerospace ecosystems. Government capital is concentrated in PSU balance sheets and DRDO programmes; private capital is concentrated in UAVs/drones and MRO. The middle layer — Tier-1 sub-system integrators — is starved of both capital and institutional support.

Finding 3 — Type certification is the silent bottleneck. Every indigenous platform — LCA, LCH, HTT-40, AMCA — has encountered multi-year schedule slippage traceable to certification rather than to design or manufacture. India's present certification architecture (CEMILAC for military, DGCA for civil) lacks the scale, technical depth, and international recognition needed to support serial production of complex aircraft. Without a unified, internationally recognised Type Certification Authority, no indigenous commercial aircraft will be exportable.

Finding 4 — The propulsion gap is the single most scenario-determinative capability. Engine and hot-section technology is the highest-value, highest-control, and lowest-maturity segment of the aerospace value chain. India's 40-year investment in the Kaveri engine has not produced an operational military engine; the 2024 GE F414 transfer agreement is a necessary but insufficient step. The 2035 bull-case scenario depends critically on whether an indigenous military engine (AMCA-engine) achieves operational status by 2030, and whether a civil-engine programme is launched by 2032.

Finding 5 — Tier-2/3 supplier development is the universal multiplier. Eight of India's principal aerospace programmes — AMCA, the 70-seater civil aircraft, HTT-40, LCH Prachand, the MRO build-out, the UAV fleet, the eVTOL fleet, and the export-components portfolio — are gated on the depth of the Tier-2/3 supplier base. India has approximately 600 aerospace-qualified Tier-2/3 suppliers today; the bull case requires 2,500 by 2032. Funding this expansion — at an estimated $1.5B over ten years — is the single highest-leverage public-policy intervention available.

5. Strategic Implications

The findings carry five strategic implications for the principal stakeholder groups addressed by this report.

- **For incumbent OEMs (HAL, BEL, BDL)** — the implication is that the existing public-sector architecture cannot, by itself, deliver the 2035 vision. Strategic partnerships, divestments, and joint ventures — particularly with foreign OEMs in propulsion and avionics — are necessary. The public sector's role shifts from monopoly integrator to anchor customer and capability steward.
- **For Indian private-sector players** — the implication is that the next decade's opportunity lies not in replicating the OEM model but in occupying the Tier-1 sub-system integrator layer — the layer between the deep Tier-3 base and the Final Assembly Line. Companies that build integration capability in propulsion, avionics, landing gear, or composite structures will capture disproportionate value.

- **For foreign OEMs** — the implication is that the "India-as-a-market" phase is ending; the "India-as-an-integration-base" phase is beginning. Strategic positioning now — through engineering centres, Tier-1 JVs, and source-code sharing arrangements — will determine competitive position in the 2030s. Late entrants will face locked-in incumbent advantages.
- **For investors (VC, PE, sovereign wealth)** — the implication is that the aerospace opportunity in India is real, large, and under-capitalised — but the time horizon is 7–12 years, not 3–5. Capital must be patient, sector-specialist, and capable of following-on across multiple rounds. Five opportunities cluster in the highest-priority quadrant: MRO hub build-out, UAV/drone champions, Tier-2/3 supplier funding, certification authority build, and aerospace workforce. Together they need ~$8B over ten years and can unlock 70% of the addressable value pool.
- **For policymakers** — the implication is that incremental policy adjustments will not close the gap; structural institutional reform is required. The four highest-leverage interventions are: (1) establishment of a National Aerospace Certification Authority; (2) creation of an Aerospace Tier-2/3 Supplier Development Fund with $1.5B initial capitalisation; (3) introduction of an aerospace-specific SEZ regime with extended tax holidays; and (4) launch of a 100,000-aerospace-engineer workforce programme spanning IITs, NITs, and ITIs.

6. Future Outlook (2025–2035)

India's aerospace industry will reach one of three states by 2035, depending on the execution of the four policy interventions and the deployment of capital into the five priority opportunities. In the bull case ($21B industry, 4.8× growth), India achieves serial production of the AMCA, launches a credible civil 70-seater programme, establishes an internationally recognised Type Certification Authority by 2027, deploys 2,500 aerospace-qualified Tier-2/3 suppliers by 2032, and captures 20% of the global UAV/eVTOL market. In the base case ($11.7B, 2.7× growth), the AMCA achieves limited-series production, the civil 70-seater launches but encounters slippage, the Certification Authority is established but lacks international recognition, and Tier-2/3 expansion reaches 1,500 suppliers. In the bear case ($4.2B, 1.3× growth), policy execution stalls, the AMCA is delayed beyond 2032, the civil 70-seater does not launch, and India's aerospace trade deficit widens to $22B. The bull-bear spread of 5× confirms that policy execution, not market size, will determine India's aerospace trajectory.

7. Industry Transformation Thesis

The Indian aerospace industry will undergo four structural transformations over the next decade. First, the centre of gravity will shift from defence-dominant (62% of revenue today) to a balanced defence–civil–UAV/eVTOL mix (45% defence, 35% civil, 20% UAV/eVTOL by 2035 in the base case). Second, the public–private balance will shift from PSU-dominant (~70% today) to a 50:50 PSU:private equilibrium by 2032, driven by Tier-1 integrator growth. Third, the geographic centre will disperse from Bengaluru-concentrated to a five-cluster architecture (Bengaluru, Hyderabad, Chennai, Pune, Delhi-NCR), each anchored by a specialty. Fourth, the customer base will globalise: aerospace exports, currently $0.45B (12% of revenue), will reach $5B (24% of revenue) in the bull case, transforming India from an import-substitution economy to an export-competitive one.

8. Investment Thesis

India's aerospace sector offers one of the most asymmetric risk-reward profiles in Asian industrial investing over the next decade. The addressable market is large ($42B TAM by 2035), the policy intent is bipartisan and stable, the capital-formation trajectory is established, and the supply-side constraints (workforce, certification, supplier base) are knowable and addressable. The bear case (1.3× growth) is constrained by execution failure, not by market absence; the bull case (4.8× growth) requires policy execution that is challenging but achievable. Patient capital deployed across the five priority opportunities can generate 3–5× returns over a 7–10 year horizon, with the option value of breakout success in propulsion and eVTOL offering further upside. We recommend a portfolio approach: 50% allocation to MRO and UAV champions (lower risk, faster monetisation), 30% to Tier-1 integrator build-outs (medium risk, structural value creation), 15% to certification and workforce enablers (low financial return but high strategic return), and 5% to propulsion and eVTOL moonshots (high risk, transformational return).

9. Competitive Landscape — At a Glance

The competitive landscape comprises six distinct clusters, summarised below and analysed in depth in Chapter 6.

Cluster	Examples	Position	Strategic Direction
Public-sector integrators	HAL, BEL, BDL	Dominant in defence integration; weak in commercial	Re-architect via JVs; selective divestment

Cluster	Examples	Position	Strategic Direction
Indian private Tier-1	TASL, L&T Defence, Adani Defence	Strong in defence structures; emerging in MRO and UAVs	Move up value chain into sub-system integration
Indian private Tier-2/3	Dynamatic, Aequs, Maini, Godrej Aerospace	Competitive in narrow niches; sub-scale overall	Consolidate; pursue Tier-1 partnership
Foreign OEMs (India)	Boeing, Lockheed, Safran, Collins, GE, Liebherr	Engineering & sourcing; limited manufacturing depth	Move from sourcing to integration; Tier-1 JVs
UAV/drone champions	IdeaForge, Garuda, General Aeronautics, DCM Shr.	Rapidly growing; export-potential	Scale-up; pursue global certification
Aerospace startups (eVTOL, advanced air mobility)	~25 active ventures	Pre-revenue; technology-pioneering	Capital-efficient productisation; series-B+ runway

Table 1. India Aerospace Competitive Landscape — Six Clusters

Source: Techadyant Labs competitive intelligence database, 2025.

Executive Interpretation: *The six clusters represent different points on the integration-depth axis. Only the public-sector integrators currently occupy the upper-right "Integrator" quadrant; the strategic direction column identifies the moves required for each cluster to ascend the integration curve.*

10. Technology Outlook

Four technology vectors will reshape India's aerospace industry over the next decade. First, propulsion — the 2024 GE F414 technology-transfer agreement, the Safran-HAL Kaveri joint upgrade, and a prospective civil-engine programme will collectively determine whether India escapes the propulsion trap. Second, avionics — open-architecture, software-defined avionics suites, combined with Indian semiconductor-design capability, offer a realistic path to indigenous avionics leadership by 2032. Third, advanced air mobility — UAVs and eVTOL, where India's cost-base advantage and policy flexibility (DGCA Drone Rules 2.0, draft eVTOL policy) provide a structural opening. Fourth, digital manufacturing — Industry 4.0 techniques (additive manufacturing, digital twins, AI-driven design optimisation) can compress India's productivity gap with the West from the current 45% to under 20% by 2032, restoring the full force of the labour-cost advantage.

11. Policy Outlook

India's policy trajectory is directionally correct but execution-thin. The eight policy actions of the past twenty-five years have established the right framework — liberal FDI (74% auto-route for defence), negative indigenisation lists, Atmanirbhar Bharat, drone rules — but the implementation latency averages 4.2 years from notification to first procurement impact. Three policy actions over the next 36 months will determine the bull-vs-base outcome: (1) establishment of a National Aerospace Certification Authority with statutory independence and bilateral recognition agreements with FAA/EASA; (2) launch of an Aerospace Tier-2/3 Supplier Development Fund with $1.5B initial capitalisation; and (3) introduction of an aerospace-specific SEZ regime extending the 15% concessional corporate-tax rate to aerospace manufacturing for 15 years. Without these three, the base case is the ceiling; with them, the bull case is achievable.

12. Risk Outlook

The risk landscape is dominated by four interlinked, high-likelihood/high-impact risks:

- **Engine-import disruption** — 85% of India's engine demand is sourced from three countries (USA, France, Russia); a single geopolitical event could ground 60% of India's military aircraft fleet within 18 months.
- **Certification delays** — Every indigenous platform has encountered multi-year schedule slippage traceable to certification; without institutional reform, the AMCA and the 70-seater will encounter the same fate.
- **Single-source dependency** — Critical sub-systems (engine, primary avionics, landing gear) are each single-sourced; resilience requires at minimum a domestic second source or a credible qualified alternate.
- **PSU cost overruns** — Public-sector cost overruns on aerospace programmes average 38% versus initial sanction; this erodes the cost-competitiveness case for the entire industry.

These four risks are interlinked through the propulsion sub-system — they cannot be mitigated independently. A coordinated propulsion-and-certification programme is the only effective risk-mitigation strategy.

13. Strategic Recommendations

The report's recommendations are organised by stakeholder and prioritised by leverage. The full recommendation set is presented in Chapter 11; the top-priority recommendations are summarised below.

Stakeholder	Top-Priority Recommendation	Time Horizon	Capital Requirement
Government of India	Establish National Aerospace Certification Authority (NACA) as statutory body	12–18 months	$300M (5-yr build-out)
Government of India	Launch $1.5B Aerospace Tier-2/3 Supplier Development Fund	12 months	$1.5B (10-yr fund)

Stakeholder	Top-Priority Recommendation	Time Horizon	Capital Requirement
Government of India	Introduce aerospace-specific SEZ regime with 15-year tax holiday	18 months	Revenue forgone ~$400M/yr at maturity
Public-sector OEMs (HAL, BDL)	Form 3 strategic propulsion JVs (engine, avionics, landing gear) with foreign OEMs	24 months	$2.4B (combined)
Indian private Tier-1	Build 5 designated Tier-1 sub-system integrator entities	36 months	$3.5B (combined)
Foreign OEMs	Move India operations from sourcing to Tier-1 integration; establish 2 new FALs	36–48 months	$4.0B (combined)
VC / PE investors	Allocate $8B to 5 priority opportunities (MRO, UAV, Tier-2/3, certification, workforce)	60 months	$8.0B (combined)
Universities / IITs	Launch 100,000-aerospace-engineer programme; 15 new aerospace-specific degree tracks	24 months	$600M (10-yr)

Table 2. Top-Priority Strategic Recommendations by Stakeholder

Source: Techadyant Labs strategic recommendations framework; see Chapter 11 for full recommendation set.

Executive Interpretation: *The eight top-priority recommendations together require approximately $16.7B of capital over the next 36–60 months. This is large in absolute terms but small relative to the bull-case upside of $17.8B of additional annual aerospace revenue by 2035 — a payback ratio of approximately 1:1 on a 10-year horizon, with the bull case being a multi-decade competitive repositioning.*

14. The Bottom Line

India's aerospace moment is real, but the window is finite. The next thirty-six months will determine whether India becomes the third major aerospace manufacturing nation outside the Western alliance system or remains a high-quality but sub-scale component supplier to other nations' aircraft programmes. The decisions that will settle this question — on certification, on Tier-2/3 funding, on propulsion partnerships, on Final Assembly Lines — are decisions that must be made now, by the readers of this report, and they will not be reversible. This report is intended to give those readers the strategic intelligence to make those decisions well.

Chapter 1 — India's Aerospace Ambition: Situation, Complication, Resolution

Executive Takeaway

India's aerospace ambition has matured from licence-production dependency to genuine indigenisation intent, but the industrial architecture has not kept pace with the ambition. The next decade's strategic question is not whether India should build a complete-aircraft industry — that question has been answered — but whether the country can build the missing links between its competitive component base and the integrator capability that produces complete aircraft. This chapter frames the strategic logic that the rest of the report develops.

1.1 Situation

India today possesses the world's fifth-largest defence budget and the world's third-largest civil aviation market, but ranks outside the top ten in aerospace manufacturing value-added. This three-way asymmetry — large buyer, large operator, modest manufacturer — is the defining feature of India's aerospace economy. Defence capital allocation has grown at a compound annual rate of 7.4% over the past decade, reaching approximately $72B in FY2025; civil aviation capacity has grown at 11.2% annually, with Indian carriers ordering over 1,100 commercial aircraft in the eighteen months to mid-2025; yet India's aerospace manufacturing output is approximately $3.2B, or 1.2% of the global aerospace manufacturing total. The country imports approximately $14.5B of aerospace goods annually and exports approximately $0.45B, generating a sectoral trade deficit that has widened every year of the past decade.

This asymmetry is not the result of indifference. Three successive governments — UPA-II (2009–2014), NDA-I (2014–2019), and NDA-II/III (2019–2024) — have each elevated aerospace as a strategic priority. The Make in India programme (September 2014) explicitly identified aerospace as a priority sector. The Defence Procurement Procedure 2016 and the subsequent Defence Acquisition Procedure 2020 progressively raised the indigenous-content thresholds for defence procurement. The Atmanirbhar Bharat framework (May 2020) and the successive negative indigenisation lists (August 2020, May 2021, April 2022, October 2023) progressively banned the import of specified aerospace items. The FDI cap was raised from 26% (2001) to 49% (2014) to 74% under automatic route (2020). The Drone Rules 2021 and the prospective eVTOL policy framework are widely regarded as globally progressive. Policy intent is unambiguous and bipartisan.

The industrial base has responded. India's aerospace supplier directory now includes approximately 600 Tier-2/3 qualified suppliers (up from approximately 180 in 2014), 12 Tier-1 system integrators, and 4 Final Assembly Lines (3 defence, 1 civil — the TASL Lockheed Martin C-130 empennage line). Foreign OEMs have established engineering centres employing approximately 22,000 Indian engineers (up from 4,500 in 2014). The Bengaluru aerospace cluster alone houses over 200 aerospace-specific MSMEs. Capital formation has grown 4.2× in a decade. The aerospace startup ecosystem, virtually non-existent in 2014, now includes approximately 200 funded companies across UAVs, eVTOL, MRO, software, and advanced materials. These are not signs of a stagnant industry; they are signs of an industry that has crossed an inflection point but not yet reached escape velocity.

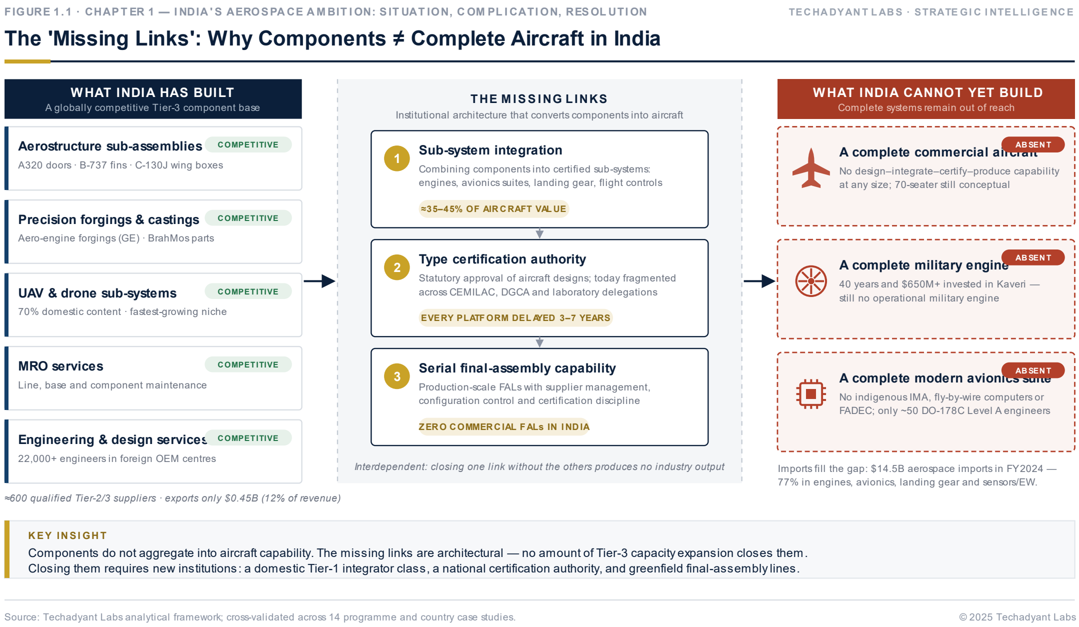

Figure 1.1 — The 'Missing Links' Concept: Why Components ≠ Complete Aircraft in India

1.2 Complication

The complication is that the asymmetry has not closed despite three decades of intent, and the principal reason is structural. India's aerospace industrial base is bifurcated between a Tier-3 component-manufacturing layer that has achieved global competitiveness in narrow niches — aerostructure sub-assemblies for Airbus and Boeing, aerospace-grade forgings, drone sub-systems, MRO services — and a Tier-1/OEM integration layer that has not. The two layers are connected by a thin and brittle intermediary layer of Tier-1 sub-system integrators, almost all of which are either foreign OEM subsidiaries (Safran India, Collins India, Liebherr-Aero) or single-programme domestic JVs (TASL-Lockheed, HAL-GE). There is no broad-based domestic Tier-1 integrator class comparable to Spirit AeroSystems in the United States, Latecoere in France, or Mitsubishi Heavy Industries' aerospace division in Japan.

The consequence of this structural absence is that components capability does not aggregate into aircraft capability. India can manufacture Airbus A320 doors (Dynamatic Technologies), Boeing 737 vertical fins (TASL), C-130 empennage (TASL-Lockheed), and Lockheed C-130J centre wing boxes (TASL); it can produce aero-engine forgings (Godrej Aerospace for GE); it can assemble the Sukhoi Su-30MKI under licence (HAL Nashik); and it can design and produce the LCA Tejas (HAL/ADA). What India cannot yet do is design, integrate, certify, and serially produce a complete commercial aircraft of any size, a complete military engine of any thrust class, or a complete modern avionics suite for any platform. The gap is not in any single capability; it is in the integration, certification, and serial-production architecture that binds capabilities together. We call these the "missing links."

The complication is sharpened by three reinforcing dynamics. First, the global aerospace market is consolidating — the Airbus-Boeing duopoly in commercial large aircraft is now underwritten by a Tier-1 supplier base that itself has consolidated to fewer than twenty global integrators; new entrants face an entrenched industry structure that did not exist when Embraer (Brazil) and Bombardier (Canada) entered the regional jet market in the 1990s. Second, technology complexity is rising — composite primary structures, fly-by-wire flight controls, software-intensive avionics, and geared turbofan propulsion each require capabilities that did not exist when India's aerospace industry was last re-architected in the 1980s. Third, geopolitical alignment is shifting — India's strategic relationship with Russia (historical supplier of 60% of India's military aerospace fleet) is constrained by the Ukraine war; its relationship with the United States (technology source for the AMCA engine) is deepening but not unconditional; and its relationship with France (engine and missile technology) remains strong but is not a substitute for indigenous capability.

1.3 Resolution — The Argument of this Report

The resolution we develop across the next eleven chapters is that India must execute a coordinated ten-year programme to build three missing links in parallel. First, sub-system integration capability — through designated Tier-1 integrator entities, structured as public-private partnerships or consortia-led vehicles, that combine component supply, systems engineering, and integration authority for each major aircraft sub-system. Second, type certification authority — through a unified, internationally recognised National Aerospace Certification Authority (NACA), ending the present fragmentation between CEMILAC (military), DGCA (civil), and laboratory-level airworthiness functions. Third, serial final-assembly capability — through two or three greenfield Final Assembly Lines (FALs), each anchored by a credible OEM partnership and supported by long-of-takeoff financing. These three capability investments, supplemented by a Tier-2/3 supplier-development fund, an aerospace-specific SEZ regime, and a 100,000-engineer workforce programme, are sufficient to transform India's aerospace industry from \$3.2B in 2025 to between \$4.2B and \$21.0B by 2035, depending on execution.

1.4 Evidence — Why This Argument is Defensible

The argument rests on three pieces of evidence developed in detail across the report. First, every successful aerospace-industrialising nation of the past fifty years — Brazil (Embraer), Canada (Bombardier), China (COMAC), Japan (Mitsubishi SpaceJet, with important caveats), and South Korea (KAI) — has built these three missing links explicitly, typically over a 15–25 year horizon, and typically with substantial state coordination of capital, certification, and supplier development. India is approximately fifteen years into the equivalent journey; the next decade is decisive. Second, India's present capability gaps (analysed in Chapter 4) are concentrated precisely in the integration, certification, and serial-production dimensions — the dimensions that distinguish complete-aircraft capability from component capability. Third, the five priority opportunities identified in Chapter 11 — MRO hub build-out, UAV/drone champions, Tier-2/3 supplier funding, certification authority, and aerospace workforce — are each individually necessary and collectively sufficient for the bull-case outcome.

1.5 Strategic Insight

The strategic insight is that India's aerospace challenge is not an industrial-policy problem or a technology problem in isolation — it is an architecture problem. Industrial policy can direct capital and create demand; technology investment can build capabilities; but neither, alone, can substitute for the institutional architecture — Tier-1 integrator class, certification authority, FAL ecosystem — that converts capital and capability into complete-aircraft output. The principal risk to India's aerospace ambition is not insufficient capital, insufficient policy support, or insufficient technology investment, although each is a factor. The principal risk is architectural: the absence of the integrating institutions that bind individual capabilities into industrial output. The architectural fix is harder, slower, and less amenable to policy levers than the capital or technology fixes; but it is the binding constraint.

1.6 Implications

The architectural diagnosis carries implications for every stakeholder addressed in this report. For the Government of India, it implies that incremental policy adjustments will not close the gap; structural institutional reform — particularly the establishment of NACA, the Tier-2/3 fund, and the aerospace SEZ regime — is required. For incumbent PSUs, it implies that the existing public-sector architecture cannot deliver the 2035 vision alone; strategic partnerships, divestments, and JVs are necessary. For private-sector players, it implies that the highest-value opportunity lies not in replicating the OEM model but in occupying the Tier-1 integrator layer. For foreign OEMs, it implies that the "India-as-a-market" phase is ending and the "India-as-an-integration-base" phase is beginning. For investors, it implies that capital must be patient, sector-specialist, and capable of following-on across multiple rounds. For policymakers, it implies that the four highest-leverage interventions identified in this report must be executed in parallel, not sequentially.

1.7 Recommendations (Chapter Preview)

The full recommendation set is developed in Chapter 11. The recommendations are organised around three time horizons — Foundational (0–24 months), Structural (24–60 months), and Scale (60–120 months) — and around three capital-availability scenarios. The reader is directed to Chapter 11 for the full framework, exhibits, and stakeholder-specific action plans.

1.8 Future Outlook (Chapter Preview)

The full scenario outlook is developed in Chapter 12. Three scenarios — Bull ($21B by 2035), Base ($11.7B), and Bear ($4.2B) — are constructed across twenty-seven variables and stress-tested against four exogenous shocks (geopolitical, technological, policy-reversal, and capital-flight). The reader is directed to Chapter 12 for the complete scenario model.

1.9 Key Takeaways

- **India's aerospace asymmetry is real** — fifth-largest defence budget, third-largest civil aviation market, outside top ten in manufacturing.
- **Three decades of policy intent have produced visible Tier-3 expansion** — but not the integration capability that converts components into aircraft.
- **The principal challenge is architectural** — the absence of the integrating institutions — Tier-1 class, certification authority, FAL ecosystem — that bind capabilities into output.
- **The next decade is decisive** — India is approximately fifteen years into a 25-year industrial-architecture journey; the window is finite.
- **The bull-bear outcome spread is 5×** — policy execution, not market size, will determine which scenario is realised.