



India's Defence Indigenisation and Military Modernisation: A Review of Policy Reforms, Technological Capabilities, Industrial Transformation and Strategic Autonomy

Anoop Ajith M¹, Dr. V.P.Nedunchezhiyan²

^{1,2} Department of Defence and Strategic Studies, SRM Institute of Science and Technology, Kattankulathur, Chennai-603203

ABSTRACT :

India's defence sector has undergone a significant transformation from a predominantly import-dependent system towards a more diversified domestic defence-industrial ecosystem. Defence indigenisation has emerged as an important component of India's broader pursuit of strategic autonomy, technological capability and military modernisation. The introduction of initiatives associated with Make in India and Atmanirbhar Bharat has sought to strengthen indigenous research and development, expand domestic manufacturing, increase private-sector participation, encourage defence start-ups, develop defence industrial corridors and promote exports. At the same time, India's continuing dependence on foreign sources for several critical technologies demonstrates that increases in domestic production do not automatically translate into complete technological self-reliance.

This review article synthesises the available literature on India's defence indigenisation and modernisation, drawing on research articles, policy studies, government documents and recent analyses. The review examines the historical evolution of India's defence-industrial base; the changing procurement architecture; the role of the Defence Research and Development Organisation (DRDO); private-sector and start-up participation; defence industrial corridors; technology transfer and foreign collaboration; major indigenous programmes; defence exports; and institutional and legal constraints. The literature indicates substantial progress in domestic production, exports and industrial participation, but also identifies persistent weaknesses in propulsion, advanced electronics, sensors, electronic warfare, testing infrastructure, systems integration and R&D intensity. A recurring issue across the literature is the difference between platform-level indigenous content and deeper technological ownership at the component, design and intellectual-property levels. The review therefore argues that the assessment of self-reliance should move beyond production value and import substitution towards measures of technological depth, indigenous intellectual property, design capability, supply-chain resilience, systems integration and lifecycle support.

Keywords: Defence Indigenisation; Atmanirbhar Bharat; Defence Modernisation; Defence R&D; Strategic Autonomy; Defence Manufacturing; Technology Transfer; Defence Corridors; Defence Exports; India.

1. Introduction

Defence capability is closely associated with national security, technological development and strategic autonomy. For India, the question of indigenous defence capability has been particularly significant because the country has historically depended heavily on foreign suppliers for major weapon systems, platforms, components and technologies. The literature reviewed in this study consistently identifies external dependence as both a strategic and industrial challenge. Yadav notes that India's continuing dependence on foreign suppliers exposes the country to supply-chain disruptions, geopolitical pressures, cost escalation and restrictions on access to critical technologies [1]. Wankhede similarly argues that India's indigenisation programme seeks to reduce dependence on foreign arms imports while strengthening domestic research, production and private-sector participation [2].

The scale of the challenge is illustrated by international arms-transfer data. India accounted for 9.8 per cent of global imports of major arms during 2019–23, making it the world's largest importer during that period [16]. However, more recent SIPRI data indicate that India's share declined to 8.3 per cent during 2020–24, when India was the world's second-largest importer of major arms [17]. SIPRI attributes part of the reduction to India's increasing ability to design and produce some weapons domestically, although the country continues to rely on foreign suppliers for important capabilities. (SIPRI)

At the domestic level, the policy environment has changed substantially. Defence Production Policy 2011, Defence Procurement Procedure 2016, Defence Acquisition Procedure 2020, positive indigenisation lists, the SRIJAN portal, Innovations for Defence Excellence (iDEX), Defence India Startup Challenge (DISC), strategic partnerships and defence industrial corridors have collectively attempted to reshape the defence-industrial ecosystem [2, 18–23].

The scale of domestic production has also increased. Government data indicate that defence production reached approximately ₹1.27 lakh crore in FY 2023–24, compared with ₹46,429 crore in FY 2014–15. Defence exports reached ₹21,083 crore in FY 2023–24. (Press Information Bureau) These developments represent important changes in India's defence-industrial landscape. Nevertheless, the literature indicates that production growth should not be interpreted as synonymous with complete technological autonomy.

Kotha et al. identify an enduring technological gap in propulsion, advanced electronics, sensors and other high-value subsystems [10]. The recent capstone study by Srivastava similarly questions whether cost-based indigenous-content measures adequately capture the technological origin of components and intellectual property [14]. The distinction between assembling a system domestically and possessing the technological capability to design, develop, modify and sustain it is therefore central to understanding India's defence self-reliance.

2. Objectives of the Review

The review has five principal objectives:

1. To examine the historical evolution of India's defence-indigenisation efforts.
2. To analyse major policy reforms introduced to promote indigenous defence production.
3. To assess the contribution of DRDO, DPSUs, private companies, MSMEs and start-ups.
4. To identify persistent technological, procurement, legal and institutional challenges.
5. To examine whether current indicators of defence indigenisation adequately measure technological self-reliance and strategic autonomy.

3. Methodology

This article adopts a qualitative narrative-review approach. The principal source base consists of the research papers, policy studies, academic articles, institutional reports and other documents supplied for the review. The literature was organised thematically around six dimensions: historical development, policy reform, defence R&D, industrial participation, technological capability and strategic autonomy.

The uploaded literature includes studies specifically examining India's defence R&D ecosystem [1], defence indigenisation policies [2], defence-sector self-reliance [3,11], legal and institutional challenges to modernisation [5], defence manufacturing [8], technological autarky [10], defence corridors [13], indigenous manufacturing capabilities [12], military modernisation [9], and India's international strategic partnerships [15].

The approach is not a statistical meta-analysis because the reviewed studies differ substantially in methodology, data sources, analytical frameworks and definitions of self-reliance. Instead, the review identifies areas of convergence, disagreement and continuing research gaps.

4. Historical Evolution of India's Defence Indigenisation

4.1 Post-independence foundations

India inherited a relatively limited industrial base at independence. The early defence-industrial strategy relied heavily on state-owned production organisations and government-controlled research institutions. The literature identifies this state-centric model as an important foundation for building an indigenous industrial base, but also associates it with limited competition, bureaucratic control and weaker incentives for innovation [7,9,14].

The experience of the 1962 Sino-Indian War strengthened the perception that dependence on foreign suppliers could create serious strategic vulnerabilities. Subsequent conflicts and security crises reinforced the importance of domestic production, while the 1999 Kargil conflict demonstrated the operational consequences of capability shortages and the need for urgent foreign procurement [7].

The Indian defence-industrial model subsequently developed around organisations such as DRDO, the public-sector defence companies and the ordnance-factory system. This approach enabled India to acquire production capabilities in areas such as aircraft, naval vessels, missiles, electronics, artillery and armoured vehicles. However, it did not always generate equivalent capabilities in basic research, advanced design and high-end technology.

4.2 From import substitution to indigenous design

The evolution of policy can be broadly understood as a transition through three stages.

The first stage emphasised licensed production and import substitution. The objective was primarily to produce foreign-designed systems domestically.

The second stage increasingly emphasised indigenous development and design.

The third stage, associated particularly with recent Atmanirbhar Bharat reforms, seeks to combine indigenous development with private-sector participation, foreign collaboration, technology transfer, exports and integration into global defence value chains [1,2,10].

This distinction is important because domestic manufacturing and technological self-reliance are not identical. A country may manufacture a platform domestically while remaining dependent on foreign engines, sensors, electronic components or specialised materials.

5. Atmanirbhar Bharat and the New Policy Architecture

The Atmanirbhar Bharat framework represents an attempt to integrate industrial policy, procurement reform, R&D, entrepreneurship and defence exports. Wankhede identifies the Defence Production Policy 2011 as an important early step in creating conditions for private participation and strengthening domestic R&D [2]. The subsequent introduction of iDEX and DISC broadened the innovation ecosystem by providing financial and institutional support to start-ups and innovators.

DAP 2020 further strengthened domestic procurement preferences and increased indigenous-content requirements in important procurement categories [2]. Positive Indigenisation Lists subsequently restricted imports of specified items after defined deadlines, while SRIJAN was developed to connect imported components with potential Indian manufacturers.

These initiatives represent a shift from a purely state-led model towards an ecosystem involving:

- DRDO;
- DPSUs;
- private defence companies;
- MSMEs;
- start-ups;
- universities;
- foreign original equipment manufacturers;
- technology partners; and
- defence users.

Yadav describes this as a multi-stakeholder approach involving policy reform, funding, infrastructure, skills and technological partnerships [1].

6. Defence R&D and the Role of DRDO

Defence R&D is arguably the most important determinant of long-term technological self-reliance.

Sharma and Bhushan identify defence R&D as a strategic and industrial driver of India's aerospace and defence transformation [4]. Their analysis emphasises the role of DRDO while also noting the growing importance of collaboration among government laboratories, private companies and academic institutions.

DRDO has contributed to numerous indigenous programmes, including missile systems, electronic systems, radars, aircraft technologies, naval technologies and other defence applications. Its achievements demonstrate that sustained institutional investment can create technological capabilities that did not previously exist.

At the same time, the literature identifies several structural problems. These include:

- long development cycles;
- delays in prototype-to-production transition;
- limited user-industry coordination;
- insufficient private-sector participation in some R&D activities;
- inadequate testing infrastructure;
- weak systems-integration capabilities; and
- limited resources relative to the breadth of technological requirements.

The 2026 literature particularly highlights the distinction between research, prototype development and production. Srivastava argues that DRDO's concentration across multiple stages of the technology-development process can create institutional bottlenecks [14].

Another important issue is R&D intensity. Kotha et al. argue that India's defence R&D expenditure remains insufficient relative to the technological ambitions of the country [10]. Sharma and Bhushan likewise highlight the comparatively limited share of defence R&D expenditure and argue that greater investment is necessary to sustain advanced technology development [4].

The literature therefore suggests that increasing R&D funding is necessary but not sufficient. Institutional structure, research autonomy, testing infrastructure, intellectual-property policy, procurement certainty and user feedback are equally important.

7. Private Sector, MSMEs and Start-ups

One of the most significant developments in recent Indian defence policy has been the increasing involvement of the private sector.

Historically, India's defence production system was dominated by government-owned organisations. Kaur and Mehta identify the growing participation of private firms as an important development in the restructuring of India's defence manufacturing sector [8].

The expansion of private participation can generate several benefits:

1. increased competition;
2. additional investment;
3. specialised engineering capabilities;
4. faster technology absorption;
5. supply-chain diversification;
6. export orientation; and
7. integration with international defence companies.

iDEX and DISC have provided an institutional mechanism for bringing start-ups into defence innovation [2]. Yadav notes the emergence of start-ups in AI, cyber security, robotics, unmanned systems, undersea technologies, communications and other emerging areas [1].

However, participation alone does not guarantee technological independence. Private firms require predictable procurement, testing facilities, access to finance, long-term orders and intellectual-property protection.

The literature therefore points towards a transition from a simple public-versus-private debate towards a more integrated ecosystem in which different organisations perform complementary roles.

8. Defence Industrial Corridors

The creation of defence industrial corridors in Uttar Pradesh and Tamil Nadu represents an important spatial dimension of India's industrialisation strategy.

Harchand, Kushwaha and Kumar argue that defence corridors can facilitate manufacturing, innovation, investment, employment, industry-academia cooperation and technology development [13].

The underlying logic is that geographically concentrated ecosystems can reduce transaction costs and encourage interaction between:

- large defence companies;
- MSMEs;
- start-ups;
- universities;
- testing centres;
- research institutions; and
- foreign investors.

The corridors can therefore function as industrial ecosystems rather than merely as physical manufacturing zones.

However, their long-term effectiveness depends on the availability of specialised infrastructure, skilled personnel, reliable testing facilities, procurement demand and integration with national defence supply chains.

A major research question is therefore whether defence corridors will become integrated technology ecosystems or remain clusters of manufacturing and assembly facilities.

9. Technology Transfer and Foreign Collaboration

India's defence modernisation cannot currently be understood solely through the concept of self-reliance. Foreign partnerships remain important because many critical technologies require substantial financial, scientific and industrial capabilities.

Panda identifies technology transfer, cooperation with original equipment manufacturers, capacity planning, industry modernisation and industry-academia cooperation as important requirements for indigenisation [3].

India's defence partnerships have historically included Russia and increasingly involve the United States, France, Israel and other countries. The literature suggests that the character of these partnerships is changing from straightforward acquisition towards co-development, co-production, maintenance and technology collaboration [10,15].

Swaran Singh conceptualises India's external relationships as a form of networked strategic autonomy in which defence, economic and technological partnerships are diversified across major powers [15].

This suggests that strategic autonomy should not necessarily be interpreted as technological isolation. Instead, it can involve maintaining sufficient domestic capacity and diversified external relationships so that no single foreign supplier becomes indispensable.

10. Legal and Institutional Challenges

Military modernisation is affected not only by technology and finance but also by legal and institutional structures.

Doad identifies procurement procedures, technology-transfer arrangements, intellectual-property rights, sanctions, infrastructure limitations, FDI, land acquisition, bureaucracy and civil-military coordination as significant issues affecting modernisation [5]. The paper also highlights the importance of procurement categories and General Staff Qualitative Requirements in shaping acquisition outcomes.

Procurement is inherently complicated because defence systems are technologically sophisticated, expensive and often developed over long time horizons. Requirements can change during development, while technological advances can make earlier specifications obsolete.

Repeated changes in requirements can contribute to delays and cost escalation. Conversely, rigid specifications can prevent the adoption of new technologies.

The literature therefore indicates the need for a procurement system that is simultaneously:

- operationally responsive;
- technologically informed;
- financially accountable;
- transparent;
- industry-friendly; and
- capable of managing long-term R&D risk.

11. The Indigenisation Measurement Problem

One of the most important findings emerging from the recent literature is that **indigenous content is not equivalent to technological self-reliance**.

Traditional measurements often emphasise the percentage of a system's value sourced domestically. However, a platform may satisfy a domestic-content threshold while still depending on imported engines, sensors, electronics, software or specialised materials.

Srivastava's capstone research identifies this distinction as a major conceptual problem in India's existing assessment framework [14]. The study argues that indigenisation should also consider the origin of design, intellectual property, components and underlying technologies.

This leads to a more comprehensive definition:

Defence self-reliance should be assessed through the country's capacity to design, develop, manufacture, integrate, upgrade, maintain and export critical defence systems without unacceptable external technological dependence.

Under this framework, five dimensions become important:

11.1 Production self-reliance

Can India manufacture the system domestically?

11.2 Design self-reliance

Can Indian organisations independently design and redesign the system?

11.3 Component self-reliance

Can critical subsystems and components be produced domestically?

11.4 Technology self-reliance

Does India possess the underlying intellectual property and technological knowledge?

11.5 Lifecycle self-reliance

Can India maintain, upgrade and modify the system throughout its operational life?

This framework provides a more meaningful measure than production value alone.

12. Indigenous Weapon-System Case Studies

12.1 Tejas

The Light Combat Aircraft Tejas represents both progress and continuing challenges.

The programme demonstrates India's capacity to develop and manufacture a modern combat aircraft, while also illustrating the difficulty of creating an entire aerospace ecosystem. The literature repeatedly identifies propulsion as a major technological constraint [7,10].

Tejas therefore demonstrates that indigenous platform development can progress even when some critical subsystems remain externally dependent.

12.2 Arjun Main Battle Tank

The Arjun programme demonstrates India's capacity to develop an indigenous armoured platform but also illustrates the difficulties associated with prolonged development cycles, changing requirements and user acceptance [7].

The principal lesson is that indigenous development must be closely integrated with user feedback, industrial production and iterative testing.

12.3 Akash

Akash represents a relatively successful example of indigenous missile development. Verma notes that the programme demonstrates the importance of long-term R&D commitment and incremental technological development [7].

12.4 BrahMos

BrahMos illustrates the potential of international collaboration and co-development. Rather than treating foreign collaboration and self-reliance as mutually exclusive, the programme demonstrates how partnerships can contribute to indigenous industrial and technological capability.

12.5 Dhanush and ATAGS

The Dhanush artillery system illustrates technology adaptation and domestic improvement, while ATAGS represents the more recent effort to create indigenous artillery capability [7].

These cases collectively indicate that India's experience is neither one of complete success nor complete failure. Different programmes have produced different outcomes depending on technological complexity, institutional arrangements, user involvement and industrial maturity.

13. Defence Manufacturing and Export Transformation

India's defence production and exports have increased considerably.

Government data report defence production of approximately ₹1.27 lakh crore in FY 2023–24 and defence exports of ₹21,083 crore during the same year. ([Press Information Bureau](#))

More recent government reporting indicates that defence exports reached ₹23,622 crore in FY 2024–25. ([Press Information Bureau](#))

The export trend is significant because an export-oriented defence industry must satisfy international standards of quality, reliability, certification and lifecycle support. Export competition can consequently create incentives for Indian firms to improve product quality.

However, export growth should also be evaluated in terms of product composition. Exporting ammunition, protective equipment or relatively less technologically complex systems is different from exporting complete high-end combat platforms.

The long-term significance of exports will therefore depend on India's ability to move progressively towards higher-value products and systems.

14. Strategic Autonomy and International Partnerships

The literature provides two apparently contrasting perspectives.

One perspective treats foreign dependence as a strategic vulnerability. Yadav, Kotha et al. and other studies emphasise the risks associated with supply disruption, technology denial and geopolitical pressure [1,10].

A second perspective argues that international collaboration can accelerate indigenous technological development. Singh's analysis of India's relations with Russia, the United States and China demonstrates that strategic autonomy increasingly operates through diversified partnerships rather than isolation [15].

These perspectives can be reconciled through the concept of **selective interdependence**.

Under selective interdependence, India can:

- maintain domestic control over strategically critical technologies;
- diversify suppliers;
- develop domestic maintenance and upgrade capabilities;
- negotiate meaningful technology transfer;
- use international partnerships for accelerated capability development; and
- gradually replace external dependence where economically and technologically feasible.

Thus, strategic autonomy should not be equated with complete autarky.

15. Major Persistent Challenges

The literature identifies several recurring challenges.

15.1 Propulsion technology

Jet engines remain among the most difficult technologies for India. Dependence on foreign propulsion affects aircraft development and limits complete technological autonomy [10].

15.2 Advanced electronics and sensors

Modern military systems depend heavily on microelectronics, sensors, radars and electronic warfare technologies. These areas require sustained investment and specialised industrial ecosystems.

15.3 Systems integration

Developing individual components is insufficient. Modern military capability depends on integrating sensors, communications, weapons, software, data networks and command systems.

15.4 Testing infrastructure

Indigenous developers require access to high-quality testing and certification infrastructure. Without it, development cycles can become longer and more expensive.

15.5 Procurement delays

Long procurement timelines can discourage private investment and reduce the commercial attractiveness of defence R&D.

15.6 Limited R&D intensity

Several studies identify insufficient defence R&D investment as a structural constraint [4,10,14].

15.7 Skill shortages

Advanced defence technologies require specialised expertise in aerospace, materials science, electronics, AI, cyber security, propulsion and systems

engineering.

15.8 Fragmentation

The defence ecosystem involves multiple organisations with different objectives and institutional cultures. Better coordination among users, researchers, manufacturers and policymakers remains necessary.

15.9 Dependence on imported components

Even when final assembly takes place in India, imported components can remain critical. This creates a distinction between manufacturing localisation and technological localisation.

15.10 Export competitiveness

Indian defence products must compete internationally on quality, price, delivery timelines, certification, financing and after-sales support.

16. Discussion

The reviewed literature reveals three broad phases in India's defence-industrial development.

Phase I: Import dependence and licensed production

The principal objective was to secure immediate military capability and create basic industrial capacity.

Phase II: Indigenous production and public-sector dominance

The state expanded DRDO, DPSUs and production infrastructure while promoting domestic development.

Phase III: Ecosystem-based indigenisation

The current model combines public-sector capabilities with private industry, start-ups, MSMEs, foreign partnerships, defence corridors and export promotion.

The third phase represents a significant institutional change. Nevertheless, the literature indicates that the transformation remains incomplete.

The most important conceptual finding is that **quantity and technological depth are different dimensions of self-reliance**.

A country can produce increasing quantities of defence equipment while continuing to depend on foreign technologies in strategically important subsystems. Therefore, future assessments should combine production indicators with technology indicators.

A useful assessment matrix would include:

Dimension	Possible indicator
Domestic production	Value of defence production
Import dependence	Share/value of major defence imports
Design capability	Percentage of systems based on indigenous design
Component capability	Indigenous share of critical subsystems
R&D	Defence R&D expenditure and outputs
Intellectual property	Indigenous patents and technology ownership
Systems integration	Domestic integration of major platforms
Lifecycle capability	Indigenous maintenance and upgrade capacity
Exports	Export value and technological composition
Industrial depth	Number and capability of Tier-1/Tier-2 suppliers
Innovation	Start-ups, prototypes and technology transitions
Strategic resilience	Diversification of external dependencies

Such an approach would allow policymakers and researchers to distinguish between **manufacturing self-reliance** and **technological self-reliance**.

17. Future Research Directions

The literature leaves several areas open for further research.

First, there is a need for component-level mapping of India's defence supply chains. Existing aggregate indicators do not fully reveal dependencies in engines, electronics, sensors and specialised materials.

Second, more empirical work is required on the performance of defence corridors. Their effectiveness should be evaluated through measurable indicators such as investment, employment, R&D activity, technology transfer, production and exports.

Third, future research should examine the relationship between procurement certainty and private-sector R&D investment.

Fourth, comparative studies could examine India alongside countries such as South Korea, Israel, China and Turkey to understand how different institutional models have produced defence-industrial capabilities.

Fifth, greater attention should be given to intellectual property and technology absorption. Technology transfer agreements should be assessed not simply according to whether equipment is manufactured domestically but according to whether Indian organisations acquire the ability to modify and independently develop the underlying technology.

Finally, research should examine emerging technologies such as artificial intelligence, autonomous systems, quantum technologies, cyber capabilities, hypersonic systems, directed-energy weapons and advanced materials.

18. Policy Implications

The review suggests several broad policy priorities.

18.1 Move from platform indigenisation to technology indigenisation

Policy should identify strategically critical technologies and components rather than focusing exclusively on complete platforms.

18.2 Strengthen R&D

Greater and more stable R&D funding is necessary, but institutional reform should accompany financial expansion.

18.3 Improve user-industry-researcher interaction

Armed forces, DRDO, academia and industry should participate in iterative development from the beginning of major programmes.

18.4 Improve procurement predictability

Long-term procurement commitments can reduce investment uncertainty for private companies and MSMEs.

18.5 Expand testing infrastructure

Shared national testing facilities could reduce entry barriers for smaller companies.

18.6 Build deeper supply chains

MSMEs should be integrated into structured Tier-1 and Tier-2 supply chains rather than treated merely as independent vendors.

18.7 Strengthen technology-transfer arrangements

Foreign partnerships should emphasise absorption, engineering knowledge, intellectual property and domestic design capability.

18.8 Develop export-oriented production

Indian defence companies need support not only for production but also certification, marketing, financing, maintenance and international regulatory compliance.

18.9 Create better self-reliance indicators

The government and researchers should distinguish domestic production from domestic technology ownership.

19. Conclusion

India's defence-indigenisation programme has entered a new phase characterised by increased domestic production, expanding exports, greater private-sector participation, defence start-ups, industrial corridors and a stronger policy emphasis on indigenous R&D. The literature reviewed in this article indicates that these developments represent a substantial transformation of India's defence-industrial ecosystem.

At the same time, the evidence does not support equating rising domestic production with complete technological self-reliance. Significant challenges remain in propulsion, advanced electronics, sensors, electronic warfare, systems integration, specialised materials, testing infrastructure and high-end R&D. The continued dependence on foreign technologies in critical subsystems demonstrates the difference between manufacturing localisation and technological autonomy.

The central challenge for India is therefore not simply to manufacture more defence equipment domestically, but to deepen the technological foundations of the defence-industrial system. This requires indigenous design capabilities, stronger research institutions, private-sector participation, skilled human resources, reliable testing infrastructure, effective procurement mechanisms and long-term investment in critical technologies.

The reviewed literature also indicates that strategic autonomy does not necessarily require technological isolation. Foreign partnerships, technology collaborations and co-development can contribute to indigenous capability when they are accompanied by effective technology absorption and domestic capacity-building.

Consequently, India's future defence-industrial strategy may be understood as a transition from **“Make in India” towards “Design, Develop, Integrate and Sustain in India.”** The ultimate measure of self-reliance should therefore be India's ability to independently design, produce, integrate, maintain and upgrade critical military capabilities while retaining the flexibility to use international partnerships where they provide technological or operational advantages.

The transformation is consequently best understood as an ongoing process rather than a completed outcome. India's defence-industrial progress is substantial, but deeper technological autonomy will depend on whether policy reforms can translate production growth into sustained innovation, technological ownership and resilient domestic supply chains.

REFERENCES

1. Yadav, A. (2024). *Strengthening Indigenous Capabilities: Analysis of India's Defence R&D Ecosystem*. Journal of Defence Studies, 18(4), 83–114.
2. Wankhede, R. (2024). *India's Defence Indigenisation Programme: Opportunities and Challenges*. Journal of Defence Studies, 18(4), 316–326.
3. Panda, A. K. (2021). *Atmanirbhar Bharat: Indigenization for Defence Forces*. Military College of Electronics and Mechanical Engineering, Secunderabad.
4. Sharma, S. K., & Bhushan, G. (2026). *Transforming the Indian Aerospace and Defence Industry by Leveraging Defence R&D*. Defence Science Journal, 76(5), 752–760. <https://doi.org/10.14429/dsj.21822>.
5. Doad, A. S. (2024). *Explore the Legal Challenges Associated with Military Modernization in India*. International Journal for Multidisciplinary Research, Review and Studies, 1(2).
6. Tarapore, A. (2026). *Tactical Successes and Strategic Challenges in Indian Defense Policy*. In *Annual Survey of India 2026*, Hoover Institution.
7. Verma, P. K. (2025). *Indigenization of Weapon Systems: Challenges and Achievements in India's Defence Industry*. International Journal of All Research Education and Scientific Methods, 13(9).
8. Kaur, T., & Mehta, S. (2024). *Indian Defence Manufacturing Industry: Import Substitution, Self-Reliance and Public Policy*. International Journal of Contemporary Research in Multidisciplinary, 3(5), 82–96.
9. Kumar, M. (2026). *Atmanirbhar Bharat and Military Modernisation: Assessing India's Defence Industrial Reforms*. International Journal of Social Science Research, 3(3).
10. Kotha, V., Vaddadi, K., Midhun, P., Bommena, N., & Sachdeva, M. (2025). *India's Defence Modernization and the Pursuit of Technological Autarky: Policy Reforms, Persistent Gaps, and Strategic Pathways*. International Journal of Advanced Research and Interdisciplinary Scientific Endeavours, 3(3). <https://doi.org/10.61359/11.2206-2547>.
11. Sahoo, P. (2023). *India's Self-Reliance in Defence: Three Parameters of Assessment*. World Focus.
12. *Assessment of India's Indigenous Defence Manufacturing Capabilities*. (2025). Research/policy study on indigenous defence manufacturing and strategic autonomy.
13. Harchand, R., Kushwaha, A., & Kumar, R. R. (2024). *The Role of Defence Corridors in Strengthening India's Defence Production*. International Journal of Interdisciplinary Cultural Studies, 19(2), 265–277.
14. Srivastava, A. (2026). *Understanding Indigenisation in India's Defence Manufacturing Ecosystem*. Capstone Project, Kautilya School of Public Policy, GITAM.
15. Singh, S. (2026). *India and the Superpowers: From Bilateral Anchors to Networked Strategic Autonomy to Viksit Bharat*. Revista UNISCI/UNISCI Journal, 70–71, 131 onward. <https://doi.org/10.31439/UNISCI-257>.
16. Wezeman, P. D., Djokic, K., George, M., Hussain, Z., & Wezeman, S. T. (2024). *Trends in International Arms Transfers, 2023*. Stockholm International Peace Research Institute.
17. Wezeman, P. D., et al. (2025). *Trends in International Arms Transfers, 2024*. Stockholm International Peace Research Institute.
18. Government of India, Ministry of Defence. (2011). *Defence Production Policy 2011*. New Delhi: Ministry of Defence.
19. Government of India, Ministry of Defence. (2016). *Defence Procurement Procedure 2016*. New Delhi: Ministry of Defence.
20. Government of India, Ministry of Defence. (2020). *Defence Acquisition Procedure 2020*. New Delhi: Ministry of Defence.
21. Government of India, Ministry of Defence. (2020). *Defence Production and Export Promotion Policy 2020*. New Delhi: Ministry of Defence.
22. Government of India, Ministry of Defence. *Positive Indigenisation Lists*. Department of Defence Production.
23. Government of India, Ministry of Defence. *SRIJAN Portal and Indigenisation Initiative*. Department of Defence Production.
24. Government of India, Ministry of Defence. *Innovations for Defence Excellence (iDEX)*. Department of Defence Production.
25. Government of India, Ministry of Defence. (2023). *Annual Report 2022–23*. New Delhi: Ministry of Defence.
26. Government of India, Ministry of Defence. (2024). *Annual Defence Production and Export Data, FY 2023–24*. Department of Defence Production.
27. Press Information Bureau. (2024). *Annual Defence Production Hits Record High of Approximately ₹1.27 Lakh Crore in Financial Year 2023–24*. Government of India.
28. Press Information Bureau. (2024). *Defence Exports Touch Record ₹21,083 Crore in FY 2023–24*. Government of India.
29. Press Information Bureau. (2025). *Make in India Powers Defence Growth: Production Hits ₹1.27 Lakh Crore in FY 2023–24*. Government

of India.

30. Press Information Bureau. (2025). *Defence Atmanirbharta: Record Production and Exports*. Government of India.
31. Basrur, R. M., Das, A. K., & Pardesi, M. S. (2014). *India's Military Modernization: Challenges and Prospects*. Oxford University Press.
32. Pardesi, M. S., & Matthews, R. (2007). India's tortuous road to defence-industrial self-reliance. *Defence & Security Analysis*, 23(4), 419–438. <https://doi.org/10.1080/14751790701752451>.
33. Bitzinger, R. A. (2015). Comparing defence industry reforms in China and India. *Asian Politics & Policy*, 7(4), 531–553. <https://doi.org/10.1111/aspp.12221>.
34. Bitzinger, R. A. (2017). *Defence Industries in Asia and the Technonationalist Impulse*. Strategic Studies/Asian defence-industry literature.
35. Cheung, T. M. (2009). Dragon on the horizon: China's defence industrial renaissance. *Journal of Strategic Studies*, 32(1), 29–66. <https://doi.org/10.1080/01402390802407418>.
36. Medeiros, E. S., Cliff, R., Crane, K., & Mulvenon, J. C. (2005). *A New Direction for China's Defense Industry*. RAND Corporation.
37. Grimmett, R. F. (2006). *Conventional Arms Transfers to Developing Nations, 1998–2005*. Congressional Research Service.
38. Behera, L. K. (2015). *Indian Defence Industry: Issues of Self-Reliance*. Institute for Defence Studies and Analyses/defence-industrial policy literature.
39. Bhushan, G., & Madhusudan, M. (2019). Studies on defence R&D, institutional structures and technology development in India.
40. Chakravarty, A. A., & Roy, G. S. (2024). From imports to exports: Analysing India's defence-sector evolution and Atmanirbharta, 2014–2024. *Journal of Defence and Strategic Studies*, 8(1), 54–68.
41. Kumar, S., & Ganguly, A. N. (2024). Military modernisation and India's security challenges post-2020. *International Research Journal of Humanities and Interdisciplinary Studies*, 5(3), 307–321.
42. Maj Vivek. (2022). Capacity development and challenges in capability building and retention in the Indian armed forces. *AIMT Journal of Management*, 10(1–2), 39–46.
43. Kelkar Committee. (2005). *Report of the Committee on Private Sector Participation in Defence Production and Defence Procurement*. Government of India.
44. Prof. K. Vijay Raghavan Committee. Recommendations on strengthening defence research and development in India. Government of India.
45. Ministry of Defence, Government of India. (2021). *Reforms in Defence Sector: Propelling Private Sector Participation, 2014–2021*. New Delhi: Ministry of Defence.