DEFENSE AND AEROSPACE INDUSTRY PROGRAM

MAR 2025

FORGING A NEW FRONTIER

India's Advances in Ammunition, Artillery, and Small Arms Manufacturing

CSDR

Recommended citation:
CSDR (2025). Forging a New Frontier: India's Emergence as a Global Leader in Ammunition, Artillery, and Small Arms Manufacturing. New Delhi: Council for Strategic and Defense Research.

The Council for Strategic and Defense Research (CSDR) does not take institutional positions on any issues.

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ABOUT THIS REPORT

This report examines India's defense industry transformation from major importer to emerging exporter, with exports surging from $83 million in 2013-14 to $2.63 billion in 2023-24 and a target of $4.22 billion by 2025. The growth stems from strategic policies including the Aatmanirbhar Bharat initiative, defense corridors in Uttar Pradesh and Tamil Nadu, and positive indigenization lists. Three sectors showcase India's progress: artillery systems (K9 Vajra-T, Bharat-52, ATAGS) with exports to Armenia and Saudi Arabia; small arms production through the AK-203 joint venture with Russia and indigenous Ugram U-51 rifle; and ammunition manufacturing expansion by Munitions India Limited and Adani Defence, with export orders valued at $724.64 million over three years. The report acknowledges challenges including competition from established exporters, balancing domestic requirements with export commitments, and intellectual property concerns, while outlining strategies for India to become a reliable global provider of advanced defense systems.

ABOUT CSDR'S DEFENSE AND AEROSPACE INDUSTRY PROGRAM

CSDR's Defense and Aerospace Industry Program combines research, policy analysis, and consulting for government and industry stakeholders. We advise government entities on defense manufacturing policies, collaborate with Armed Forces on technology impact assessments, and develop procurement strategies aligned with emerging warfighting doctrines. For public and private firms, we provide market entry strategies, export promotion services, and risk assessments. As India's defense industry transforms through increased FDI limits, foreign partnerships, and public sector corporatization, our program facilitates the nation's emergence as a significant player in the global arms market.

ABOUT COUNCIL FOR STRATEGIC AND DEFENSE RESEARCH

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

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Executive Summary

- India's defense industry has transformed dramatically over the past decade. It has shifted from being primarily an arms importer to a flourishing exporter with a global reach. Defense exports have surged from approximately USD 83 million in FY 2013-14 to USD 2.63 billion in FY 2023-24, with an ambitious target of USD 4.22 billion by 2025.

- This remarkable growth has been spurred by strategic policy initiatives, including the Aatmanirbhar Bharat (Self-Reliant India) program, Positive Indigenisation Lists, and the establishment of defense industrial corridors in Uttar Pradesh and Tamil Nadu. The Defense Research and Development Organization (DRDO) has facilitated this transformation by providing businesses with newly developed technologies at no cost and granting them free access to DRDO patents.

- The artillery sector exemplifies India's indigenous innovation capabilities. Systems such as the K9 Vajra-T self-propelled howitzer, the Bharat-52 towed howitzer, and the Advanced Towed Artillery Gun System (ATAGS) have gained both domestic and international recognition. Armenia has acquired ATAGS units, while Saudi Arabia has placed substantial ammunition orders worth USD 225 million, demonstrating India's capacity to meet global defense needs.

- India's small arms industry has made significant progress. The AK-203 assault rifle, developed through a joint venture between India and Russia, along with the indigenous Ugram U-51 rifle, demonstrates domestic manufacturing capabilities. These advancements position India to compete in international markets, especially in regions like Africa where the demand for small arms is substantial.

- The ammunition sector has emerged as a key growth catalyst. Companies like Adani Defence and Munitions India Limited have ramped up production to meet both domestic and global demands. Munitions India Limited has secured export orders valued at USD 724.64 million to be supplied over the next three years, underscoring India's expanding influence in international markets.

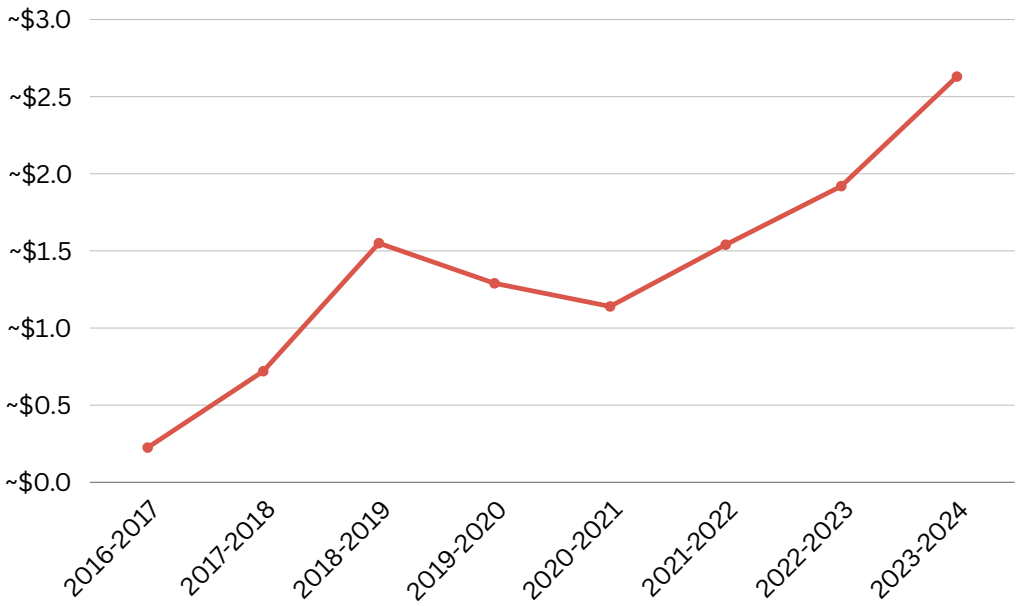
- India now exports defense equipment to more than 90 countries, with the private sector accounting for about 60% of these exports. Despite these advancements, challenges persist, such as competition from established exporters like the US and China, balancing domestic requirements with export commitments, and safeguarding intellectual property rights.

- The path forward demands ongoing innovation, improved manufacturing capabilities, strategic marketing through diplomatic channels, and the maintenance of ethical standards in defense trade. With sustained policy support and targeted investment, India is positioning itself as a dependable global provider of advanced defense systems. This will contribute to national security and global stability while fostering a robust ecosystem for indigenous defense manufacturing.

Introduction

India's defense ecosystem has significantly evolved over the past decades, adapting to various historical, geopolitical, and technological changes. Despite being one of the largest importers of defense equipment, New Delhi has effectively carved out a niche in the global weapons market. Its defense exports have soared dramatically from approximately USD 83 million in FY 2013-14 to around USD 2.63 billion in FY 2023-24, reflecting phenomenal growth of over 30 times in the past decade.[1] The Indian government has set an ambitious target of achieving approximately USD 4.23 billion in defense exports by 2025.[2]

The Vajpayee government initially championed this change, marking the beginning of India's arms exports to allied nations. The Modi government further advanced the initiative by introducing self-reliance in defense, based on the Aatmanirbhar Bharat (Self-Reliant India) policy.[3] These efforts underscore India's commitment to indigenization and export goals, aiming to reduce reliance on foreign suppliers and establish a robust domestic manufacturing framework. The defense sector has become a cornerstone of this initiative, fostering innovation, economic growth, and job creation.



India's defesne exports in USD Billion

The ammunition, artillery, and small arms industries are crucial in this transition. These sectors are vital for strengthening national security and act as tools for enhancing India's regional and global influence. The production and export of small arms and artillery systems showcase India's capability to protect its national security and its readiness to compete with established players in the global arms market. These components are essential for ensuring the armed forces are adequately equipped to tackle conventional and unconventional threats. Beyond their tactical significance, these military elements are strategically crucial for India's geopolitical ambitions.

India's robust defense production capabilities have significantly bolstered its defense exports in recent years. The Department of Defence Production (DDP) has set ambitious targets to enhance domestic manufacturing and export of defense equipment. The DDP aims for USD $36 billion in defense production by 2029 and USD 6 billion in defense exports by 2029.[4]

As of February 24, 2025, defense exports have reached USD 2.3 billion,[5] indicating substantial progress toward the annual goal. This growth is further supported by strategic investments in defense corridors, such as the Uttar Pradesh Defense Corridor, which has attracted USD $3.78 billion in investments, with USD $469.64 million already invested.[6] These initiatives underscore India's commitment to strengthening its defense manufacturing base, thereby enhancing its competitiveness in the global arms market.

Year	Old Defence PSUs	New Defence PSUs	Other PSUs/JVs	Private Companies	Total Production
2016-2017	0.48 bn	0.18 bn	0.06 bn	0.17 bn	0.88 bn
2017-2018	0.52 bn	0.17 bn	0.06 bn	0.18 bn	0.93 bn
2018-2019	0.54 bn	0.15 bn	0.07 bn	0.21 bn	0.97 bn
2019-2020	0.57 bn	0.15 bn	0.08 bn	0.19 bn	0.94 bn
2020-2021	0.53 bn	0.17 bn	0.08 bn	0.21 bn	1.01 bn
2021-2022	0.67 bn	0.14 bn	0.09 bn	0.23 bn	1.09 bn
2022-2023	0.76 bn	0.20 bn	0.09 bn	0.25 bn	1.30 bn
2023-2024	0.89 bn	0.23 bn	0.08 bn	0.32 bn	1.52 bn
2024-2025	0.36 bn	0.10 bn	0.05 bn	0.16 bn	0.67 bn

Summation of annual sales turnover as reported by companies

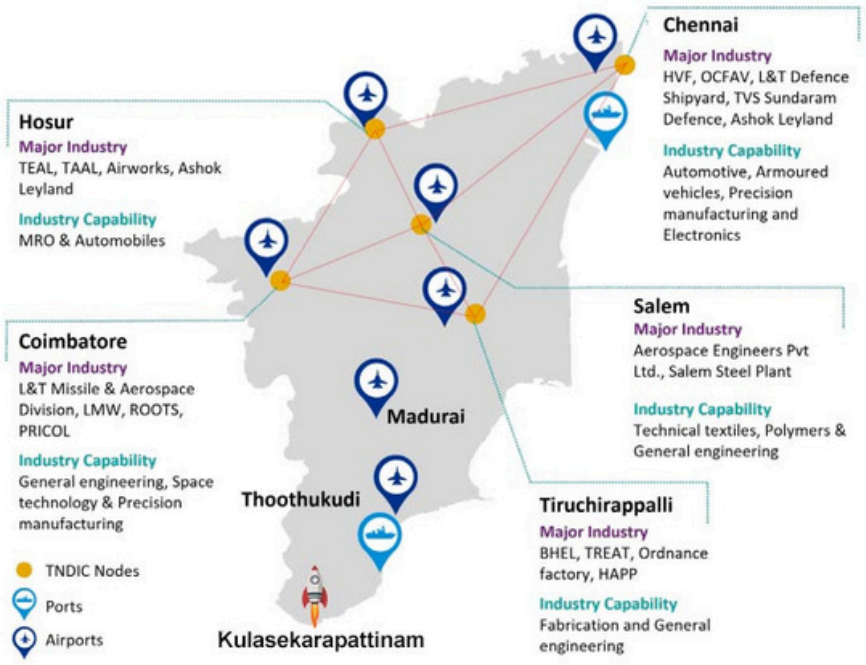
Comprehensive policy reforms have bolstered India’s growing capabilities in defense manufacturing. Positive indigenization lists, defense corridors, and access to advanced technologies have further accelerated progress. The Defence Research and Development Organization (DRDO) consistently provides businesses with newly developed technologies at no cost and grants free access to DRDO patents, thereby supporting the defense sector.[7]

Policy Enablers

These developments have not occurred in isolation. The DRDO, along with favorable government policies, has played a pivotal role in nurturing the entrepreneurial environment. For instance, establishing military-industrial corridors in Uttar Pradesh and Tamil Nadu has created a robust military-industrial ecosystem by facilitating collaboration between the public and private sectors.

A typical Defence Industrial Corridor encompasses Advanced Manufacturing Units, Research and Development Centers, Testing and Evaluation Facilities, Training Institutes, and Robust Infrastructure. Companies establishing operations within these corridors are poised to reap several advantages, such as financial incentives, streamlined regulatory processes, and a collaborative ecosystem that fosters synergy among enterprises, research institutions, and government bodies, promoting innovation and efficiency.

Tamil Nadu Defense Industrial Corridor [8]



In line with this, the DRDO has set up the Technology Development Fund (TDF), which provides financial support to the Indian industry in designing and developing innovative defense products. In June 2023, the DRDO identified 75 priority technological areas to promote defense R&D within the industry, signaling a deliberate shift toward greater participation from the private sector.

The list identified by the DRDO is further divided into 403 technological categories, which further spread out to 1,295 current and future technology development tasks. The technology priority areas, as listed in DRDO Technology Foresight 2023, are as follows:

1	Additive Manufacturing	17	CBRN Defence
2	Aero Structures	18	Communication
3	Aerodynamics	19	Control Systems
4	Aeromechanical Systems	20	Counter Swarm Technology
5	Airborne Sensors & Military Support in High Altitude Area	21	Cyber Information & Communication Security
6	AI/ML Technology	22	Drives
7	Alternative Power Plant	23	Intelligent Mechanisms
8	Armament	24	Diesel Engine
9	Armoured & Combat Vehicles	25	Directed Energy
10	Autonomous Systems and Robotics	26	Electric Power Technology
11	Behavioral Analysis for Personnel	27	Electro-optics
12	Big Data Analytics	28	Electronic Devices
13	Bio-remediation	29	Electronic Warfare
14	Biotechnology Engineering & Technologies	30	EM Rail Gun
15	Bridge Technologies	31	Embedded Systems
16	Camouflage Technology	32	Energy

33	Environment Protection	55	Propulsion Technologies
34	Environmental Testing	56	Protective Clothing & Equipment
35	Explosive Warfare	57	Quantum Technologies
36	Guidance and Navigation	58	RADAR Technologies
37	Guided Artillery	59	Radome Technologies
38	Gun Technology	60	Respiratory Development
39	Hardware-in Loop	61	Seeker Technologies
40	High Performance Computing	62	Sensors/Detectors
41	Hydro Structures	63	Signal Processing
42	Hypersonic Technology	64	Sonar Technologies
43	Life Sciences	65	Space Structural Analysis
44	Materials	66	Space Technologies
45	Military Food Technology	67	Surveillance and Tracking
46	Mines & Mines Detection	68	Stealth Technology
47	Missile Systems	69	Terahertz
48	Multi-Barrel Rockets	70	UAV
49	Nutrition/Ammunition	71	Underwater Defence Technologies
50	Natural Hazard Management	72	Warfighting
51	Non-destructive Evaluation	73	Warhead/Payloads
52	Ocean Profiling	74	Ballistic Protection
53	Parachute Technology	75	Waste Management
54	Passive Countermeasures		

Source DRDO [9]

Despite significant advancements in unconventional technologies and advanced weapon systems, conventional artillery gun systems remain essential for modern armies. They play a vital role in both offensive and defensive operations, delivering sustained firepower, area suppression, and battlefield dominance. Their reliability and versatility make them a key element of military strategy, even in the era of emerging warfare technologies.

Artillery Systems: A Showcase of Indigenous Innovation

The artillery gun remains one of the most effective and reliable weapon systems for neutralizing targets, particularly due to its ability to sustain fire over extended periods. This has been evident in recent conflicts, such as the Russia-Ukraine war,[8] where heavy artillery has played a decisive role in shaping battlefield outcomes. The war has reinforced the importance of long-range firepower in modern warfare, with both sides relying heavily on artillery for area denial, counter-battery operations, and strategic bombardment. Similarly, past conflicts like those in Syria and Nagorno-Karabakhhave demonstrated that despite advancements in precision-guided munitions,[9] conventional artillery remains a dominant force on the battlefield.

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sides relying heavily on artillery for area denial, counter-battery operations, and strategic bombardment. Similarly, past conflicts like those in Syria and Nagorno-Karabakh[11] have demonstrated that despite advancements in precision-guided munitions, conventional artillery remains a dominant force on the battlefield.

The history of Indian artillery begins with the acquisition of 410 pieces of 39-caliber 155mm FH-77B howitzers from Sweden's AB Bofors in 1987.[12] This deal was soon overshadowed by corruption allegations,[13] hindering the modernization of the Indian military through significant foreign acquisitions. It was not until 2014 [14] that Dhanush, the Indian variant of the Swedish howitzers manufactured by the Ordnance Factory Board (OFB), began trials, marking a domestic effort to upgrade existing platforms. The initiative was later adopted by private firms such as Larsen & Toubro (L&T), Kalyani Group, and others, which developed major platforms like ATAGS, B-52, and ULH.

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- **K9 Vajra-T 155mm/52 caliber self-propelled howitzer:** Co-developed by Larsen & Toubro and Hanwha Aerospace, and based on the South Korean K9 Thunder, it was introduced when the Indian Army faced an urgent need for self-propelled howitzers in its desert formations, where it can keep pace with mechanized units.[15] It provides exceptional mobility, equipped with a 1,000-horsepower engine. These attributes establish the K9 Vajra-T as a powerful artillery system in India's arsenal and as an appealing choice for countries looking for advanced, reliable, and versatile self-propelled howitzers.

- **Bharat 52 155mm/52 Caliber Towed Howitzer:** The Bharat-52 gun is a 155mm, 52 caliber towed howitzer manufactured by Bharat Forge, a subsidiary of the Kalyani Group, designed and developed entirely in India. Weighing less than 15 tons, the Bharat-52 is engineered for superior maneuverability across diverse terrains. It can be towed at speeds of up to 80 km/h and converted to a self-propelled mode at 21 km/h, enabling rapid deployment and repositioning, making it operable in all environments. The automatic load assist system enhances firing frequency, reducing the need for additional manpower. Notably, two Bharat-52 units were dispatched to Saudi Arabia in 2020 for testing by the Royal Saudi Army. In November 2022, it secured an order worth USD 155.50 million from an unspecified country. The Bharat Forge press release states that this country is in a non-conflict zone.[16] Experts speculate that it may be Saudi Arabia, given its prior testing of the platform.[17]

- **The Advanced Towed Artillery Gun System (ATAGS)** is a towed 155 mm/52 caliber howitzer being developed for the Indian Army by the DRDO's Armament Research and Development Establishment (ARDE) laboratory, Tata Advanced Systems (TASL), and Kalyani Strategic Systems (KSSL). With a range of nearly 48 km and a charge 7 ammunition, it surpasses many NATO-standard artillery pieces. This impressive range is further enhanced by its ability to fire five rounds per minute in burst mode, thanks to an efficient automatic ammunition handling system. Its all-electric drive system exceeds conventional hydraulic systems in terms of reliability and durability. The howitzer is designed for rapid deployment, featuring a "shoot and scoot" capability that allows it to swiftly relocate after firing, thus minimizing vulnerability to counter-battery fire. ATAGS has attracted global attention, with Armenia becoming its first export customer.[18] In 2023, Armenia purchased 84 units, of which six have been delivered, demonstrating ATAGS' competitiveness in the global artillery market.[19]

- **Dhanush 155 mm/45 caliber towed howitzer:** Manufactured by the Ordnance Factory Board (OFB), the Dhanush howitzer represents a significant advancement in India's indigenous artillery capability, building on the design of the Swedish Bofors FH-77B howitzer. Advanced Weapons and Equipment India Limited, created following the corporatization of the Ordnance Factory Board, now produces the Dhanush guns. The gun received service approval in 2019 and has since been inducted into the Indian Army.[20] The OFB launched the Dhanush project to replace the older 105 mm Indian Field Gun, 105 mm Light Field Gun, and the Russian 122 mm guns with a modern 155 mm artillery piece. The Dhanush Howitzer has garnered interest from various countries due to its innovative features and cost-effectiveness. Its successful induction into the Indian Army and performance in diverse terrains has demonstrated its reliability, making it an attractive option for nations looking to enhance their artillery capabilities.

Export Success and Global Demand

India's indigenous artillery systems have attracted significant global attention, leading to notable export successes. In particular, Saudi Arabia has placed a substantial order for 155mm artillery ammunition from Munitions India Limited (MIL) for USD 225 million.[21] Armenia has also emerged as a key buyer,[22] acquiring the Indo-French Trajan 155mm towed artillery gun system for its armed forces. This development underscores Armenia's confidence in India's defense industrial capabilities. The UAE previously procured large quantities of 155mm artillery ammunition from India, placing orders for 40,000 rounds in

Equipment	Company	Value of exports
Bharat 52 155mm/52 Caliber Towed Howitzer	Bharat Forge	155.5 million USD
Advanced Towed Artillery Gun System (ATAGS) 155mm	DRDO	155 million USD
Trajan 155 mm towed artillery	L&T- KNDS	106 million USD (projection)

2017 and 50,000 rounds in 2019.[23] Furthermore, India's defense exports have reached over 90 countries, [24] with Armenia, France, and the United States as the primary beneficiaries. Among the sophisticated defense equipment in the export portfolio are artillery guns, radar systems, and other equipment.

Artillery Systems: A Showcase of Indigenous Innovation

India's military paradox is striking. It is ranked fourth globally in military strength,[25] with advanced space and nuclear capabilities, yet has historically struggled with basic small arms production. While its defense procurement processes have historically been fragmented, recent reforms signal a shift toward more streamlined military manufacturing.

India had been equipping its infantry with foreign Original Equipment Manufacturer (OEM) firearms. In 1998, it began procuring domestically manufactured Indian Small Arms System (INSAS) rifles, developed by DRDO and produced by OFB. The following year, during the Kargil War, the rifles were tested in live combat, and they fell short of expectations. Several problems emerged, including jamming, stoppages, and the cracking of rifle barrels, which continued even during counter-insurgency operations.[26] Since then, India has embarked on a mission to manufacture several locally produced rifles.

- **AK-203 Assault Rifle:** Due to delays and shortcomings of the INSAS rifles, the Army turned to Kalashnikov rifles acquired from the Soviet Union, Hungary, Romania, and Israel during the 1990s as a temporary solution.[27] However, this was clearly not a viable strategy. To address the Indian Army's persistent challenges with rifles and modernize its military capabilities, a joint venture (JV) between India's Advanced Weapons and Equipment India Limited (AWEIL) and Russia's Rosoboronexport led to the formation of Indo-Russian Rifles Private Limited (IRRPL) in Uttar Pradesh. This JV produces the AK-203, a modified version of the AK-47 specifically designed to meet the needs of the Indian Army. The AK-203 is chambered in 7.62x39mm, enhancing accuracy, durability, and ease of maintenance. In December 2021, a contract worth USD 604.83 million was signed between the Ministry of Defence and IRRPL for 601,427 assault rifles.[28] Subsequently, in late 2024, a batch of 35,000 Kalashnikov assault rifles was delivered to the Indian Army.[29]

- **Ugram U-51 Assault Rifle:** Dvipa Armour India Pvt Ltd has developed the Ugram, a 7.62x51mm caliber assault rifle that weighs under 4 kg. The weapon measures 960 mm when folded and nearly 1,000 mm when extended. It features a 20-round magazine and can fire in both single-shot and continuous-burst modes. While the company is currently focused on addressing India's defense needs, its export potential is still to be determined. The Ugram was developed in an impressive 100 days using specifications provided by DRDO's Armament Research and Development Establishment (ARDE). Dvipa Armour is also working on additional prototypes for extensive testing in various climates.

- **SIG Sauer 716:** Initially procured to meet urgent operational needs, India signed contracts for approximately 72,000 SIG Sauer rifles to enhance its existing capabilities, addressing delays in domestic production. The SIG-716 is a 7.62×51 mm caliber assault rifle, weighing around 4 kg, with slight variations depending on configuration. In November 2024, SIG Sauer announced a joint venture with Nibe Defence and Aerospace Limited to advance small arms and ammunition manufacturing in India.[30] It offers a longer effective range compared to the INSAS rifles previously used by the Indian Army.

Export Success and Global Demand

India is currently prioritizing the modernization of its military capabilities through foreign collaborations and innovations in small arms. Its aim is to establish a dominant small arms industry in the global defense market by investing in research and development, fostering public-private partnerships, and adhering to international standards.

The demand for defense equipment, technology, and services is expected to rise, leading to orders valued at $138 billion for India's defense sector between FY24 and FY32.[31] According to the "India Defence" report by Nomura, this presents significant opportunities for companies involved in technology development and defense production.[32] They can actively expand their presence in international markets, particularly in Africa, the Middle East, and Asia. In Africa, nations do not require heavy weaponry, as their primary challenges involve civil strife and terrorism rather than the large-scale conflicts currently occurring in Gaza or Ukraine. According to SIPRI, Africa accounted for 4.3% of global arms imports from 2018 to 2023.[33] Consequently, Africa represents a lucrative market for the sale of advanced assault rifles and other small arms, including ammunition.

Moreover, India's competitiveness in the global small arms market needs improvement by addressing several challenges and policy shortcomings, despite the progress achieved thus far. The first element is reliability and quality. These core issues can be tackled by implementing strict quality control measures, adopting best manufacturing practices, and maintaining continuous feedback loops with end-users to foster improvement.

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Additionally, it is crucial to establish and sustain trust with international clients through comprehensive after-sales support, which encompasses the availability of spare parts and maintenance services. Finally, the government should contemplate introducing policy-driven incentives, including tax benefits, subsidies for research and development, and streamlined export procedures.

The Ammunition Sector: A Growth Catalyst

The ammunition sector in India is experiencing significant growth, acting as a key driver of the nation's defense industry. The Indian ammunition market is projected to grow at a compound annual growth rate (CAGR) of 4.93% over the next decade, surpassing the global average by about 1%, according to forecasts.[34] In 2023, the global ammunition market was valued at USD 15.5 billion and is expected to rise to USD 16.0 billion in 2024.[35] A global shortage of various products, especially ammunition, has emerged. Many of these shortages were triggered by the COVID-19 pandemic, which exposed the vulnerabilities of this supply chain. This presents a significant opportunity for Indian enterprises, which have recently demonstrated their capabilities through exports.

Prominent Indian defense companies are significantly enhancing their manufacturing capacities to meet domestic and global demand. For instance, Adani Defence recently began producing 150 million rounds of small-caliber ammunition, estimated at 25% of India’s annual requirement.[36] The Kanpur facility is equipped with cutting-edge machinery and technology for producing various types of small arms ammunition, including 5.56 x 45 mm, 7.62 x 51 mm, 7.62 x 39 mm, .338 Lapua Mag, and 9 x 19 mm rounds. Recent reports from IDRW indicate that the company plans to double its annual production of small arms ammunition to 300 million rounds by next year, fulfilling 50% of India’s yearly requirement.[37]

Similarly, Munitions India Limited (MIL) manufactures a wide range of ammunition, including 7.62 mm, 5.56 mm, and 9 mm calibers, catering to military and commercial needs. MIL is actively engaged in discussions to export ammunition to friendly nations as part of India's defense cooperation initiatives. Furthermore, MIL claims its products are in high demand abroad, with export orders valued at USD 724.64 million to be supplied over the next three years.[38] Furthermore, it will begin production of 125-mm 'Mango' tank shells, which can penetrate a 600-mm thick tank skin. The Mango shells are manufactured in India under license from the Russian armaments major Techmash, with MIL set to produce 6,000 units at its plant in Tiruchi, Tamil Nadu. MIL has previously shipped its products to Israel and has now reapplied to export the same products under a repeat order from Israel.[39] Approval for the company's second export to Israel is currently being considered by the licensing authorities.

Additionally, according to Reuters, a former senior official at the Indian defense company Yantra India, the Italian defense contractor Meccanica per l'Elettronica e Servomeccanismi (MES) was one of the firms that supplied Indian-made shells to Ukraine.[40] In the same report by Reuters, Customs data indicated that from February 2022 to July 2024, Yantra delivered $35 million worth of empty 155-mm L15A1 shells to this client. The company manufactures various types of ammunition, including 5.56 mm, 7.62 mm, and 9 mm, along with different caliber rounds to meet the specific needs of military applications. Recently, the company has ramped up its production of 155 mm artillery rounds in response to increasing export demands.

Technological Leadership

Advancements in ammunition technology have significantly enhanced precision, range, and versatility, thereby solidifying technological dominance in modern warfare. The Indian Institute of Technology Madras is developing the nation's first indigenous 155mm smart artillery shell, designed to be compatible with 39 and 45-caliber artillery systems without requiring modifications.[41] This fin-stabilized, canard-controlled guided shell boasts a maximum range of 38 kilometers and a minimum range of 8 kilometers. It incorporates a tri-modal fuse mechanism—point detonation, height of burst, and delayed detonation—and utilizes the Indian Regional Navigation Satellite System (IRNSS) with GPS support to improve precision.

In addition to enhancing precision, India is focusing on broadening the range and effectiveness of its bombs. The DRDO, in collaboration with ARDE, is developing the High-Speed Low Drag (HSLD) bomb,[42] a new type of short-range precision-guided bomb deployed by air. The HSLD bomb family includes versions weighing 100 kg, 250 kg, 450 kg, and 500 kg, specifically tailored for the Indian Air Force. These munitions can strike critical high-value enemy installations from long distances. The HSLD bombs are similar to the Mark 80 series used by the United States Air Force. The development includes both general-purpose and precision-guided variants, which will enhance the operational capability of the Indian Air Force.

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India’s Strategic Role in the Global Defence Ecosystem

India's strategic role in the global military ecosystem has significantly evolved. It has made substantial contributions to allied nations' defense capabilities, utilized defense exports to strengthen diplomatic relations, and actively engaged in establishing international defense trade standards.

Global Impact

India's defense exports have surged more than 30-fold over the past decade. The country now provides defense equipment to over 90 nations. From approximately $1.14 billion in 2020-2021, exports surged to a record high of around $2.63 billion in 2023-2024, representing a 32% increase from the previous year. Notably, the private sector accounted for 60% of these exports, underscoring the vital role of private companies in India's defense industry.

While specific details of many deals remain undisclosed, key exports include the BrahMos supersonic cruise missiles to the Philippines and Pinaka multi-barrel rocket launchers to Armenia. This upward trend demonstrates India's growing capability in manufacturing defense equipment, ranging from aircraft like the Dornier 228 to artillery and ammunition. The expanding reach of Indian-made defense products, to countries from Southeast Asia, the Middle East, Africa, and South America, indicates a burgeoning global footprint, positioning India as a rising player in the international arms market and furthering its strategic partnerships worldwide. This growth signifies a shift from primarily being an importer to becoming a significant exporter of defense technologies.

Geopolitical Relevance

India's strategic management of defense exports has significantly enhanced bilateral and multilateral relations. By supplying protective equipment and engaging in joint exercises, India has notably improved its geopolitical standing, thereby strengthening the defense capabilities of partner nations. At the same time, this indicates that India is adopting a more impactful approach to diplomacy.

India and the United States are steadily strengthening their defense ties. This progress is partly driven by extensive defense trade and joint military exercises. Since 2008, defense trade has become a vital component of the U.S.-India security alliance. Joint exercises across various domains will enhance interoperability and bolster strategic cooperation. To nurture this partnership, India and the United States have launched INDUS-X, a defense innovation bridge designed to promote collaboration in defense technology.

India has increased its defense and security cooperation with Southeast Asian nations such as Vietnam and Myanmar, focusing on maritime security collaboration and reinforcing territorial claims in the South China Sea. This strategic engagement enhances regional security and strengthens India's relationships with ASEAN countries. To further these connections, India might consider offering defense training programs and collaborative development initiatives tailored to the specific needs of these nations.

Challenges and the Way Forward

The journey to becoming a leading exporter in the international market is filled with numerous challenges India must confront.

Challenges

- **Competition from Established Exporters**

The global defense market is dominated by established players such as the USA and Russia. According to the SIPRI report, the five largest exporters are the United States, France, Russia, China, and Germany. The US accounts for 42% of the global share of major arms exports, with Russia and France holding 11%, while China ranks among the top five with 5.8%. China has rapidly increased its defense exports by providing cost-effective solutions to various countries. Although India's defense exports are rising, they face stiff competition from these established players.

- **Balancing Domestic Needs and Export Commitments**

The security challenges posed by India's neighboring nuclear powers are distinct from those encountered by any other nation. Consequently, India must consistently maintain operational readiness and ensure that spare parts are readily available. A precarious situation arose in 2020 when, following the Galwan Valley incident, the defense minister traveled to Russia to secure stockpiles and spare parts. Administrators are expected to guide major defense equipment manufacturers in India to prioritize the needs of the Indian military.

- **Inadequate R&D Funding**

Both the government and private sector have not invested sufficiently in research and development for defense technologies. Greater investment is required to achieve the level of innovation and technological advancement needed to compete in the global market. Without adequate R&D funding, India will continue to depend on foreign technologies and struggle to develop cutting-edge indigenous solutions that can attract international buyers.

- **Intellectual Property Rights and Technology Transfer**

Developing indigenous technology for defense manufacturing involves significant investment in research and development. Protecting intellectual property rights and facilitating technology transfers through collaborations and joint ventures are critical. Establishing clear policies in these areas can encourage innovation and attract foreign partners.

- **Infrastructure and Supply Chain Constraints**

Scaling up the production of defense equipment demands robust infrastructure and a resilient supply chain. Challenges with adequate manufacturing facilities, dependence on imported raw materials, and logistical bottlenecks can impede production efficiency. Investing in modern infrastructure and developing a self-sufficient supply chain are vital to meeting domestic and international demands.

Way Forward

- **Improving Competitiveness**

India must emphasize innovation, quality, and cost-efficiency to effectively compete with established exporters. Investing in research and development to design advanced defense systems that cater to the specific needs of potential clients could offer a competitive edge. Collaborating with international military companies can enhance knowledge transfer and improve product standards. India's partnerships with French firms Dassault Aviation and Thales have facilitated the export of components like Rafale fighter jet engine doors, showcasing the potential of these alliances.

- **Enhancement of Capabilities**

Enhancing manufacturing capacity is essential for addressing both domestic and international demands. Collaborations between the public and private sectors can significantly contribute to this endeavor. Stimulating private sector involvement through legislative incentives and streamlining regulatory frameworks can enhance production capacity. The Indian government aims to achieve USD 6.05 billion in annual military exports by 2028-29, highlighting the necessity for substantial capacity improvements.

- **Strategic Marketing and Diplomacy**

Using diplomatic channels to promote defense products can create new business opportunities. Participating in international defense exhibitions and forming strategic partnerships will enhance India's reputation as a reliable defense manufacturer. Aligning defense exports with foreign policy objectives can strengthen bilateral relations. India's increased defense and security collaboration with Southeast Asian countries reflects a dedicated effort to improve regional ties.

- **Adherence to Ethical Standards**

Complying with international humanitarian laws and ensuring that defense exports do not facilitate human rights abuses are essential. Establishing a robust export control system will enhance India's international reputation and prevent diplomatic issues. By highlighting ethical concerns in the arms trade, India can position itself as a responsible global actor while fostering regional stability.

Conclusion: India’s Defence Renaissance

India's rise as a defense manufacturing powerhouse signifies a transformative phase in its economic and geopolitical landscape. The Aatmanirbhar Bharat initiative has driven significant growth in domestic defense production. In 2023-24, India’s defense production hit a record USD 15.34 billion, with exports to over 90 countries. This represents a notable shift from being a major importer to becoming a minor exporter of defense equipment.

India's vision of becoming a global hub for high-quality, reliable defense products is taking shape. Strategic initiatives like the inauguration of the Tata Aircraft Complex in Vadodara, Gujarat, in partnership with Airbus Spain, represent a significant advancement. This facility, dedicated to producing C-295 military transport aircraft, not only bolsters domestic manufacturing capabilities but also integrates India into the global defense supply chain. The participation of Indian startups in the Indo-US defense collaboration program further acknowledges India’s potential to contribute to advanced defense technologies. To sustain this momentum, India must innovate, streamline the regulatory framework, and build international partnerships. With its growing industry and talent pool, India is positioned to become the preferred location for defense manufacturing, enhancing its strategic autonomy and global security.

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