India Exim Bank

INDIA'S DEFENCE EQUIPMENT INDUSTRY: EXPLORING NEW FRONTIERS

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India's Defence Equipment Industry: Exploring New Frontiers

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Background

The world today is increasingly becoming multipolar, marked by a sense of uncertainty in the geopolitical landscape. In this context, the importance of developing robust defence capabilities has heightened, driven by emerging technologies that are reshaping the conventional norms.

India recognises that developing and integrating defence manufacturing and related technologies, though a complex and expensive process, is crucial for enhancing national security and self-reliance. The ongoing challenges related to supply chains in the defence equipment sector further underscore the importance of promoting indigenisation in India. By reducing import dependency, India would be able to mitigate risks and ensure supply chain resilience and safeguard national sovereignty.

Bolstering the domestic defence industry involves working on multiple critical components including advanced research and development facilities, manufacturing and assembly infrastructure, skilled workforce training, and supply chain management, among others. Besides, the role of communications sector is also coming critical. The advancements in communication technology are not only supporting the development of defence equipment industry but also leading to significant spillover effects on other sectors.

The defence sector is witnessing technological breakthroughs that are not only enhancing existing capabilities but also fundamentally altering the operational landscape for defence companies in this dynamic environment. Nations are increasingly looking to leverage innovations such as robotics and autonomous systems, artificial intelligence, anti-satellite technologies, additive manufacturing, big data analytics, advanced manufacturing, and enhanced cybersecurity measures. Furthermore, growing research on advanced materials such as heat-resistant protective clothing, and stronger yet lighter materials is paving the way for the development of next-generation defence solutions.

In light of these developments, countries are compelled to reinforce their defence strategies. Nations are increasingly focusing on modernising armed forces, developing indigenous defence industries, and participating in global defence alliances. Such measures are becoming essential not only for larger nations but also for smaller countries and emerging economies.

GLOBAL SCENARIO

The Study analyses recent trends in the global defence industry, drawing on data from the Stockholm International Peace Research Institute (SIPRI) and by analysing segment-wise trade flows of defence equipment

using the ITC Harmonized System (HS) classification. As per the SIPRI database, during 2014-2023, the volume of global major arms exports increased by 7.7%, peaking at 33.5 billion TIV in 2022, followed by exports of 29.1 billion TIV in 2023[1]. The five largest exporters of arms during the period were the USA, France, Russia, China, and Germany, together accounting for 75% of all arms exports.

Besides, almost half of the global arms exports during 2014-23 comprised aircrafts, that is, all fixed-wing aircraft and helicopters, followed by missiles with a share of 14% in global exports, ships (14%), armoured vehicles (10%), air defence systems (4.8%), and sensors (4.6%). As regards imports, during the period, Saudi Arabia was the largest arms importer globally, accounting for a 9.8% share in global imports, followed by India (9.4%), Egypt (4.7%), Qatar (4.5%), Australia (4.2%), and China (3.9%).

Segment-wise Analysis Based on HS Codes

Aerospace Equipment: The USA has the largest aerospace industry in the world, with the revenue of the aerospace and defence sector estimated at US$ 952 billion in 2022. The country is a global leader in aerospace manufacturing, defence technology, and space exploration and the largest exporter of aerospace and defence. France is another leading country in the sector with a rich history of innovation, engineering excellence, and strategic military development.

The world exports of aerospace equipment stood at about US$ 298 billion in 2023, up by 17.4% from 2022. Aerospace equipment exports of the USA were to the tune of US$ 124.9 billion, followed by France (US$ 38.2 billion), Germany (US$ 34.2 billion), the UK (US$ 14.8 billion), and Canada (US$ 11.8 billion). The top importing countries were also the USA, the UK, Germany and France along with Ireland, demonstrating the prevalence of high intra industry trade in the sector.

Further, the global space economy was valued at approximately US$ 630 billion in 2023, with projections estimating growth to reach US$ 1.8 trillion by 2035. The establishment of the US Space Force as the sixth branch of the US military, highlights the strategic significance of space, driving increased investment in space technology and potentially influencing global space policy and geopolitics. In Europe, the development of an EU Space Strategy for Security and Defence also marks a significant step in Europe's approach to space policy.

Arms and Ammunition: Global exports of arms and ammunition have increased from US$ 21.7 billion in 2022 to US$ 24.8 billion in 2023. The top exporting countries during 2023 for arms and ammunition were the USA (23%), Italy (9%), Turkey (7%), the UK (7%), and Poland (6%). The top import sources were the USA (22%), Poland (13%), the UK (5%), Saudi Arabia (5%), and the Czech Republic (4%).

Naval Defence: Key players in the naval defence sector include the USA, China, Russia, and several European nations. According to the rankings of the World Directory of Modern Military Warships, the USA ranks first among the 39 countries assessed in global naval power. China is also rapidly advancing its naval power and has a younger fleet compared to the USA. The global exports of warships stood at US$ 847.6 million in 2023. Spain was the top exporting country for warships in 2023, accounting for 68.2% of the exports, followed by South Korea (19.9%), the USA (6.2%), and Israel (5.3%).

[1] The Stockholm International Peace Research Institute (SIPRI) tracks international arms transfer, covering only certain 'major weapons,' all measured using a common unit - the trend-indicator value (TIV). Rather than representing the financial value of the arms transfer, the TIV is based on the known unit production costs of a core set of weapons.

It may be noted that a decade ago, the USA used to be the top exporter of naval ships. However, its exports have declined over the years. As regards imports, Saudi Arabia was the top importing country accounting for 64% of global imports in 2023, followed by Indonesia (22%), Romania (6%), and the Philippines (3%).

Communication Equipment: Communication equipment plays a pivotal role in defence, forming the backbone of modern military operations. The evolving role of communication equipment in defence is becoming increasingly critical for securing national interests. The world exports of select communication equipment finding applications in defence stood at US$ 86.3 billion in 2023, up from US$ 77 billion in the previous year.

Asia leads in the exports of defence communication equipment. In 2023, China was the largest exporter with exports at about US$ 18 billion. Vietnam was the second largest exporter with exports at US$ 14.5 billion, followed by South Korea (US$ 8.6 billion), Hong Kong (US$ 7.3 billion), and the USA (US$ 6 billion). Among the segments considered, the global exports were the highest of parts for radiobroadcasting, radar apparatus, radio navigational aid apparatus and the like at US$ 58.3 billion in 2023.

It is evident that while the traditional defence superpowers such as the USA, France and Russia remain formidable players and top exporters in the defence equipment industry, many Asian nations such as China are increasingly exuding dominance in emerging technology driven segments such as drones and advanced communication systems. China has also been rapidly developing its naval prowess. Simultaneously, import dependent countries like Saudi Arabia and India, are actively bolstering their domestic defence industries to enhance self-reliance.

GLOBAL INDUSTRY SUPPORT: SELECT COUNTRY ANALYSIS

Heightened tensions and territorial disputes necessitate advanced military capabilities to ensure national security. As a result, countries are investing in modernising their armed forces, developing new technologies, and strengthening alliances.

USA: The USA, the highest spending country on defence, spent a share equivalent to about 3.4% of its GDP on military expenditure in FY 2024. For FY 2025, the proposed budget for defence is US$ 849.8 billion, a 4.2% increase over the FY 2023 base level of US$ 815.9 billion. Major investments are envisaged for the year in modernisation (US$ 147.5 billion), R&D for artificial intelligence, 5G and experimentation (US$ 143.2 billion), air power (US$ 61.2 billion), nuclear enterprise modernisation (US$ 49.2 billion), and sea power (US$ 48.1 billion). Besides, its recently released “National Defense Industrial Strategy” aims at modernising the defence industrial ecosystem in sync with its “National Defense Strategy”.

Russia: In the 2024 Budget, Russia proposed a record defence spending of 36.6 trillion rubles (US$ 408.7 billion)**,** a massive increase of about 30% over the previous year and equivalent to about 6% of the GDP. Russia is prioritising its ground forces and improving the rapid reaction forces besides developing its long range and precision-strike capabilities.

China: China’s 2024 defence budget reached RMB1.66 trillion (US$ 236 billion), an on-year increase of 7.2% in 2024, the most in five years. China is investing heavily in modernising its military capabilities. China aims to develop the People’s Liberation Army (PLA) into a “world-class military” by 2049 and is acquiring global intellectual property for the same. The Made in China 2025 initiative also aims at self-sufficiency in aerospace, communications, and transportation.

UK: The UK has earmarked £57.1 billion (US$ 73.6 billion) for defence in the budget 2024-25, a 4.5% rise from the £54.2 billion in the previous year. UK's defence spending accounted for 2.33% of its GDP, with plans to increase the spending further to 2.5% of GDP by 2030. UK's major focus areas include strengthening the defence industrial base by investing "at least an additional £10 billion" over the next decade on munitions production; modernising the armed forces by creating a new Defence Innovation Agency and committing at least 5% of the defence budget to R&D.

Saudi Arabia: Saudi Arabia, the fifth largest defence spender globally, allocated a corpus of SR 269 billion (US$ 71.7 billion) for defence in its 2024 Budget. Saudi Arabia has been increasing the defence budget to support its goal of localising 50% of its military procurement by 2030. Saudi Arabia is providing opportunities to local and international investors in the defence industry with, inter alia, financial concessions including interest-free loans for select products and grants.

Support by Export Credit Agencies (ECAs) to the Defence Sector: ECAs across countries are playing a key role in financing exports of defence equipment albeit in varying capacities. While the Export-Import Bank of the United States (US EXIM) finances only dual-use items, having both military and civilian applications, the UK Export Finance (UKEF) plays an active role in financing exports of defence and aerospace from the UK. Under UKEF's direct lending, an amount of £1 billion (US$ 1.3 billion) has been allocated for defence transactions. However, given that there is need for aerospace sector to decarbonise, UKEF has set targets to reduce its emissions exposure from the aerospace sector. Export Finance Australia (EFA) also provides dedicated financial solutions to support Australian defence exports across various sectors, including advanced manufacturing, engineering, and software. EFA also manages the Australian Government's National Interest Account, which includes the US$ 3 billion defence export facility that offers support for defence exports.

DEFENCE EQUIPMENT INDUSTRY IN INDIA

The Government of India has identified the Defence and Aerospace sector as a focus area for its 'Aatmanirbhar Bharat' initiative to reduce India's import dependence. For bolstering the defence industry, the Government is focusing on rapid indigenisation of the sector through greater procurement from both public and private players in the country.

Production: India's defence production has been on an upward trajectory during 2016-17 to 2023-24, with total production growing from ₹740.5 billion in 2016-17 to ₹1268.9 billion in 2023-24. India's defence production is predominantly attributable to the public sector entities. In 2023-2024, at ₹1003.8 billion, public sector entities including joint ventures, accounted for a share of 79% in India's defence production, followed by production of ₹265.1 billion by the private sector.

Among the products manufactured in India are arms and ammunition; armoured vehicles; heavy vehicles; fighter aircrafts and helicopters; warships; missiles; electronic equipment; and earth moving equipment.

Budgetary Support: In the Union Budget 2024-25, the Government of India allocated ₹6.2 trillion for defence, which was an increase of 4.3% from the revised estimates of the previous year, and accounts for 12.9% of the total budget. Of this, ₹1.7 trillion is earmarked for capital outlay in defence, a rise of 9.4% from the revised estimates of 2023-24. This expenditure majorly includes purchasing new weapons, aircraft, warships and other military hardware.

Notably, funds equivalent ₹1.05 trillion in the capital outlay are meant for domestic capital procurement, aimed at further boosting self-reliance in the sector. Funds equivalent to ₹402.78 billion are earmarked for aircraft and aero engines, ₹238 billion for naval fleet, ₹68.3 billion for naval dockyard projects, almost ₹17 billion for air force projects, ₹46.4 billion for heavy and medium vehicles, and about ₹ 622 billion for other equipment. For space technology and space applications, allocations of ₹100.9 billion and ₹16 billion have been made, respectively.

Foreign Trade: As per SIPRI, India's major arms exports volume saw a fall from 40 million TIV in 2014 to 34 million TIV in 2023. In 2020, the arms exports had skyrocketed to 153 million TIV. However, during 2014-2023, India's major arms imports far exceeded the exports. Imports were estimated at 1428 million TIV in 2023, down from 2582 million TIV in 2022.

It may be noted that as per SIPRI, India was the world's largest arms importer during 2019-2023, accounting for a share of 9.8% of global arms imports over the period, followed by Saudi Arabia (8.4%) and Qatar (7.6%). India's import sources for major weapon categories have remained largely unchanged over the past decade, with Russia being the largest arms provider holding a share of almost 50% of all major arms imports by India during 2014-2023. In 2023, however, Israel was India's largest arms import source followed by Russia. Other top arms import sources for India include the USA, the UK and France.

Exhibit 1: India's Foreign Trade in Select Defence Segments in 2023

Top Segments	Exports (in US$ mn.)	Top Export Destinations	Imports (in US$ mn.)	Top Import Sources
Aerospace equipment	**1933.3**	**USA (25%) France (10%) UAE (10%)**	**10,085.4**	**Germany (21%) France (17%) USA (15%)**
Parts of aircraft and spacecraft	1416.7	USA (33%) France (14%) UK (10%)	479.8	USA (36%) France (21%) UK (16%)
Powered aircraft	499.9	Kuwait (36%) UAE (33%) Oman (21%)	9,544.2	Germany (22%) France (17%) Saudi Arabia (14%)
Arms and Ammunition	**358.6**	Israel (36%) Myanmar (15%) USA (14%)	**167.6**	Israel (81%) Germany (6%) Italy (2%)
Parts and accessories for weapons	200.7	Israel (60%) USA (21%) Myanmar (8%)	6.2	Israel (36%) Italy (17%) USA (14%)
Bombs, grenades and torpedoes	148.5	Nigeria (32%) Myanmar (26%) Italy (18%)	148.8	Israel (89%) Bosnia & Herzegovina (3%) Germany (1%)
Communication Equipment	354.6	USA (20%) Israel (19%) Hungary (16%)	1644.4	China (57%) Vietnam (11%) Israel (8%)

Source: ITC Trade Map; India Exim Bank Research

- **Aerospace Equipment:** India's exports of aerospace equipment stood at US$ 1.9 billion in 2023, constituting a share of 0.6% in global exports of aerospace. Imports on the other hand equalled US$ 10.1 billion in 2023, a share of 4.5% in its world imports. The top exported items in 2023 were parts of aircraft and spacecraft, with a share of 78% in India's aerospace exports followed by powered aircraft (26%). India's imports in these segments are also high, the highest imports being in powered aircraft, at US$ 9.5 billion in 2023.
- **Arms and Ammunition:** In the trade of arms and ammunition, in 2023, India accounted for a share of 1.4% in global exports and 0.8% in global imports. India's exports of arms and ammunition amounted to US$ 358.6 million in 2023 and the imports equalled US$ 167.6 million. Parts and accessories for weapons accounted for a majority of the exports with a share of almost 60% in 2023, followed by bombs, grenades and torpedoes (41.4%).
- **Communication Equipment:** India is a net importer of communication equipment finding applications in defence services. Exports in the category have increased to US$ 354.6 million in 2023 while the imports have increased to US$ 1644.4 million. For the sourcing of communication equipment, India shows considerable import reliance on several Asian countries, with China being the dominant import source.

Foreign Direct Investment (FDI): FDI limit in defence sector has been enhanced up to 74% through the automatic route for companies seeking new defence industrial license, and up to 100% through the government route wherever it is likely to result in access to modern technology. However, FDI into the defence sector in India has been modest. During April 2000-June 2024, India received FDI inflows to the tune of US$ 19.9 million in the defence sector, equivalent to 0.003% of total FDI received by India in all the sectors.

BOOSTING INDIA'S DEFENCE MANUFACTURING AND EXPORT CAPABILITIES

For India to position itself as a defence powerhouse globally, a comprehensive and strategic approach is required. To ascertain businesses' areas of interest in defence and to understand the challenges that they face, Exim Bank surveyed a group of companies engaged in defence, including both MSMEs and large enterprises. Based on the inputs from the survey, interactions with key stakeholders, and extensive desk research, the Study has proposed a set of strategies as outlined below:-

Exhibit 2: Select Strategies for Strengthening India's Defence Capabilities

Expanding Defence Export Horizons	Bolstering the R&D Ecosystem	Addressing the Financing Needs
• Enhancing Strategic Engagement with Potential Countries • Enabling Greater Export Facilitation • Exploring Countertrade Arrangements • Developing Vendor Development Programmes	• Increasing Budgetary Allocation for R&D in Defence • Protecting Intellectual Property Rights • Encouraging Cutting Edge Dual-use Technologies	• Designing Defence-specific Financing Programmes • Encouraging Financing Support by Defence OEMs to their Suppliers

A. Expanding Defence Export Horizons: India aims at achieving defence exports of ₹ 500 billion by 2029 from an estimated ₹ 210.8 billion in 2023-24. This may be achieved by accelerating the pace of indigenisation, tapping the potential of unexplored markets, and strengthening collaboration with foreign OEMs, among others.

A.1. ***Enhancing Strategic Engagement with Potential Countries:*** Several countries across Africa, Middle East, Europe, and South and Southeast Asia offer unexplored markets for India's defence systems. With advanced military economies, India may leverage export opportunities by focusing on supplying defence-related parts and sub-systems/components as they often outsource the labour-intensive parts of the defence supply chain to developing countries. With developing nations, India has the potential to supply indigenously manufactured complete defence equipment.

Accordingly, India may possibly push for securing export contracts for its major defence systems like the Light Combat Aircraft Tejas, BrahMos cruise missile, Akash Surface-to-Air Missile systems, among others to developing countries. For the same, India could focus on countries like Nigeria and Kenya in Africa, Malaysia and the Philippines in South East Asia, Saudi Arabia and the UAE in the Middle East, among others. Besides, given the strategic importance of the South Asian region, India may expand defence cooperation with countries in the region.

India may also prioritise pushing for greater exports in the naval space. Given that the Indian Navy is a prominent catalyst in India's effort towards defence indigenisation and that several countries wish to cooperate on improving maritime security, export potential of India's naval systems like Offshore Patrol Vessels and Autonomous Underwater Vehicles (AUV), among others may be focused on.

A promising way to further strategic cooperation with the identified countries is through the posting of Defence Attachés in these countries. As India is exploring this route to deepen defence partnership with countries like Tanzania, Mozambique, Djibouti, Ethiopia, and the Ivory Coast, similar arrangements may be intensified with all identified countries where India's defence equipment industry has markets.

A.2. ***Enabling Greater Export Facilitation:*** There is an ongoing proposal towards setting up a much-needed export promotion council to accelerate India's defence export growth and provide holistic support to the industry. To enhance its effectiveness, the council could focus on capacity building through workshops and seminars and could serve as a one-stop hub for defence trade information. Establishing export help desks in Indian embassies and establishing a robust ecosystem among the domestic stakeholders like DPSUs, private manufacturers, and the MoD would further bolster its role.

A.3. ***Exploring Countertrade Arrangements:*** With increasing emergence of countertrade as a mode of international trade transactions, India may also enter into such arrangements in a barter set up to boost exports. For instance, in 2003, Indonesia acquired the Russian Sukhoi SU-27 SK and SU-30 MK combat aircraft with the deal involving a downpayment of 13.5% of the total contract value of US$ 192 million, while the remaining was settled through the countertrade of commodities. Following suit, India may enter into such exchanges of its defence systems for either the partner country's defence equipment or other locally acquired non-defence commodities especially, mineral fuel or agricultural products.

A.4. ***Developing Vendor Development Programmes:*** The MoD may formulate a Vendor Development Programme that identifies, assesses, and enlists potential vendors through a meticulous assessment process encompassing evaluation criteria like field visits, evaluation of infrastructure, technology capabilities, production capacity, and quality control measures. The identified potential vendors may

then be classified based on their capabilities and the list such prepared may be made accessible to the relevant stakeholders and serve as a comprehensive database for easy reference during vendor selection. This way, India may foster a competitive ecosystem that supports indigenous manufacturing and enhances participation of MSMEs.

B. Bolstering the R&D Ecosystem: India's R&D spend as a share of GDP, estimated at 0.7% in 2020, lags the expenditure of the top military powers such as the USA (3.5%), the UK (2.9%) and China (2.4%). Since R&D in defence manufacturing plays a crucial role in driving innovation, the R&D ecosystem in defence may be strengthened by some of the following measures:

B.1. ***Increasing Budgetary Allocation for R&D in Defence:*** India's defence R&D constituted a share of about 5.9% its total defence budget in 2021-22, much lower than the global norm of 10-15%. Further, in the Union Budget 2024-25, the budgetary allocation for Defence Research and Development Organisation (DRDO) accounted for less than 4% of the total defence budget, a concern flagged by the Standing Committee on Defence (2023-24). Given DRDO's crucial role as the R&D wing of MoD, increased budgetary allocation for DRDO's R&D operations are imperative for fostering innovation and enhancing India's indigenous defence capabilities.

B.2. ***Protecting Intellectual Property Rights:*** The Transfer of Technology (ToT) arrangements under DAP 2020 have significantly promoted indigenous production, but several challenges persist, especially in "Make II" and "Make III" projects. In "Make II," ambiguity around IP ownership and usage rights often leads to foreign Original Equipment Manufacturers (OEMs) imposing restrictive practices, which can limit the capabilities of Indian Production Agencies (IPAs). Similarly, "Make III" faces a lack of clear guidelines on IP rights. Thus, a comprehensive strategy addressing these IP concerns may be designed. Establishing clear, transparent guidelines for IP ownership and usage in ToT agreements will ensure fair terms for both OEMs and IPAs.

B.3. ***Encouraging Cutting Edge Dual-use Technologies:*** There is a concerning gap in R&D intensity in India's defence industry, as demonstrated by a notably low R&D intensity of Indian defence firms (1.2%) vis-à-vis the global average (3.4%)[2]. To cultivate a more vigorous R&D climate at the firm level, the Government may encourage more companies to explore and invest in emerging cutting-edge technologies such as cybersecurity technologies, augmented reality and virtual reality, robotics and automation, among others.

For instance, in the USA, private sector's contribution to R&D has increased substantially so much so that in 2021, the private funds accounted for 75% of USA's R&D funding. This has been driven by its institutions such as the Defense Advanced Research Projects Agency and its initiatives such as the Small Business Innovation Research program. On similar lines, India too needs to develop a thriving ecosystem for businesses to tap the unexploited potential of new age technologies for defence as well as for commercial applications.

C. Addressing the Financing Needs: It is gauged that access to quality finance remains a significant challenge across the defence industry, particularly for MSMEs. Few of the challenges faced by the industry include delayed payments from buyers, lack of support for product trials, high Transfer of Technology fees and collateral related issues. The financing concerns may be assuaged by some of the following ways:

2 FAST India and IIFL Securities. State of Industry R&D in India (2024).

C.1. ***Designing Defence-specific Financing Programmes:*** Financial institutions (FIs) may offer tailored financial programmes specifically designed for defence companies to address their unique financing needs. These may include extending early-stage support for defence companies, including campus-based startups. The FIs may partner with incubators engaged with defence companies to identify and support promising companies. Besides, given that many startups typically lack the financial literacy necessary to identify and leverage appropriate funding products, FIs may fill this knowledge gap by incorporating financial advisory services in the support offered.

FIs may also consider extending working capital loans by considering purchase orders (POs) obtained from the suppliers as a collateral on a case to case basis. By offering financing based on confirmed POs, MSMEs can access the necessary working capital without having to wait for payments from buyers, improving their liquidity. Furthermore, for companies to scale their operations, invest in research and development, and expand to new segments, FIs may offer growth finance in the form of long-term debt that is mapped with their growth cycles.

C.2. ***Encouraging Financing Support by Defence OEMs to their Suppliers:*** Given the limited financial support offered by defence OEMs to their suppliers, the Government may facilitate a framework wherein the OEMs, in collaboration with banks could offer structured financing programs, to meet the financing needs of the suppliers such as longer payment terms for cash flow management, guarantees etc. Supplier credit programmes wherein OEMs offer loans to suppliers; performance-based incentives; revolving credit lines; equity investments; and establishment of factoring arrangements of OEMs with factoring institutions are some of the ways OEMs may provide financial support to their suppliers and in return benefit from more robust supply chains.

In Conclusion

India's defence equipment industry stands at a critical juncture, where the convergence of robust capabilities, innovative technologies, and a strategic vision for self-reliance presents opportunities to enhance domestic production and boost exports. By strengthening its flourishing R&D ecosystem alongside its industrial capabilities, India stands to emerge as a significant player in the global defence market. For India to unlock new frontiers in the defence equipment sector, it is vital to cultivate a vibrant public-private ecosystem that fosters a flexible financial framework, accelerates technological advances, and streamlines regulatory processes. Such an integrated approach would enhance India's defence manufacturing prowess and ensure its competitiveness on the world stage.

Chapter

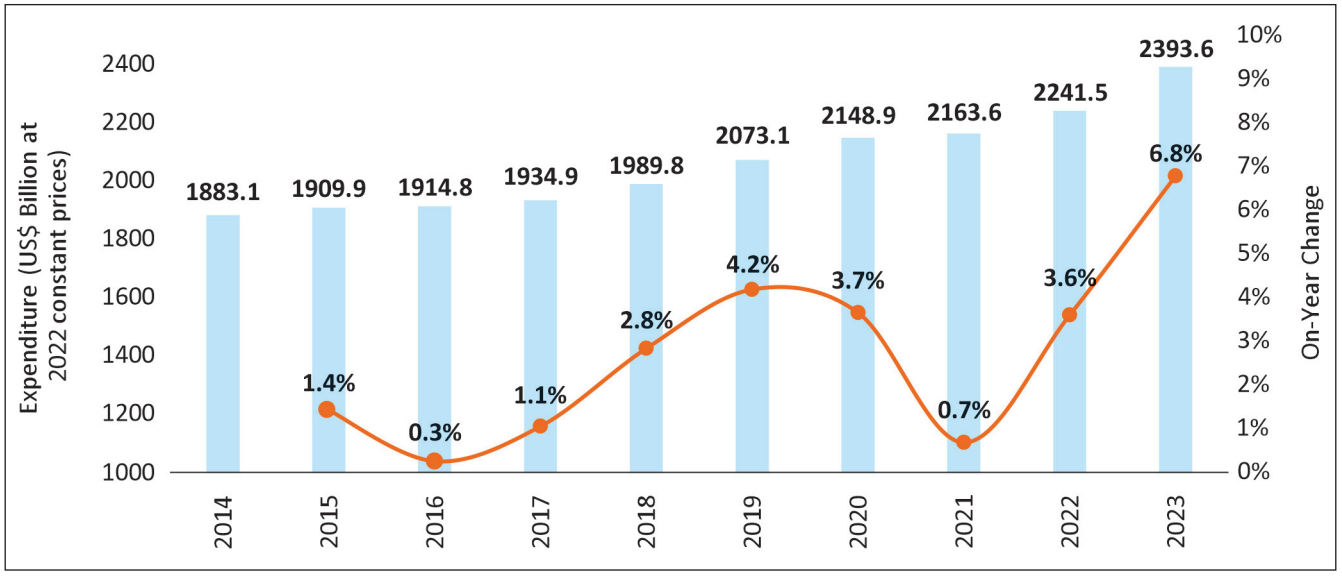
1 Introduction

In today's rapidly evolving geopolitical landscape, defence has emerged as a critical priority for nations worldwide. Growing security needs and rapid technological advancements, combined with the need for economies to become more agile and responsive, are driving countries to strengthen their defence capabilities. The modernisation of armed forces, development of indigenous defence industries, and participation in global defence alliances have become central to maintaining a secure and resilient state for all countries including smaller nations and emerging economies. As defence assumes greater importance in global discourse, there is a need to evaluate the dominant trends in the sector and assess the future trajectories.

1. Growing Spending on Defence

The increasing defence expenditure of countries reflects a growing recognition of the need to enhance national security amid rising geopolitical tensions, technological advancements, and new forms of warfare. Governments are allocating more resources to modernise military capabilities. The global military expenditure rose to a record high of US$ 2393.6 billion in 2023, recording a 6.8% increase from the previous year, the steepest rise since 2009 **(Figure 1.1)**. At current prices, the expenditure stood at US$ 2443 billion.

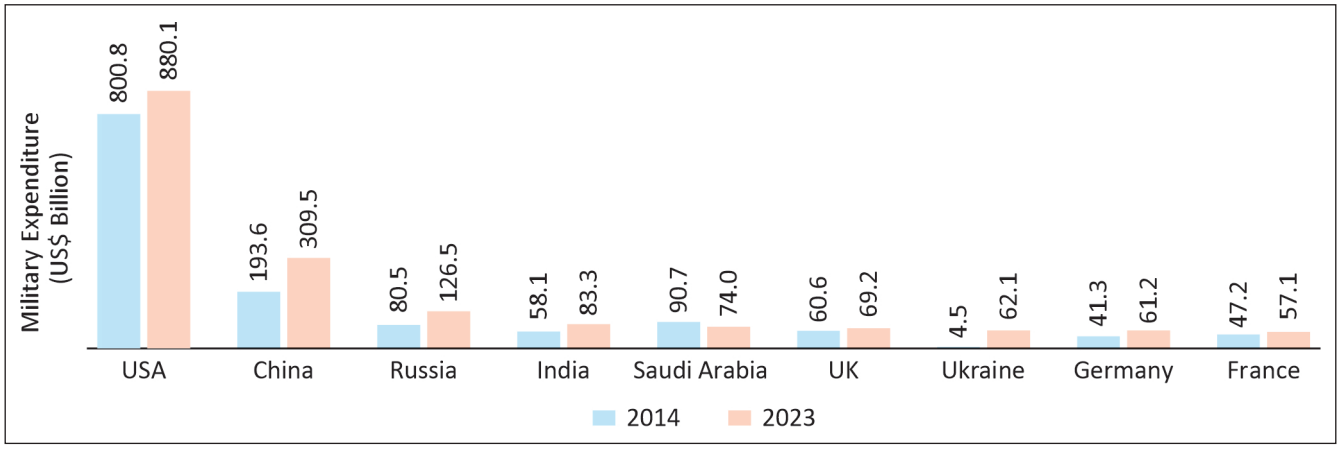
Figure 1.1: Global Military Expenditure



Source: The SIPRI Military Expenditure Database; India Exim Bank Research

Half of the global military expenditure is accounted by the top two spending countries - the USA and China alone. The USA accounted for about 37% of global military expenditure in 2023 which represented 3.4% of its GDP. China accounted for about 13% of the global military expenditure in 2023, representing 1.7% of its GDP. The other top countries by military expenditure include Russia, India and Saudi Arabia, with a share of 5.3%, 3.5%, and 3.1%, respectively, in global military expenditure in 2023.

Figure 1.2: Top Countries by Military Expenditure



Source: The SIPRI Military Expenditure Database; India Exim Bank Research

Table 1.1: Military Expenditure as a Share of Government Spending and GDP

Country	As a Share of Government Spending in 2023	As a Share of GDP in 2023
Ukraine	58.2%	36.7%
Saudi Arabia	24.0%	7.1%
Russia	16.1%	5.9%
UK	5.2%	5.2%
USA	9.1%	3.4%
Germany	3.1%	3.1%
India	8.1%	2.4%
France	3.6%	2.1%
China	5.0%	1.7%

Source: The SIPRI Military Expenditure Database; India Exim Bank Research

2. Increasing Indigenisation

The defence sector is increasingly being seen as a driver of economic growth, innovation, and employment, particularly through the development of indigenous defence industries. The indigenisation of defence has emerged as a key economic strategy for several countries, driven by the goal of reducing dependency on foreign arms, enhancing national security, and bolstering domestic industries.

China is a prominent example of a country that has taken considerable strides in indigenising its defence sector. Over the years, China has dramatically transitioned from being a major arms importer to becoming one of the world's leading defence manufacturers and exporters. It has achieved substantial progress in developing indigenous capabilities in missile systems, aircraft, naval vessels, and advanced technologies like artificial intelligence (AI) and hypersonic weapons. The indigenisation efforts have been heavily supported by

the State with measures such as contractual support by People's Liberation Army to the industry and the "Made in China 2025" strategy for strengthening domestic production capacities in aerospace, defence, and cybersecurity industries, among others.

Similarly, Turkey's indigenisation efforts in defence have gained momentum, as it aims to reduce its reliance on imported weapons and increase exports. The country is modernising its defence industry, producing advanced military equipment ranging from drones to naval ships and missile systems. Its defence exports have also increased considerably, growing from about US$ 1.9 billion a decade ago to US$ 5.5 billion in 2023[3].

Saudi Arabia, traditionally a major importer of defence equipment, has also embarked on an ambitious plan to indigenise its defence sector under its "Vision 2030" initiative. Having among the highest defence budget globally, the country is seeking to localise 50% of its defence procurement by 2030 to reduce its dependence on foreign suppliers and diversify its economy. To this end, the government has established the General Authority for Military Industries (GAMI) to oversee and drive the localisation efforts and develop partnerships with global defence manufacturers for technology transfers and knowledge sharing.

In India too, indigenisation plans are being implemented at full steam given that it is among the largest importers of defence equipment. Self-reliance is being accorded high priority with reforms being rolled out for promotion of design, development and manufacture of defence equipment locally. India is aiming at achieving defence production equivalent to ₹ 3 trillion and exports of ₹ 500 billion by 2029[4].

A few of the key measures being implemented for indigenisation of defence equipment include introducing the Defence Acquisition Procedure (DAP) 2020 for procurement, releasing the Positive Indigenisation Lists (PIL), development of defence corridors, and launching the Innovations for Defence Excellence Scheme (iDEX), among others. These policies will be covered in detail in the subsequent chapters.

Thus, indigenisation of defence has become a powerful economic strategy for countries across the globe, driven by the need for self-reliance, technological advancement, and economic diversification. By focusing on developing local capabilities, countries plan to not only enhance their national security but also stimulate economic growth, foster innovation, and create high-skilled jobs.

3. Technological Advancements and Innovation

The defence sector remains a powerful engine of technological advancement, driving innovations that not only shape the future of warfare but also contribute to civilian industries. Developments in the defence sector in the recent years reflect a significant acceleration in technology adoption. The key trends in the sector include-

- **Satellite technologies and space militarisation**: With the increasing reliance on satellite systems for communication, surveillance, navigation, and missile defence, space has emerged as a critical domain for national security. Countries across the globe are investing heavily in space technologies, recognising the strategic advantages they offer. Space-based satellite systems provide real-time communication between military units, enhancing coordination during operations. They also serve as intelligence-gathering platforms, offering high-resolution images and data.

[3] Presidency of the Republic of Türkiye

[4] PIB. (2024). Self-reliance is first condition for a strong economy; Giant strides being made to realise PM Modi's vision of 'Aatmanirbhar Bharat': Raksha Mantri.

Satellites are also crucial for positioning and navigation, enabling precise military operations such as missile guidance, troop movements, and logistics. Satellites also support space situational awareness i.e tracking and monitoring of objects in space, such as satellites and debris. Besides, the development of anti-satellite (ASAT) weapons, designed to neutralise adversaries' space assets, adds a new layer of strategic competition between global powers. Four countries, namely the USA, China, Russia, and India have demonstrated their ability to operate ASATs.

Thus, as nations harness space capabilities, strategic threats emerge, making space as the next domain for defence. To mitigate the security risks, several nations are establishing dedicated military space branches. For instance, taking cognisance of the emerging threats to national security, the US established the US Space Force in December 2019 as a new branch of armed services. The "Guardians" who work for the Space Force, protect and defend the country's interests in space to ensure unhindered access to space capabilities that are fundamental to both warfighting and day-to-day life.

Overall, countries around the world are making significant investments in space-based assets, recognising their importance in securing strategic interests. With growing trends of militarisation of space, the race for dominance in space technologies will likely intensify, reshaping global defence strategies in the years to come.

- **Integration of artificial intelligence (AI)**: With AI integration, defence systems can perform tasks autonomously, including surveillance, reconnaissance, and target identification. AI-enabled decision-making tools enhance the ability to process large amounts of data in real-time, providing valuable insights. Globally, AI is being integrated into, inter alia, command and control, intelligence, surveillance, logistics, healthcare, information warfare, cyber warfare, training and simulation, autonomous systems, and lethal autonomous weapons.

  The USA is at the forefront of AI adoption in defence. It began integrating AI into its combat systems since as early as 2017. The US Department of Defense's "Data, Analytics and Artificial Intelligence Adoption Strategy", 2023 aims to leverage high-quality data and advanced AI-enabled tools for enhancing operational efficiency, speed, and accuracy. It intends to do so by investing in improving data quality and accessibility across the Department, integrating AI with military operations through rapid experimentation and continuous feedback, removing policy barriers and improving governance for AI deployment, and developing a skilled workforce.

  Similarly, other countries like China, Russia, and Israel are leading in the adoption of AI for applications ranging from autonomous systems to cybersecurity. As AI technology continues to evolve, its integration into defence strategies will only deepen further.

- **Recognising the role of startups**: Traditionally, defence technology development was the domain of large, established defence contractors. However, the rise of small, technology-focused startups has transformed the landscape. These startups are particularly adept at developing advanced technologies such as artificial intelligence, autonomous systems, cybersecurity, and space technologies, which are crucial for modern military operations.

  Governments worldwide are recognising the importance of startups in the defence sector and are implementing a range of policies to finance, support, and incentivise their involvement. For instance, the US Department of Defense has set up the "Defense Innovation Unit" (DIU) as a focused organisation to accelerate the adoption of commercial technology into the military by working with startups. The DIU helps startups navigate the complex defence procurement process and provides them with funding opportunities to develop dual-use technologies that benefit both defence and civilian sectors.

On similar lines, the EU has set up the European Defence Fund with a budget of nearly €8 billion for 2021-2027, to provide grants up to 100% of eligible costs to SMEs. Notably, the NATO members have also launched the NATO Innovation Fund, a standalone venture capital fund with a goal of investing €1 billion in cutting-edge science and engineering startups to strengthen defence.

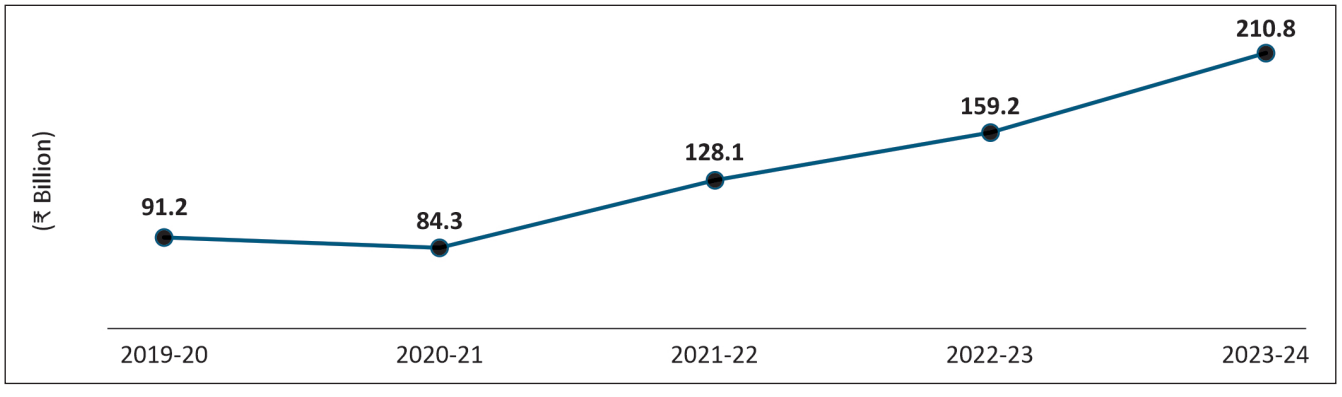
By fostering an ecosystem of collaboration between startups, large defence contractors, and military organisations, governments are accelerating the pace of defence innovation and ensuring that their militaries remain at the forefront of technological advancements. These policies not only enhance military capabilities but also promote the development of dual-use technologies that benefit both defence and civilian sectors.

Need for the Study

Amid the rapidly changing geopolitical trends, evolving security needs, and the fast-changing technology, it is crucial for India to continue to harness its military prowess and emerge as a leading defence manufacturing nation. India needs to maximise the strategic and economic benefits of its defence industry. While the Government of India is undertaking remarkable policy initiatives in the sector to enhance India's manufacturing capabilities at a brisk pace, the country is still critically dependent on imports in many of the crucial segments.

A major priority area for India is to boost defence exports and the progress made in this regard is noteworthy. India's defence exports reached a record high of ₹ 210.8 billion in 2023-24, more than twice the exports recorded in 2019-20. India now aims at achieving defence production equivalent to ₹3 trillion and exports of ₹ 500 billion by 2029.[5]

Figure 1.3: India's Defence Exports



Source: Ministry of Defence, Government of India

However, to emerge as a defence powerhouse and achieve self-reliance in the sector, there is a long way to go. In this regard, this Exim Bank Study attempts to closely study the manufacturing and trade trends of India's defence sector across segments vis-a-vis the top defence manufacturing countries. The Study attempts to identify the opportunities in the sector and suggests way to tap these. A primary survey has also been undertaken to seek inputs from the defence manufacturing companies in the country to gauge the challenges they face and the support that they seek for enhancing their performance and contributing to India's defence growth story. The Study envisages to recommend suitable policy measures to boost India's defence manufacturing and exports, thereby securing its strategic interests and enhancing the country's global positioning in defence capabilities.

[5] PIB. (2024). Self-reliance is first condition for a strong economy; Giant strides being made to realise PM Modi's vision of'Aatmanirbhar Bharat': Raksha Mantri.

Chapter

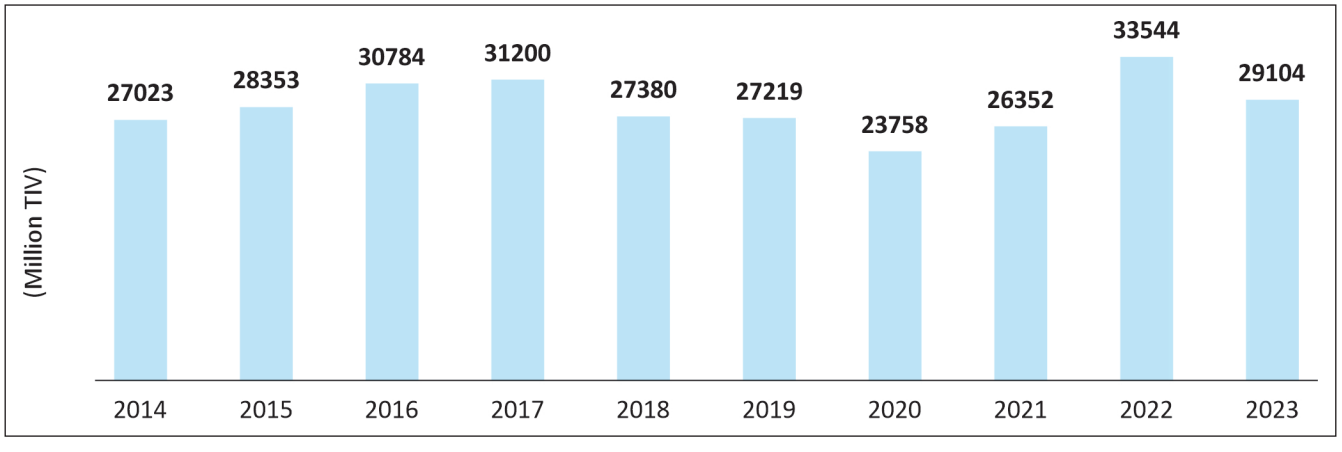
Global Scenario

Amid growing global defence requirements, countries are increasingly focusing on not only boosting domestic production but also leveraging strategic imports and exports to enhance their military capabilities. This chapter delves into recent trends in the global defence industry, drawing on data from the Stockholm International Peace Research Institute (SIPRI) and by analysing segment-wise trade flows of defence equipment using the ITC Harmonized System (HS) classification.

A. Global Defence Trade based on Stockholm International Peace Research Institute (SIPRI) Database

During 2014-23, the volume of global major arms exports has increased by 7.7%, reaching its peak in 2022 at 33.5 billion TIV[6]. As per SIPRI, during 2019-23, the five largest exporters of arms were namely, the USA, France, Russia, China, and Germany, together accounting for 75% of all arms exports over that period.

Figure 2.1: Volume of Global Arms Exports (in million TIV)



Source: Stockholm International Peace Research Institute (SIPRI)

The USA is the world's largest major arms supplier accounting for about 40% of all arms exports over the period of 2014-23. Between 2014-18 and 2019-23, arms exports from the USA increased by 17%, delivering

[6] The Stockholm International Peace Research Institute (SIPRI) tracks international arms transfer, covering only certain 'major weapons,' all measured using a common unit - the trend-indicator value (TIV). Rather than representing the financial value of the arms transfer, the TIV is based on the known unit production costs of a core set of weapons.

major arms to around 107 countries in the past 5 years. As reported, deliveries of combat aircraft typically make up a significant part of the USA's total arms exports. Further, as per SIPRI's data, despite Russia's arms exports falling by 53% between 2014–18 and 2019–23, the country stood as the second largest major arms exporter, holding a share of 16% of all such arms transfers over the period of 2014-23. Russia delivered major arms to over 40 states during 2019–23.

Table 2.1: Top Global Arms Exporters (2014-2023)

Exporter	2014 (million TIV)	2023 (million TIV)	Share in Global Arms Exports over 2014-2023 (%)	Share of Top Importing Partners over 2014-2023 (%)
USA	9490	11287	38.0%	Saudi Arabia (18.0%), Australia (7.4%), Japan (7.1%), Qatar (5.6%), South Korea (5.0%)
Russia	5335	1269	16.0%	**India (27.0%),** China (18.0%), Algeria (12.0%), Vietnam (7.9%), Egypt (7.6%)
France	1768	2012	9.0%	**India (21.0%),** Egypt (15.0%), Qatar (10.0%), Saudi Arabia (7.3%), China (5.1%)
Germany	1822	3287	5.9%	South Korea (12.0%), Egypt (12.0%), Israel (10.0%), Greece (5.9%), Ukraine (5.6%)
China	1327	2432	5.9%	Pakistan (47.0%), Bangladesh (13.0%), Algeria (7.2%), Myanmar (5.3%), Thailand (4.5%)
UK	1658	1204	3.9%	Saudi Arabia (26.0%), Qatar (11.0%), USA (10.0%), Oman (8.4%), Indonesia (6.8%)
Italy	674	1437	3.2%	Qatar (18.0%), Egypt (14.0%), Turkey (11.0%), Kuwait (8.3%), Algeria (4.6%)
Israel	400	1159	2.8%	**India (40.0%),** Azerbaijan (10.0%), Vietnam (6.3%), USA (6.2%), Philippines (5.6%)
Spain	962	940	2.7%	Australia (35.0%), Turkey (17.0%), Saudi Arabia (11.0%), Belgium (5.6%), Malaysia (3.8%)
South Korea	220	621	1.9%	Poland (15.0%), Philippines (14.0%), Indonesia (13.0%), UK (10.0%), **India (8.2%)**

Source: Stockholm International Peace Research Institute (SIPRI); India Exim Bank Research

Almost half of total global arms exports during 2014-23 have predominantly been in the category of aircrafts, that is, all fixed-wing aircraft and helicopters. The USA has been a major exporter of aircrafts to different countries. Other major arms exports during this period include missiles (14%), ships (14%), armoured vehicles (10%), and air defence systems (4.8%).

Table 2.2: Category-wise Global Arms Exports over 2014-2023 (in million TIV)

Category	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2014-2023	Share in Total Exports over 2014-23 (%)
Aircraft	11557	12916	12414	14166	11760	13956	11369	13314	15078	10191	126722	45.0%
Missiles	3111	3088	4046	4105	4337	3839	3330	3278	5360	5329	39822	14.0%
Ships	4424	3918	4422	5093	3488	2017	3076	3853	3935	5483	39706	14.0%
Armoured vehicles	2956	2710	3882	3147	2940	2389	2271	2283	3994	3126	29698	10.0%
Air defence systems	1230	1872	2265	1596	1677	1218	567	705	1276	1395	13801	4.8%
Sensors	1690	1799	1595	1098	1006	1095	800	1009	1598	1485	13173	4.6%
Engines	1217	1299	1385	1369	1375	1587	1330	1073	1069	934	12640	4.4%
Artillery	288	366	396	210	382	398	493	369	686	596	4185	1.5%
Other	163	200	119	142	134	514	319	281	332	287	2490	0.9%
Naval weapons	287	185	161	176	231	155	153	178	209	279	2012	0.7%
Satellites	100	-	100	100	50	50	50	10	10	-	470	0.2%
Total	**27023**	**28353**	**30785**	**31202**	**27380**	**27218**	**23758**	**26353**	**33547**	**29105**	**284719**	**100.0%**

Source: Stockholm International Peace Research Institute (SIPRI); India Exim Bank Research

Over the period of 2014-23, Saudi Arabia was the world's largest arms importer with the USA supplying 70% of its major arms imports. India followed closely behind, importing 9.4% of global arms over the same time period. Russia and France were India's largest arms suppliers over the last decade. Notably, the volume of arms imports expressed in million TIV, has seen a fall for the two largest arms importers – Saudi Arabia and India – in 2023 when compared to the start of the decade in 2014.

During the last five years from 2019 to 2023, in particular, the top five global arms importers — India, Saudi Arabia, Qatar, Ukraine, and Pakistan — together accounted for 35% of all major arms imports in the period. The regions of Asia and Oceania saw the highest volume of arms imports over the same time period.

Table 2.3: Top Global Arms Importers (2014-2023)

Importer	2014 (million TIV)	2023 (million TIV)	Share in Global Arms Imports over 2014-2023 (%)	Share of Top Exporting Partners over 2014-2023 (%)
Saudi Arabia	2711	1315	9.8%	USA (70.0%), UK (10.0%), France (6.7%), Spain (3.2%), Canada (2.0%)
India	**3201**	**1428**	**9.4%**	**Russia (47.0%), France (20.0%), USA (13.0%), Israel (12.0%), UK (2.7%)**
Egypt	430	1130	4.7%	France (29.0%), Russia (26.0%), Germany (15.0%), USA (12.0%), Italy (9.5%)
Qatar	55	1805	4.5%	USA (48.0%), France (21.0%), Italy (13.0%), UK (9.1%), Germany (4.2%)
Australia	857	362	4.2%	USA (67.0%), Spain (23.0%), France (2.9%), Switzerland (2.1%), Germany (1.5%)
China	1041	471	3.9%	Russia (73.0%), France (12.0%), Ukraine (8.2%), UK (2.3%), Switzerland (2.3%)
Pakistan	860	2129	3.6%	China (77.0%), USA (3.8%), Turkey (3.6%), Russia (3.5%), Italy (2.7%)
Algeria	716	355	3.0%	Russia (63.0%), China (14.0%), Germany (11.0%), Italy (5.0%), France (1.9%)
South Korea	742	189	2.9%	USA (64.0%), Germany (25.0%), France (5.4%), UK (2.9%), Israel (1.8%)
UAE	738	902	2.9%	USA (64.0%), France (11.0%), Turkey (4.2%), Sweden (3.3%), Netherlands (2.5%)

Source: Stockholm International Peace Research Institute (SIPRI); India Exim Bank Research

B. Segment-wise Analysis

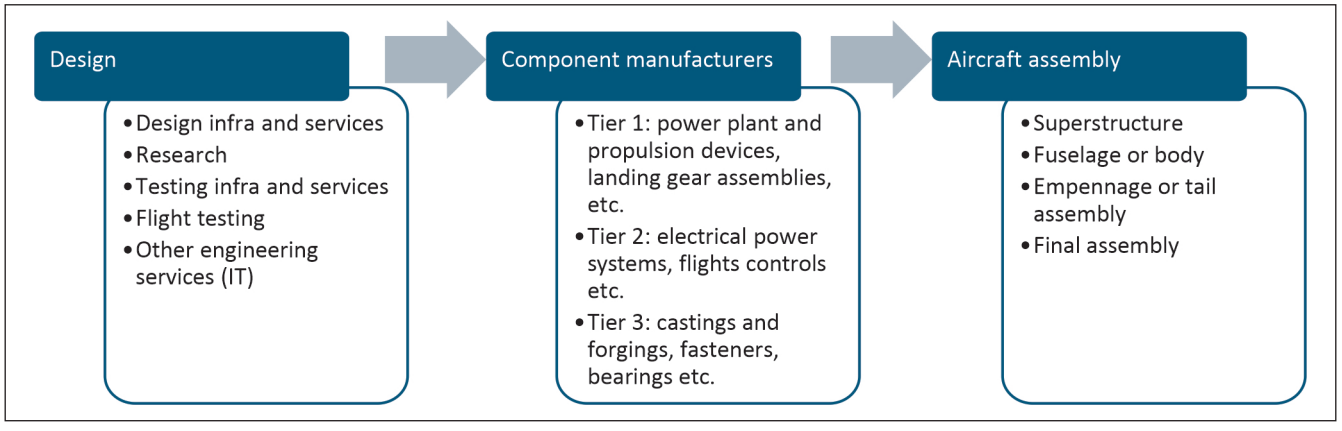
The following sections delve into the segment-wise global trends in the defence industry with emphasis on trade flows of product categories based on ITC HS codes. In each segment, the top exporting and importing countries are identified.

B.1 Aerospace

The aerospace sector, covering both commercial and military aviation, involves the design and production of aircraft, rockets, missiles, spacecraft, and the like. The sector is critical for national security, technological advancement, and economic growth.

The aerospace industry relies on a highly specialised and intricate supply chain to manufacture the complex components and systems required for aircraft and other aerospace technologies. Unlike many other industries, aerospace supply chains are characterised by a multi-tiered structure that involves a range of suppliers, from those providing basic materials and components to those responsible for assembling entire systems. Each tier plays a critical role in ensuring the quality, safety, and performance of aerospace products.

Figure 2.2: Core Manufacturing Processes in Aerospace



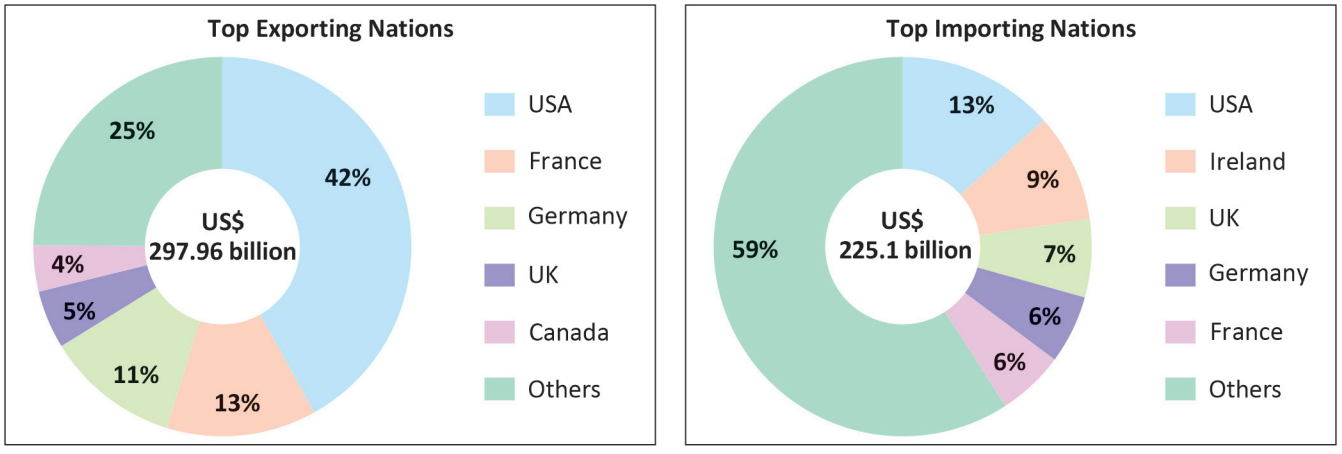
The USA has the largest aerospace industry in the world. According to the Aerospace Industries Association, in 2022, the aerospace and defence sector (A&D) generated sales revenue of US$ 952 billion, up 6.7% from 2021. Of the total sales revenue, US$ 537 billion was generated through direct industry output and the remaining 44% through indirect output through supply chains. The country is a global leader in aerospace manufacturing, defence technology, and space exploration and also the largest exporter of aerospace and defence, with civil aviation products including aircrafts and engine parts accounting for about 65% of all A&D exports and the defence products accounting for the remaining 35%.

France is another leading country in the A&D industry, with a rich history of innovation, engineering excellence, and strategic military development. France boasts world-class military and civilian aircraft, helicopters, missiles, satellites, and spacecraft. In 2023, the industry's revenue stood at €70.2 billion (approximately US$ 78.6 billion). Civil aerospace accounted for about 69% of the revenue in 2022 and the remaining 31% by defence. Further, a considerable share (65%) of the aerospace and defence revenue was earned through exports in 2022, pointing at the important role exports play in the A&D sector in France. The country's defence exports have benefited from geopolitical shifts, with increasing demand from the Middle East, Asia, and Africa.

B.1.1 Global Trade in Aerospace

The world exports of aerospace equipment stood at US$ 297.96 billion in 2023, up by 17.4% from the previous year. The top exporting countries in 2023 were the USA with exports of US$ 124.9 billion, France (US$ 38.2 billion), Germany (US$ 34.2 billion), the UK (US$ 14.8 billion), and Canada (US$ 11.8 billion). The top importing countries were also the USA, the UK, Germany, and France along with Ireland, demonstrating the prevalence of high intra industry trade in the sector.

Figure 2.3: Top Trading Countries for Aerospace in 2023[7]

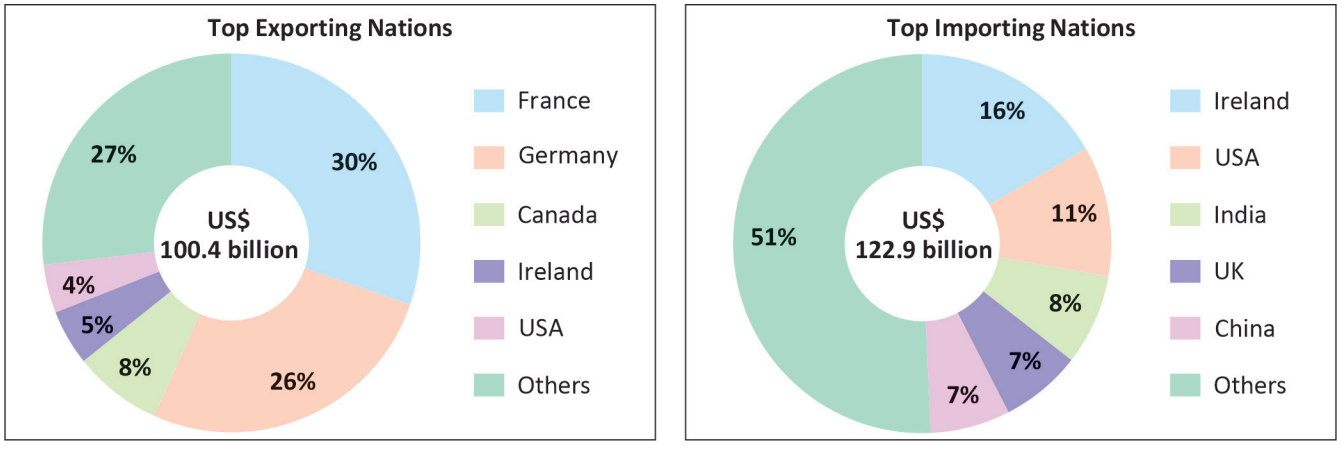


Source: ITC Trade Map; India Exim Bank Research

Trade in Powered Aircraft[8]

The world exports of powered aircraft equalled US$ 100.4 billion in 2023, up from US$ 82.4 billion in 2022. France was the top exporting country for powered aircraft in 2023, accounting for 30% of the global export value, followed by Germany (26%), Canada (8%), Ireland (5%), and the USA (4%). The exports of aircraft are heavily concentrated with the top five exporting countries accounting for 73% of global exports. The top importing countries for aircrafts in 2023 were Ireland (16%), the USA (11%), India (8%), the UK (7%), and China (7%).

Figure 2.4: Top Trading Countries for Powered Aircraft in 2023



Source: ITC Trade Map; India Exim Bank Research

Trade in Parts of Aircraft and Spacecraft[9]

The world exports of aircraft and spacecraft parts stood at US$ 68.7 billion in 2023, up from US$ 62.1 billion in 2022. The top exporting countries for aircraft and spacecraft parts in 2023 were the UK with a share of

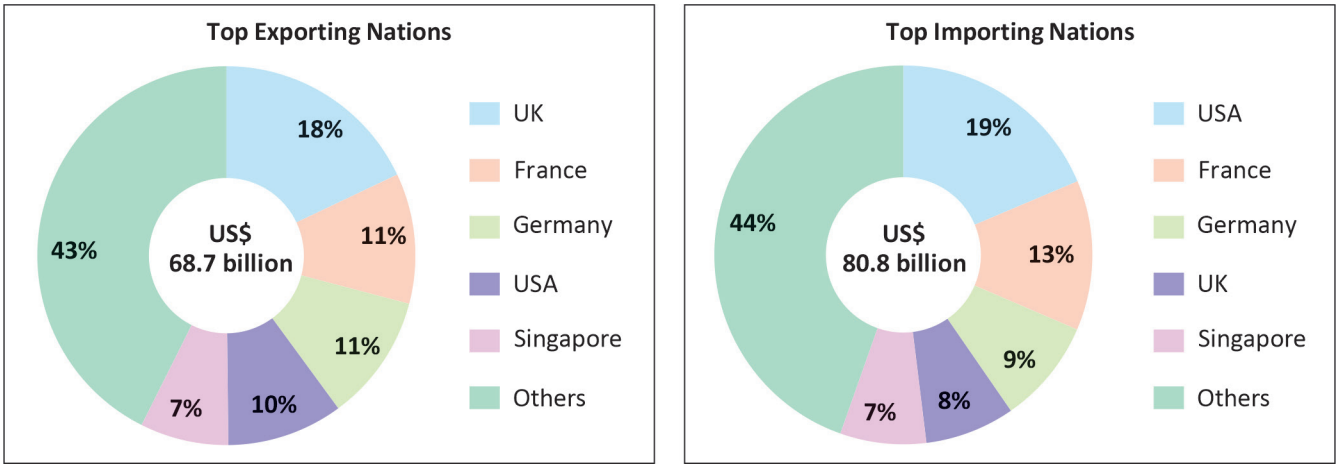
[7] The global export and imports figures are different due to factors such as varying valuation methods used by different customs agencies, transshipment, and re-exports among others. For instance, the price of imports often includes the costs of transport and insurance, while exports are traditionally reported without these costs.

[8] HS 8802: Powered aircraft "e.g. helicopters and aeroplanes" (excl. unmanned aircraft of heading 8806); spacecraft, incl. satellites, and suborbital and spacecraft launch vehicles

[9] HS 8807: Parts of aircraft and spacecraft of heading 8801, 8802 or 8806, not elsewhere specified

18% in global exports followed by France (11%), Germany (11%), the USA (10%), and Singapore (7%). The top importing nations were the USA (19%), France (13%), Germany (9%), the UK (8%), and Singapore (8%).

Figure 2.5: Top Trading Countries for Parts of Aircraft and Spacecraft in 2023

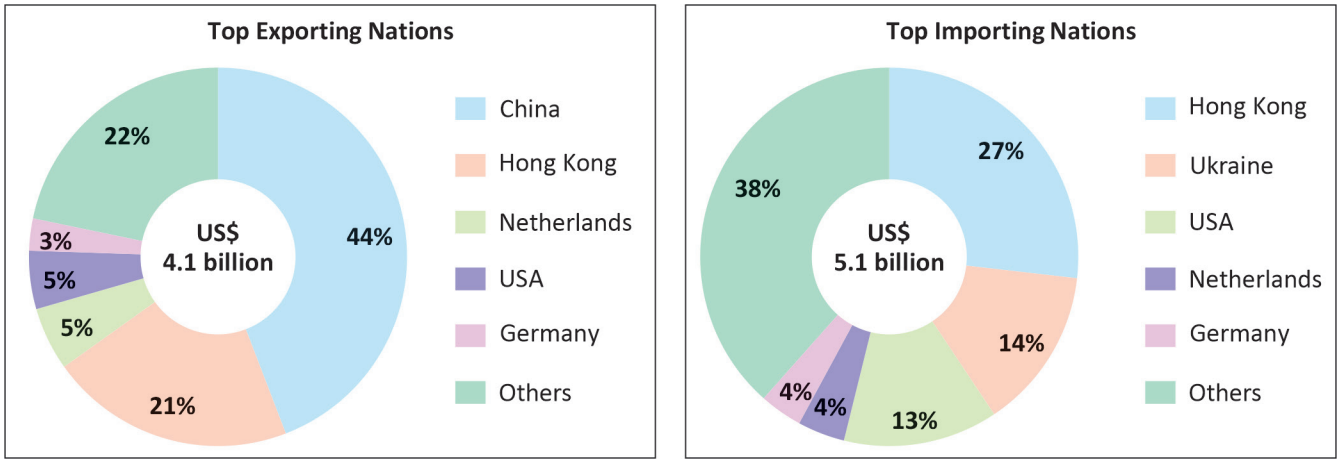


Source: ITC Trade Map; India Exim Bank Research

Trade in Unmanned Aircraft[10]

The exports of unmanned aircraft stood at US$ 4.1 billion in 2023, up from US$ 3.8 billion in 2022. China held a share of 44% in global exports in 2023, followed by Hong Kong (21%), the Netherlands (5%), the USA (5%), and Germany (3%). The top importing countries in 2023 were Hong Kong (27%), Ukraine (14%), the USA (13%), the Netherlands (4%), and Germany (4%).

Figure 2.6: Top Trading Countries for Unmanned Aircraft in 2023



Source: ITC Trade Map; India Exim Bank Research

Trade in Aircraft Launching Gear, Deck-Arrestor or Similar Gear[11]

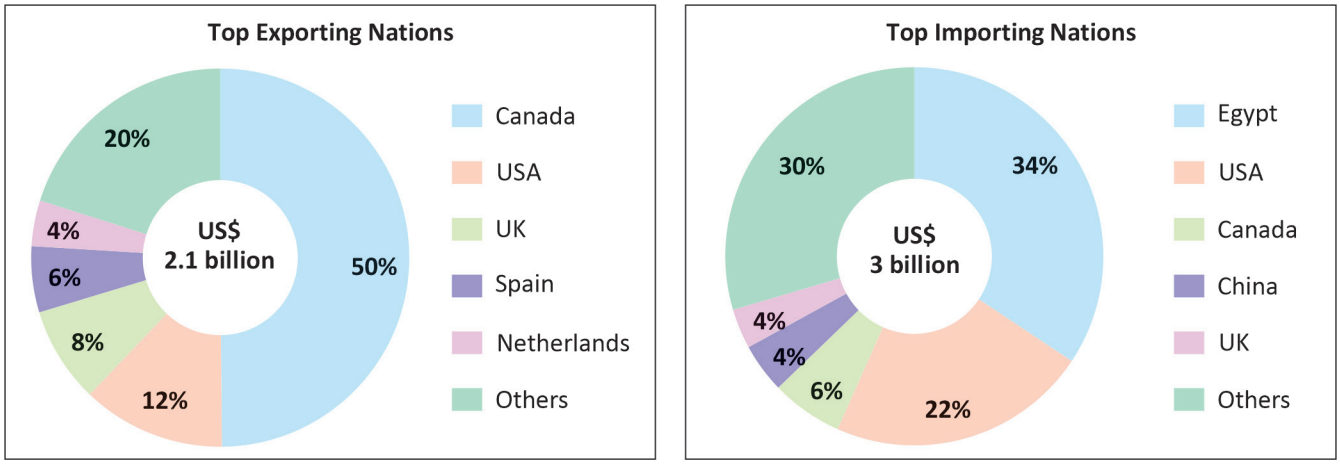
Global exports of aircraft launching gear, deck arrester and similar gear were to the tune of US$ 2.1 billion in 2023. Canada accounted for half of the global exports in 2023, followed by the USA (12%), the UK (8%),

[10] HS 8806: Unmanned aircraft

[11] HS 8805: Aircraft launching gear (excl. motor winches for launching gliders); deck-arrestor or similar gear; ground flying trainers; parts of the foregoing articles, not elsewhere specified

Spain (6%), and the Netherlands (4%). The top importers during the year were Egypt with a share of 34% in global imports, the USA (22%), Canada (6%), China (4%), and the UK (4%).

Figure 2.7: Top Trading Countries for Aircraft Launching Gear in 2023

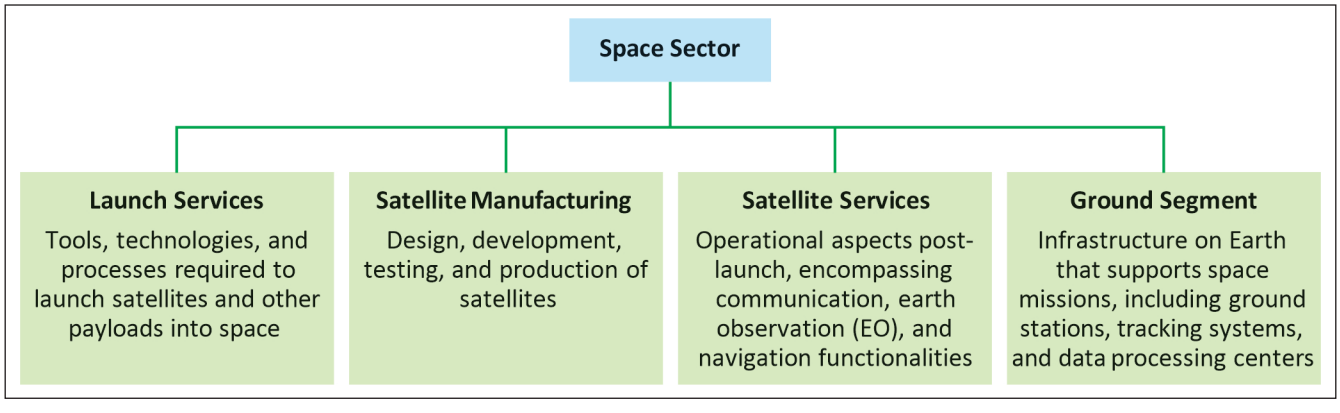


Source: ITC Trade Map; India Exim Bank Research

B.1.2 Space Sector

The global space economy was valued at approximately US$ 630 billion in 2023, with projections estimating growth to reach US$ 1.8 trillion by 2035. Countries with space agencies are expected to cross 100 from 70, space start-ups are expected to expand to over 1000 from 600 and satellite launches are expected to cross 200 from 145 during 2022-2030.

Figure 2.8: Space Sector - Key Segments

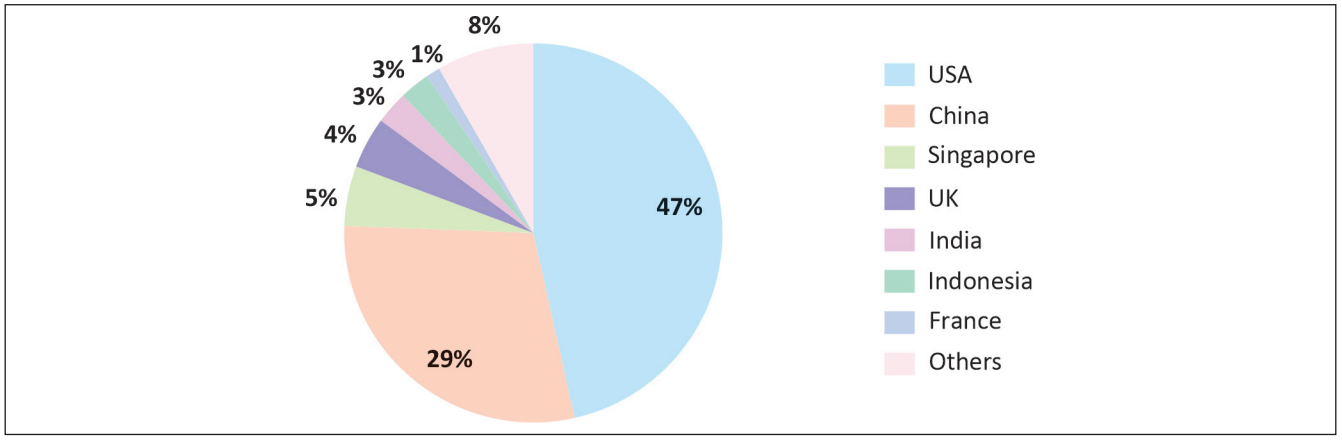


The growth trajectory highlights the increasing importance and expansion of space-based and space-enabled technologies, such as communications, positioning, navigation and timing, and earth observation. Several industries, including supply chain and transportation, food and beverage, state-sponsored defence, retail, consumer goods and lifestyle, and digital communications are anticipated to drive more than 60% of the growth in the space economy by 2035.

Private sector investment in the space sector is increasing exponentially, spanning across various applications, including space tourism and defence. Since 2013, approximately US$ 272 billion in equity investments have been made in space companies worldwide. The USA space companies account for almost 47% of this investment, followed by China (29%), Singapore (5%), the UK (4%), and India (3%). This significant investment

flow underscores the strategic importance of space as a frontier for technological innovation and economic development.

Figure 2.9: Equity Investment in Space Companies Worldwide from 2013 to 2022



Source: Space Capital; India Exim Bank Research

Significant policy developments are shaping the strategic landscape of the global space industry. The establishment of the US Space Force as the sixth branch of the US military, highlights the strategic significance of space, driving increased investment in space technology and potentially influencing global space policy and geopolitics. Meanwhile, in Europe, the development of an EU Space Strategy for Security and Defence marks a significant step in Europe's approach to space policy. The strategy is driven by the recognition that space is increasingly critical to national and collective security, requiring a coordinated European response. Key ambitions under the Strategy include improving space surveillance and tracking systems to monitor space debris and threats, and enhancing the resilience of space infrastructure. Investment in advanced technologies including satellite communications, earth observation, and space-based navigation systems is increasingly becoming a priority for nations globally.

B.2. Arms and Ammunition

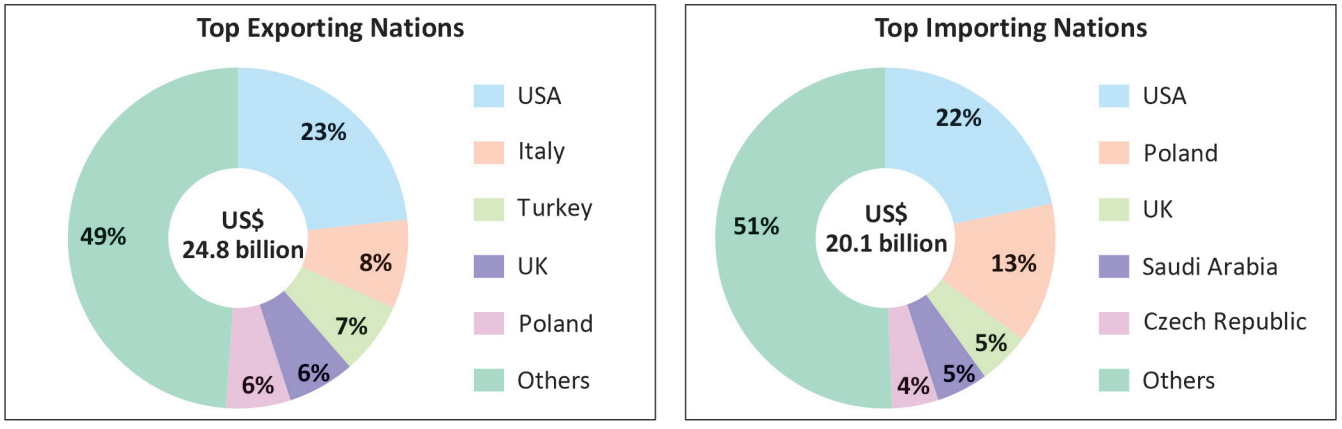
The global arms and ammunition industry is vast and lucrative, encompassing the manufacturing, distribution, and sale of military weapons, ammunition, and other defence related equipment. The industry entails product segments like bullets, grenades, firearms, aerial bombs and rifles, among others, and supplies primarily to national governments, defence agencies and military organisations, apart from catering to other civilian and commercial applications. An everchanging geopolitical landscape, growing military spending across nations, defence modernisation programmes and counterterrorism efforts are some of the growth propelling factors of the arms and ammunition industry, assisting countries attain national security objectives.

B.2.1 Global Trade in Arms and Ammunition

Global exports of arms and ammunition have increased from US$ 21.7 billion in 2022 to US$ 24.8 billion in 2023. As per the product-wise disaggregation, the global exports of arms and ammunition are majorly concentrated in bombs, grenades and torpedoes (HS 9306) which takes up about 60% of total exports of arms and ammunition in 2023, amounting to US$ 12.1 billion. The USA was the largest exporting country for arms and ammunition in 2023, holding a share of around 23%, with exports at US$ 6 billion. The USA was also the largest importer of arms and ammunition in the same year, with a similar share of about 22% amounting to

US$ 4.4 billion. Other major arms and ammunition exporting countries include Italy (US$ 2.1 billion), Turkey (US$ 1.7 billion), the UK (US$ 1.6 billion) and Poland (US$ 1.5 billion).

Figure: 2.10: Top Trading Countries for Arms and Ammunition in 2023

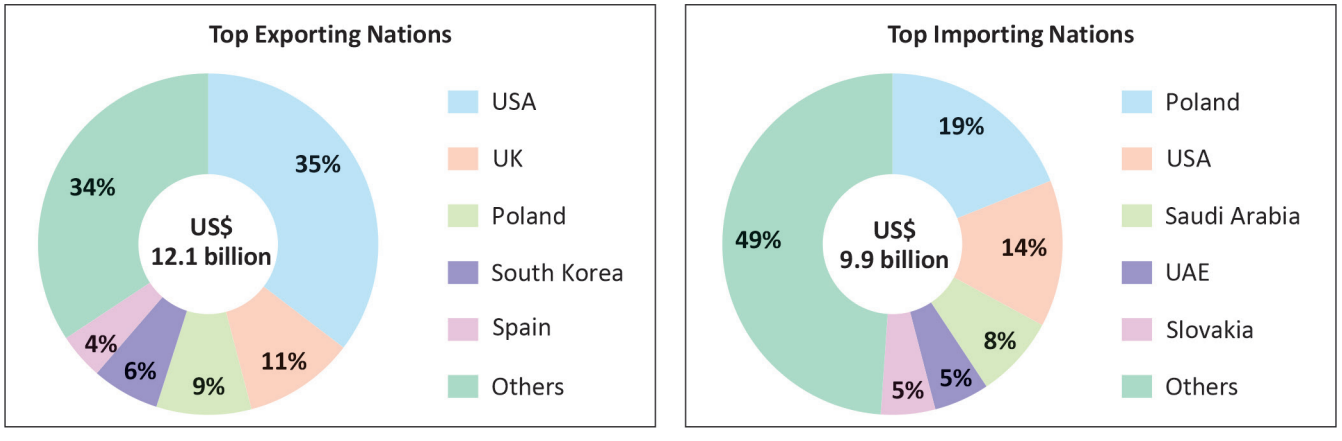


Source: ITC Trade Map; India Exim Bank Research

Trade in Bombs, Grenades and Torpedoes[12]

Global trade in bomb, grenades and torpedoes increased from US$ 9.3 billion in 2022 to US$ 12.1 billion in 2023. Exports of this product category have majorly been from the USA amounting to US$ 4.3 billion, followed by the UK (US$ 1.3 billion), Poland (US$ 1.1 billion), South Korea (US$ 0.8 billion) and Spain (US$ 0.5 billion). Imports of bomb, grenades and torpedoes in 2023 have been concentrated in Poland which imported US$ 1.9 billion worth of the commodity, followed closely behind by the USA (US$ 1.4 billion).

Figure 2.11: Top Trading Countries for Bombs, Grenades and Torpedoes in 2023



Source: ITC Trade Map; India Exim Bank Research

Trade in Parts and Accessories for Weapons[13]

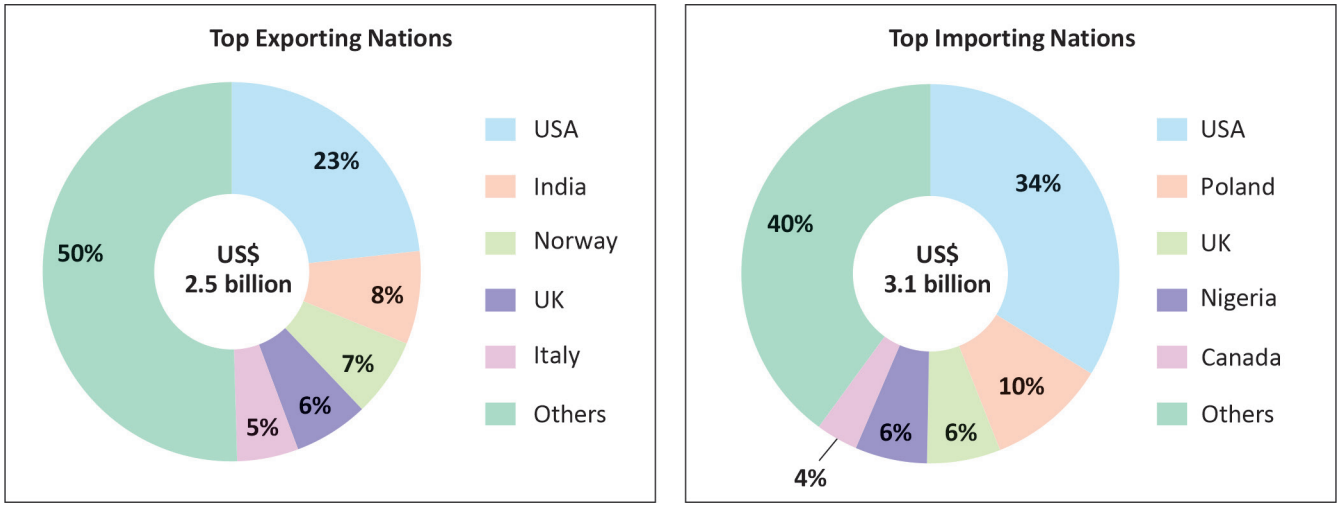
In 2023, exports of parts and accessories of weapons amounted to US$ 2.5 billion globally, a marginal rise from US$ 2.3 billion in 2022. The USA was both the largest exporter as well as importer of parts and accessories of weapons in 2023. Exports of the same from the USA amounted to US$ 0.6 billion in 2023 while imports

[12] HS 9306: Bombs, grenades, torpedoes, mines, missiles and similar munitions of war and parts thereof; cartridges and other ammunition and projectiles and parts thereof, including shot and cartridge wads

[13] HS 9305: Parts and accessories for weapons and the like of heading 9301 to 9304

in the same year stood at US$ 1 billion. Notably, India was the second largest global exporter of parts and accessories of weapons in 2023, with exports, standing at US$ 0.2 billion. Other major exporting countries include Norway (6.7%), the UK (6.4%) and Italy (5.3%). Further, Poland (10.2%), the UK (6.3%), Nigeria (6.2%) and Canada (3.6%) were among the major importers of parts and accessories of weapons in the same year.

Figure 2.12: Top Trading Countries for Parts and Accessories for Weapons in 2023

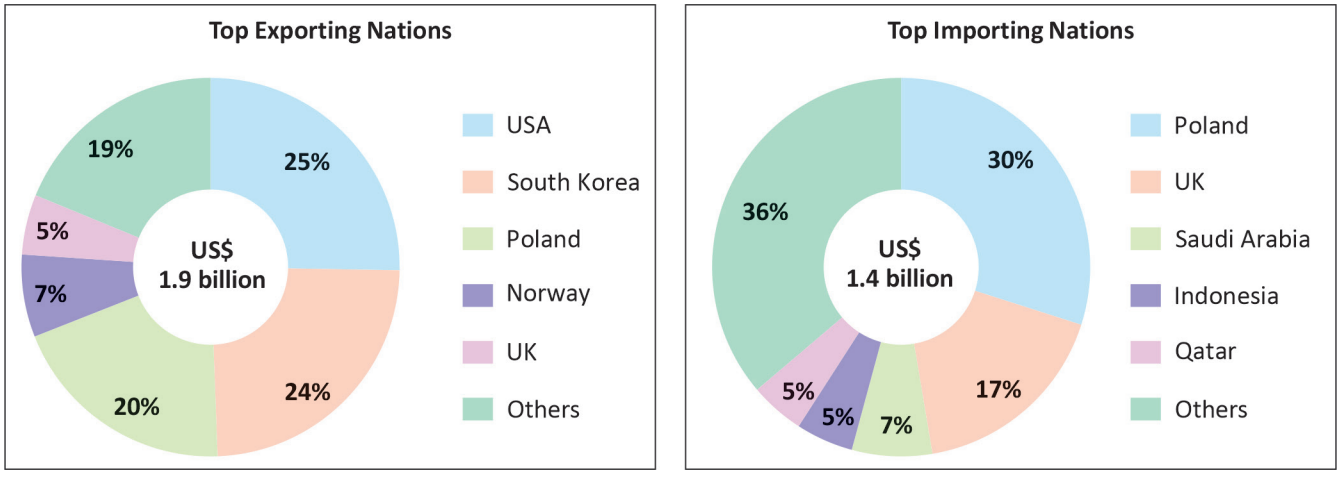


Source: ITC Trade Map; India Exim Bank Research

Trade in Military Weapons, including Sub-Machine Guns[14]

Global exports of military weapons, including sub-machine guns, have seen a marginal rise from US$ 1.7 billion in 2022 to US$ 1.9 billion in 2023. The USA is the largest exporter worldwide with its exports amounting to US$ 0.5 billion in 2023. Other major exporters include South Korea that followed closely behind, contributing to 24.1% of global military weapons exports in the year, and Poland (19.6%), Norway (7.0%) and the UK (5.1%). In terms of imports of military weapons, during the year, Poland was the largest importer holding a share of almost 30% of all global military weapons, followed by the UK (17.4%), Saudi Arabia (6.9%), Indonesia (4.9%), and Qatar (4.7%).

Figure 2.13: Top Trading Countries for Military Weapons, including Sub-machine Guns in 2023



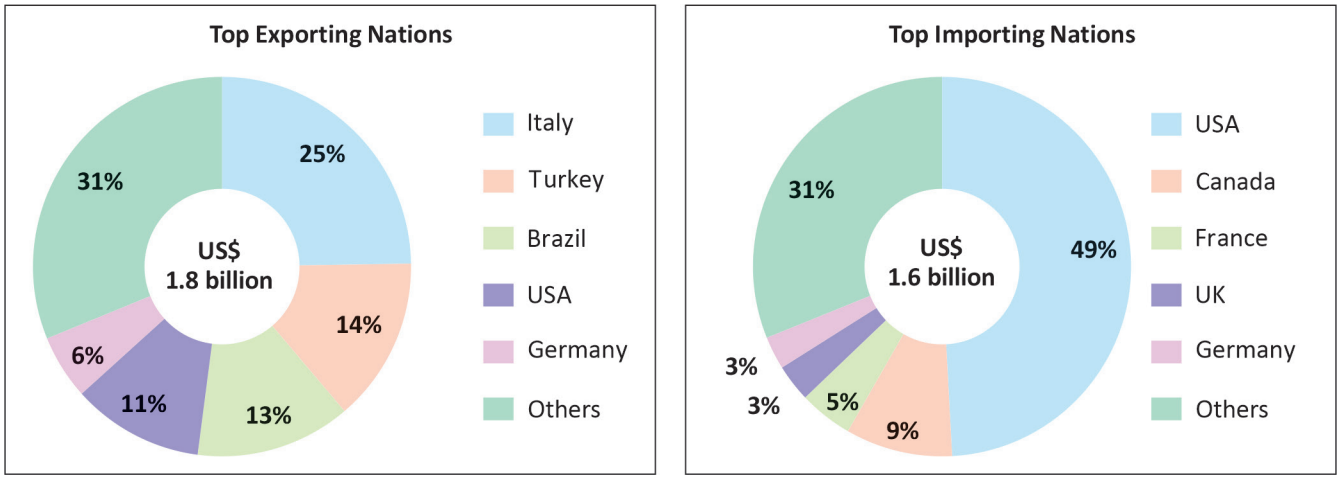
Source: ITC Trade Map; India Exim Bank Research

[14] HS 9301: Military weapons, other than revolvers, pistols and the arms of heading 9307

Trade in Firearms and Similar Devices which Operate by the Firing of an Explosive Charge[15]

Global exports of firearms have remained stagnant over the past two years, standing at US$ 1.8 billion in both 2022 and 2023. Nations exporting firearms in 2023 are relatively diversified when compared to the nations importing the same. Italy was the largest exporter of firearms in 2023 amounting to US$ 0.4 billion holding a share of about 25%, followed by Turkey (14.0%), Brazil (13.3%), the USA (11.3%) and Germany (5.5%). Global imports of firearms are heavily concentrated in the USA, contributing contributed to almost half of the total firearms imports in the same year, valued at US$ 0.8 billion.

Figure 2.14: Top Trading Countries for Firearms and Similar Devices which Operate by the Firing of an Explosive Charge in 2023



Source: ITC Trade Map; India Exim Bank Research

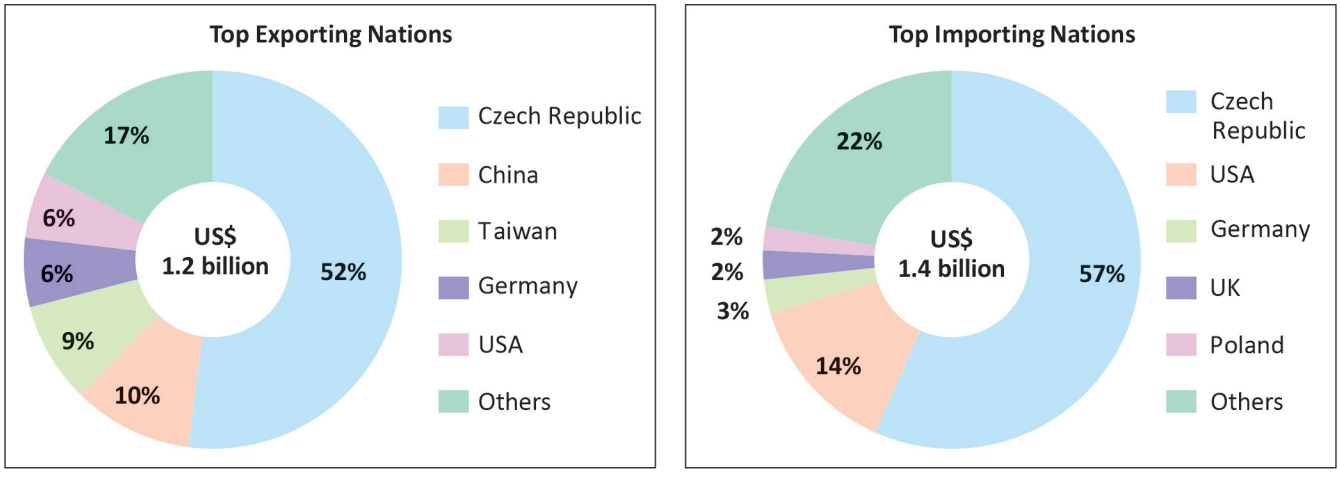
Trade in Spring, Air or Gas Guns and Pistols, Truncheons and other Non-firearms[16]

Exports of spring, air or gas guns globally have risen from US$ 1 billion in 2022 to US$ 1.2 billion in 2023. The Czech Republic was the leading player in the global trade of spring, air or gas guns in 2023. The country exported US$ 0.6 billion worth of spring, air or gas guns, that is, over 50% of total global exports in the year, and imported US$ 0.8 billion worth of the same, holding a share of 57% of total global imports of the commodity. The USA and Germany were other recurring names in the global trade of spring, air or gas guns in 2023 (Figure 2.15).

[15] HS 9303: Firearms and similar devices which operate by the firing of an explosive charge, e.g. sporting shotguns and rifles, muzzle-loading firearms, Very pistols and other devices designed to project signal flares only, pistols and revolvers for firing blank ammunition, captive-bolt humane killers and line-throwing guns (excl. revolvers and pistols of heading 9302 and military weapons

[16] HS 9304: Spring, air or gas guns and pistols, truncheons and other non-firearms (excluding swords, cutlasses, bayonettes and similar arms of heading 9307)

Figure 2.15: Top Trading Countries for Spring, Air or Gas Guns and Pistols, Truncheons and other Non-firearms in 2023

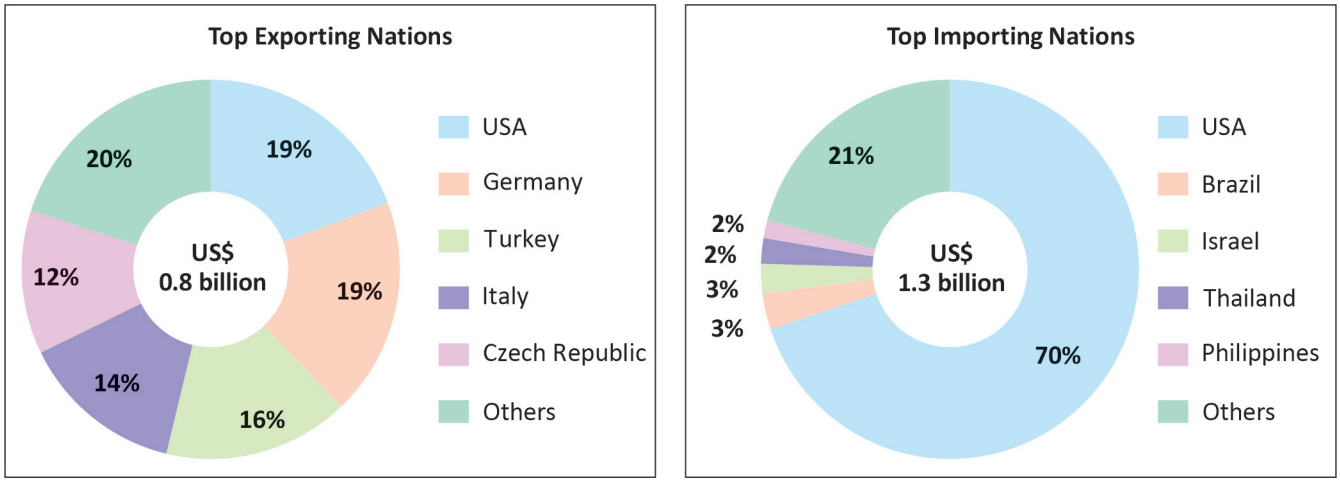


Source: ITC Trade Map; India Exim Bank Research

Trade in Revolvers and Pistols[17]

Global exports of revolvers and pistols have seen a marginal drop from US$ 0.9 billion in 2022 to US$ 0.8 billion in 2023. While there exists a well-diversified set of major exporting nations for revolvers and pistols, imports, however, are primarily sourced by the USA which holds an overwhelming share of almost 70% of total global import of revolvers and pistols in 2023. Germany (18.6%), Turkey (15.9%), Italy (14.0%) and the Czech Republic (12.3%) are among other major revolvers and pistols exporters worldwide.

Figure 2.16: Top Trading Countries for Revolvers and pistols in 2023



Source: ITC Trade Map; India Exim Bank Research

B.3. Naval Defence

Naval defence encompasses a diverse array of assets and technologies aimed at safeguarding maritime security. It includes warships and submarines, such as destroyers, aircraft carriers, and nuclear-powered vessels, along with naval aviation for surveillance and strike missions. As geopolitical tensions rise and new

[17] 9302 Revolvers and pistols (excluding those of heading 9303 or 9304 and sub-machine guns for military purposes)

maritime threats emerge, countries are investing heavily in modernising their naval fleet. This includes the development of advanced warships, submarines, aircraft carriers, and autonomous systems, alongside the integration of cutting-edge technologies like artificial intelligence, cyber defence, and missile defence systems.

Key players in the sector include the USA, China, Russia, and several European nations. According to the rankings of the World Directory of Modern Military Warships (WDMMW), the USA ranks first among the 39 countries assessed in global naval power, achieving the highest attainable TrueValueRating (TvR)[18] score of 323.9. This is attributed to its broad mix of warships and submarines and strong strength by numbers. Its current active inventory which includes frontline commissional vehicles, stands at 243 fleet units. Of these, submarines account for 28% of the fleet, followed by cruisers (9.1%), destroyers (28.8%), corvettes (8.6%), and others (25.5%).

China, securing the second spot in the WDMMW rankings with a TvR Score of 319.8, has the world's largest navy fleet, with 427 units in active inventory. About 17% of the fleet consists of submarines, followed by destroyers (11.5%), frigates (10.5%), corvettes (16.6%), mine warfare (11.5%), and offshore patrol vessels (29.7%). China is rapidly advancing its naval power, adopting more advanced surface and undersea vessels as well as critical support ships. China has a younger fleet compared to the USA with 70% of the warships launched after 2010 as against 25% of the USA[19]. China possesses a highly extensive shipbuilding industry and holds an advantage in guided missile cruisers and destroyers.

The WDMMW ranked Russian navy as the third most powerful naval force with a TvR score of 242.3, followed by the naval forces of Indonesia (TvR score of 137.3), South Korea (TvR score of 122.9), Japan (TvR score of 121.3), and India (100.5).

B.3.1. Global Trade in Warships

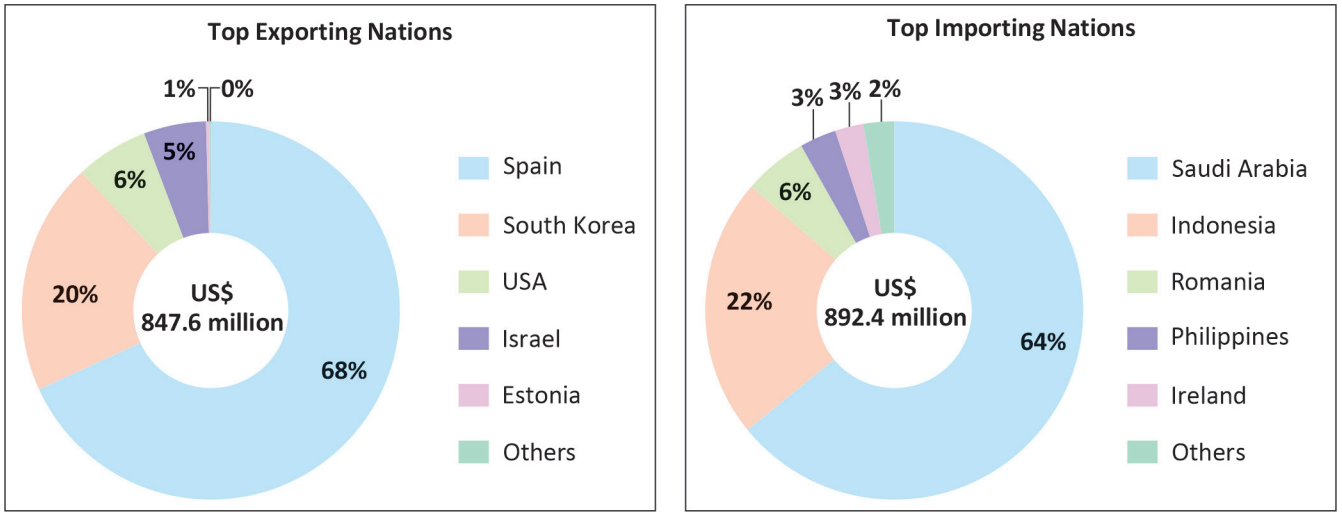
The global exports of warships[20] stood at US$ 847.6 million in 2023, down from US$ 1.1 billion in 2022 but a considerable rise from the exports of US$ 586.4 million a decade ago. Spain was the top exporting country for warships in 2023, accounting for 68.2% of the exports, followed by South Korea (19.9%), the USA (6.2%), and Israel (5.3%). It may be noted that a decade ago, the USA used to be the top exporter of naval ships. In 2014, its exports comprised half of the global exports of warships. However, its exports have declined over the years, falling from US$ 297.2 million in 2014 to US$ 52.7 million in 2023. The top importing countries for warships in 2023 were Saudi Arabia with a share of 64.1% in global imports, followed by Indonesia (22.2%), Romania (5.4%), Philippines (3.1%), and Ireland (2.4%) (Figure 2.17).

[18] The score is based on a formula that considers values related to total fighting strength of the carious naval services of the world. Besides quantity of warships and submarines, the formula incorporates factors related to quality, shipyard capabilities,

[19] Center For Strategic and International Studies. (2024). Unpacking China's Naval Buildup

[20] HS 890610: Warships of all kinds

Figure 2.17: Top Trading Countries for Warships in 2023



Source: ITC Trade Map; India Exim Bank Research

B.4. Communication Equipment

Communication equipment plays a pivotal role in defence, forming the backbone of modern military operations. It encompasses a wide range of technologies, from tactical radios and satellite communication systems to encryption devices and advanced data transfer networks. These systems ensure secure, real-time information exchange across various branches of the armed forces, enabling coordination, strategic decision-making, and mission success.

The evolving role of communication equipment in defence is becoming increasingly critical for securing national interests. As warfare shifts toward more sophisticated, digital battlefields, the ability to maintain secure, real-time communication between military units and command centers is essential for operational success and safeguarding sovereignty. Besides, the use of encrypted systems, quantum communication, and AI-driven cybersecurity measures ensures that critical military and strategic data remain secure from adversaries.

B.4.1. Global Trade in Communication Equipment

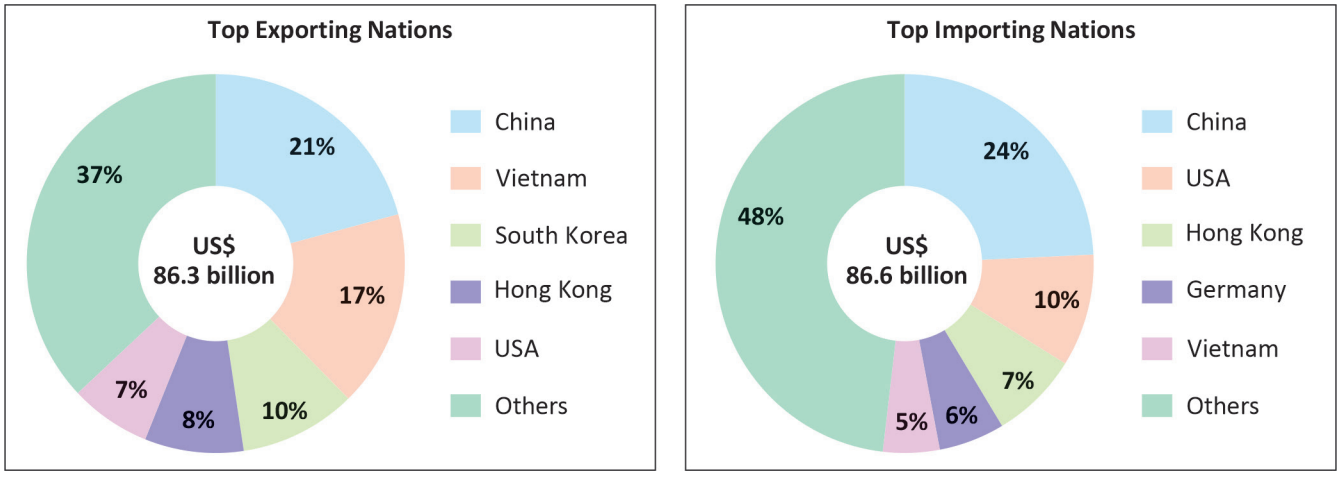
The world exports of select communication equipment having application in defence[21] stood at US$ 86.3 billion in 2023, up from US$ 77 billion in the previous year. Asia leads in the exports of such communication equipment. In 2023, China was the largest exporter in this category with exports at about US$ 18 billion, a share of 20.8% in global exports. Vietnam was the second largest exporter with exports at US$ 14.5 billion, followed by South Korea (US$ 8.6 billion), Hong Kong (US$ 7.3 billion), and the USA (US$ 6 billion).

China was also the top importing nation for defence communication equipment with imports at about US$ 21 billion, followed by the USA with imports of US$ 8.3 billion, Hong Kong (US$ 6.5 billion), Germany (US$ 4,9 billion), and Vietnam (US$ 4.2 billion). It is interesting to note that while China's imports in the

[21] Data included for HS 852550 (Transmission apparatus for radio-broadcasting or television, not incorporating reception apparatus); 852560 (Transmission apparatus for radio-broadcasting or television, incorporating reception apparatus); 852610 (Radar apparatus); 852691 (Radio navigational aid apparatus); 852910 (Aerials and aerial reflectors of all kinds); 852990 (Parts suitable for use solely or principally with flat panel display modules, transmission and reception apparatus for radio-broadcasting); and 854389 (Electrical machines and apparatus, having individual functions)

category have increased over the years, from US$ 8.8 billion in 2014 to US$ 21 billion in 2023, imports of the USA have fallen from US$ 11.3 billion in 2014 to US$ 8.3 billion in 2023.

Figure 2.18: Top Trading Countries for Select Communication Equipment in 2023



Source: ITC Trade Map; India Exim Bank Research
Note: As these are dual use goods, the exports encompass both civilian and military applications.

Among the segments considered, the global exports were the highest of parts for radio-broadcasting, radar apparatus, radio navigational aid apparatus, radio remote control apparatus, and others (HS 852990) at US$ 58.3 billion in 2023. The global exports of radio navigational aid apparatus were recorded at US$ 10.3 billion, of radar apparatus at US$ 7.6 billion, of aerials and aerial reflectors at US$ 5.4 billion, and of transmission apparatus for radio-broadcasting or television, both incorporating reception apparatus or not at US$ 4.7 billion (Table 2.4).

Table 2.4: Segment-wise Global Exports of Select Communication Equipment Finding Applications in Defence in 2023

HS Code	Segment	Export Value (in US$ billion)
852990	Parts for radio-broadcasting, radar apparatus, radio navigational aid apparatus, radio remote control apparatus, and others	58.3
852691	Radio navigational aid apparatus	10.3
852610	Radar apparatus	7.6
852910	Aerials and aerial reflectors of all kinds and parts	5.4
852560	Transmission apparatus for radio-broadcasting or television, incorporating reception apparatus	2.4
852550	Transmission apparatus for radio-broadcasting or television, not incorporating reception apparatus	2.3

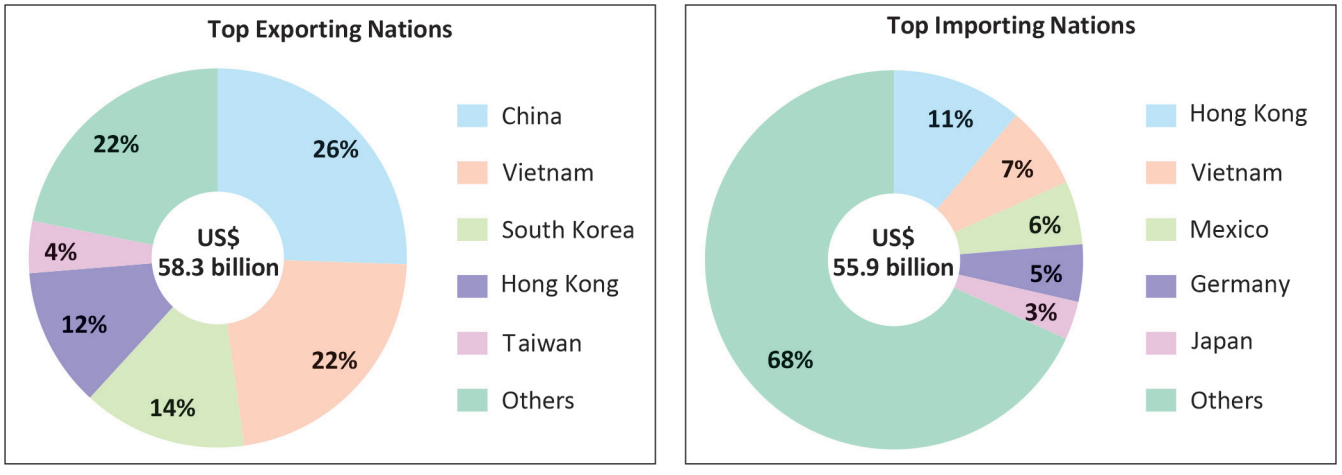
Source: ITC Trade Map; India Exim Bank Research

Trade in Parts for Radio-Broadcasting, Radar Apparatus, Radio Navigational Aid Apparatus, Radio Remote Control Apparatus, and Others

The global exports of parts of radio-broadcasting, radar apparatus, radio navigational aid apparatus and others stood at US$ 58.3 billion in 2023, a 13% growth from exports of US$ 51.8 billion in 2022. Notably, the top

five exporting countries were all from Asia, accounting for over 78% of global exports. The top importing nations for parts of radio-broadcasting, radar apparatus, radio navigational aid apparatus and others in 2023 were Hong Kong, accounting for 11% of imports, Vietnam (7%), Mexico (6%), Germany (5%), and Japan (3%).

Figure 2.19: Top Trading Countries for Parts for Radio-Broadcasting, Radar Apparatus, Radio Navigational Aid Apparatus and Others in 2023

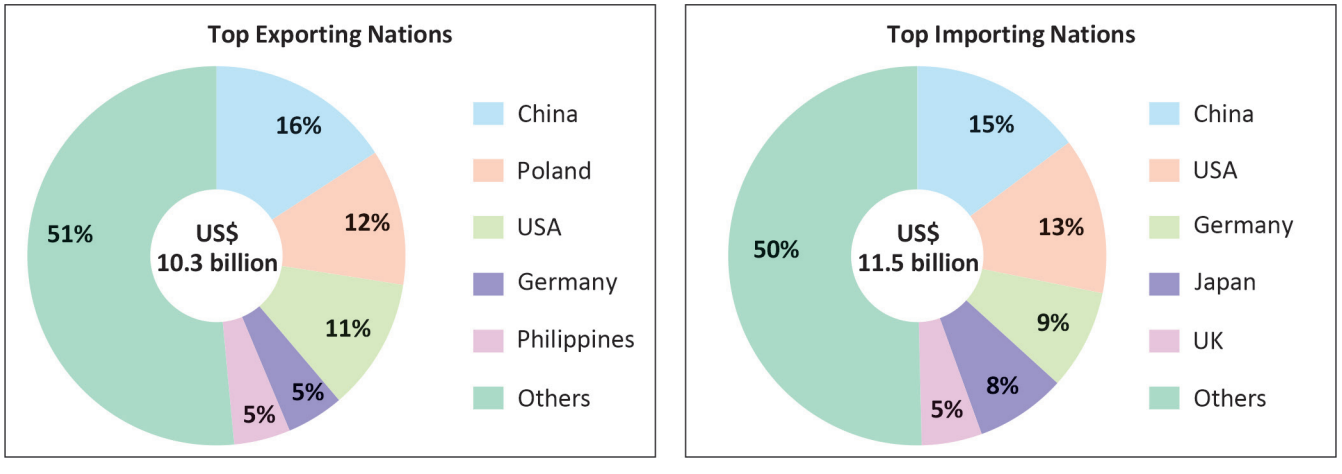


Source: ITC Trade Map; India Exim Bank Research

Trade in Radio Navigational Aid Apparatus

The global exports of radio navigational aid apparatus have risen sharply from US$ 8.9 billion in 2022 to US$ 10.3 billion in 2023. The top exporters of the product category in 2023 were China with a share of 16% in global exports, followed by Poland (12%), the USA (11%), Germany (5%), and the Philippines (5%). China was also the top importing country for radio navigational aid apparatus in 2023, constituting a share of 15% in global imports, followed by the USA (13%), Germany (9%), Japan (8%), and the UK (5%).

Figure: 2.20: Top Trading Countries for Radio Navigational Aid Apparatus in 2023



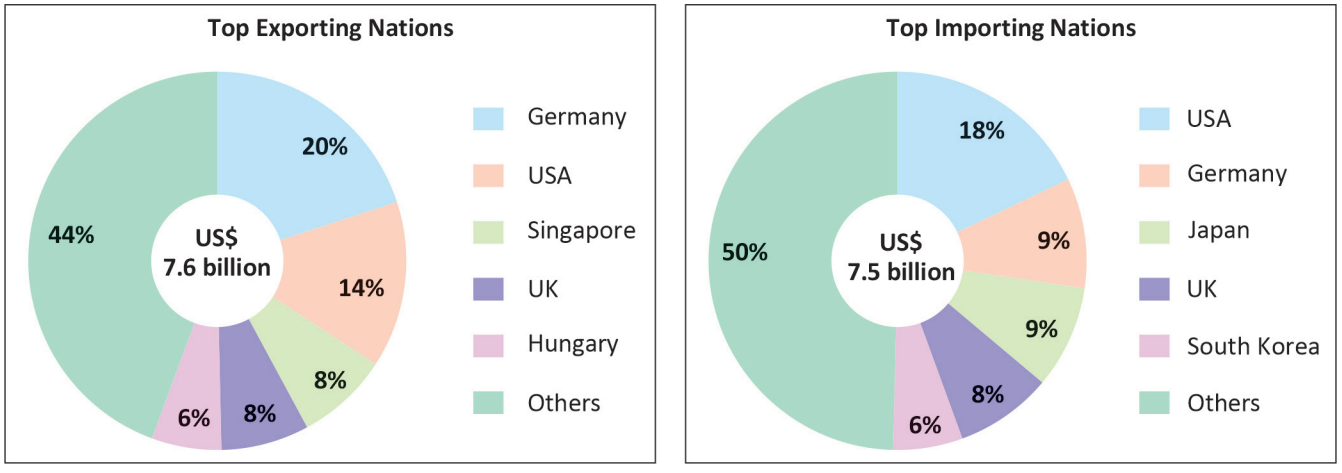
Source: ITC Trade Map; India Exim Bank Research

Trade in Radar Apparatus

Radar apparatus is crucial in defence for detecting, tracking, and identifying potential threats such as aircraft, missiles, and ships, ensuring early warning and response capabilities. It also enhances battlefield awareness,

enabling precise targeting and coordination of defence systems. The global exports of radar apparatus in 2023 stood at US$ 7.6 billion with the top exporting nations being Germany with a share of 20% in global exports, the USA (14%), Singapore (8%), the UK (8%), and Hungary (6%). The top importing nations were the USA, accounting for 18% of global imports, Germany (9%), Japan (9%), the UK (8%), and South Korea (6%).

Figure: 2.21: Top Trading Countries for Radar Apparatus in 2023

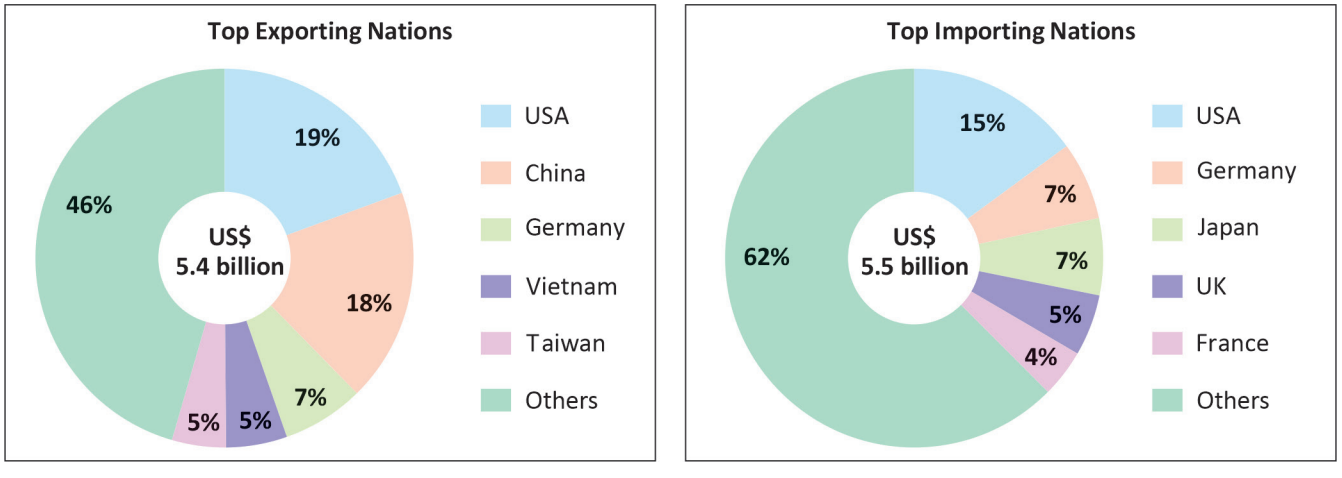


Source: ITC Trade Map; India Exim Bank Research

Trade in Aerials and Aerial Reflectors of all Kinds and Parts

Aerials and aerial reflectors are instrumental for transmitting and receiving communication, navigation, and radar signals, ensuring seamless communication across military systems. They enhance signal range and accuracy, supporting effective coordination and surveillance in complex environments. The global exports in the segment stood at US$ 5.4 billion in 2023. The top exporting countries in 2023 were the USA with a share of 19% in global exports, followed by China (18%), Germany (7%), Vietnam (5%), and Taiwan (5%). The USA and Germany were also the top importing countries in the segment.

Figure 2.22: Top Trading Countries for Aerials and Aerial Reflectors and Parts in 2023



Source: ITC Trade Map; India Exim Bank Research

In Conclusion

It is evident that while the traditional defence superpowers such as the USA, France and Russia remain formidable players and top exporters in the defence equipment industry, many Asian nations such as China are increasingly exuding dominance in emerging technology driven segments such as drones and advanced communication systems. China has also been rapidly developing its naval prowess, thereby positioning itself as a key contender in the global market.

Simultaneously, countries that have historically relied heavily on imports, like Saudi Arabia and India, are actively bolstering their domestic defence industries to reduce dependence and enhance self-reliance. Although India has made significant strides in building its defence manufacturing capacity, its current position in the global export market remains modest. The subsequent chapters provide insights about the performance and trade trends in India's defence equipment industry.

Chapter

Global Industry Support: Select Country Analysis

Growing geopolitical conflicts are driving nations to prioritise strengthening their defence capabilities. Heightened tensions and territorial disputes necessitate advanced military capabilities to ensure national security. As a result, countries are investing in modernising their armed forces, developing new technologies, and strengthening alliances.

A. Support by Select Countries

The USA

Globally, the USA has the highest defence expenditure. As a percentage of GDP, the USA's defence expenditure stood at 3.38% in 2024. For FY 2025, the proposed budget for defence is US$ 849.8 billion, a 4.2% increase over the FY 2023 base level of US$ 815.9 billion. The budget focuses on investing in capabilities to maintain a “ready, lethal, and combat-credible joint force” for mitigating risks against China and Russia, particularly.

The major investments envisaged include:

Table 3.1: Select Planned Investments by the USA (US$ billion)

Category	FY 2025
Modernisation	147.5
R&D for Artificial Intelligence, 5G, and Experimentation	143.2
Air Power	61.2
Nuclear Enterprise Modernisation	49.2
Sea Power	48.1
Space capabilities	33.7
Missile Defeat and Defence	28.4
Cyberspace Activities	14.5
Land Power	13
Long-Range Fires	9.8

Source: United States Department of Defense

The USA released the "National Defense Strategy" in 2022 which outlines how the country will respond to growing threats and changes for safeguarding national interests. Investments are accorded a key role in the strategy for inter alia, integrating cutting-edge technologies including advanced capabilities in directed energy, hypersonics, integrated sensing, and cyber technologies and in emerging fields such as biotechnology, quantum science, advanced materials, and clean-energy technology. Investments are also envisioned to be instrumental for strengthening the defence industrial base and enabling advanced manufacturing processes.

Furthermore, in January 2024, the USA released its first ever "National Defense Industrial Strategy" with the vision of modernising the defence industrial ecosystem in sync with the National Defense Strategy. It advocates for sustained collaboration and cooperation between the entire US government, private industry, and overseas partners. The four long term strategic priorities in the Strategy are -

- **Resilient supply chains**: Ensuring supply chains can securely produce necessary products and technologies at the required speed, scale, and cost. This involves increasing capacity, managing risks, supporting domestic production, and engaging with global partners.
- **Workforce readiness**: Building a diverse, skilled workforce prepared for technological innovation, with a focus on critical skill sets in science, technology, engineering, and math.
- **Flexible acquisition**: Developing strategies that balance efficiency, maintainability, and customisation in defense systems, reducing development times, costs, and ensuring scalability.
- **Economic deterrence**: Promoting market mechanisms that support a resilient defence industrial ecosystem, enhancing international alliances, and deterring adversarial entities by safeguarding economic security and technological innovations.

The UK

The UK has earmarked £57.1 billion (US$ 73.6 billion) for defence in the budget 2024-25, a 4.5% rise from the £54.2 billion in the previous year. The UK's defence spending as a percentage of GDP, at 2.33%, ranked 9th out of the 32 NATO member states for 2024. The UK plans to increase the spending further to 2.5% of GDP by 2030.

The major focus areas set out for the decade are -

- **Strengthening the defence industrial base**: There are plans to invest "at least an additional £10 billion" over the next decade on munitions production, delivering high-quality jobs, and investment across the UK and to ensure that there is rapid production capacity and stockpiles of next-generation munitions.
- **Modernising the armed forces**: The UK plans to reform defence procurement and create a new "Defence Innovation Agency" to ensure availability of cutting-edge modern warfare technology, with at least 5% of the defence budget to be committed to R&D.
- **Backing Ukraine's defence**: The UK Government has committed an additional £500 million in budget 2024-25 for providing ammunition, air defence and drones to Ukraine. The UK remains committed in supporting Ukraine in maintain existing levels of support for as long as needed.

Saudi Arabia

Saudi Arabia, the fifth largest defence spender globally, allocated a corpus of SR 269 billion (US$ 71.7 billion) for defence in its 2024 Budget. Saudi Arabia has been increasing the defence budget to support its Vision 2030 goals of localising 50% of its military procurement by 2030. Two military industrial bodies, General

Authority for Military Industries (GAMI) and Saudi Arabian Military Industries (SAMI) are at the forefront of working on this vision.

GAMI launched the Military Industries Enabler initiative in 2023, aimed at creating a new platform for providing opportunities to local and international investors in the country's defence industry. Saudi Arabia has unveiled an offering of ten investment prospects with applications in both military and civilian domains, in the first phase under the initiative.

The investment opportunities in the first phase cover segments such as batteries, wires, cables, harnesses, and fiber optics, mechanical transmission components, aircraft propellers and components as well as pipes, tubes, and rigid tubing, brakes, axles, track components, electronic circuit components etc. Incentives such as financial concessions including interest-free loans for select products and grants are being offered by Saudi Arabia, thereby creating an attractive investment environment for both companies based in the country and overseas.

China

China's 2024 defence budget reached RMB 1.66 trillion (US$ 236 billion), an on-year increase of 7.2% in 2024, the most in five years. The rate of real annual growth in China is persistently higher compared to the rest of Asia, averaging 6% as compared to 3% for the rest of the continent since 2014[22].

China is investing heavily in modernising its military capabilities. China's Military-Civil Fusion Policy aims to develop the People's Liberation Army (PLA) into a "world-class military" by 2049. China is acquiring global intellectual property and investing in technology to support its military goals. Key aspects of the policy include integrating the defense and civilian industrial bases, improving efficiency, and achieving self-reliance in critical technologies and materials. The Made in China 2025 initiative also aims at self-sufficiency in aerospace, communications, and transportation.

Russia

In the 2024 budget, Russia proposed a record defence spending of 36.6 trillion rubles (US$ 408.7 billion), a massive increase of about 30% over the previous year and equivalent to about 6% of its GDP. Most of the planned defence spending is expected to go towards producing military equipment and in payments to the wounded in Ukraine as well as to the families of the killed soldiers.

The State Armament Program 2027 (GPV 2027) forms the basis of Russia's defence procurement and military priorities until 2027. Under the programme, the Ministry of Defence is responsible for procurement of military equipment, its modernisation and repair, and research and development. The plan prioritises Russia's ground forces and improving the rapid reaction forces, including Spetsnaz, Naval Infantry, and Airborne and Air Assault Troops.

Besides, a key priority of the GPV 2027 is the development of long range and precision-strike capabilities. This includes sea and air-launched cruise missiles (3M-54 Kalibr, Kh101/102), land-based short and intermediate-range missiles (9K720 Iskander-M, 9M729 Novator), air-launched ballistic missiles (Kh-47M2 Khinzhal), and hypersonic missiles (3M-22 Zircon, Avangard).

[22] International Institute for Strategic Studies

Germany

In its 2025 Budget allocations, Germany has allocated €53.2 billion (US$ 57.7 billion) for its defence sector, an increase of €1.25 billion from the previous year. With this budget, the NATO target of achieving spending equivalent to 2% of GDP would be achieved.

Germany's 2023 Defence Policy Guidelines identify key objectives as further strengthening NATO as a guarantor of deterrence and defence, meeting NATO Capability Targets, and strengthening the Bundeswehr's regional defence capability. Military aid to Ukraine is planned to be doubled in 2024, to €8 billion (US$ 8.9 billion).

B. Support by ECAs to the Defence Sector

Export-Import Bank of the United States

While the Export-Import Bank of the United States (US EXIM) is prohibited by law from financing defence articles and services, it assesses items based on the foreign end-user, the nature of the item, and its intended use. Items sold to military organisations or primarily designed for military use are presumed to be defence articles unless proven otherwise. Exceptions include small craft used for border patrol, drug interdiction, and natural resource monitoring, even if sold to military entities.

Dual-use items, which have both military and civilian applications, are eligible for support if proven non-lethal and primarily for civilian use, with certification from the buyer or end-user. Further, under the U.S. Anti-Drug Abuse Act of 1988, a waiver can allow US EXIM to support defence articles if a Presidential Determination of National Interest, requested through the U.S. Department of State, confirms the item is for drug interdiction purposes. In fiscal year 2022, US EXIM did not finance any new dual-use exports. As of August 2023, it was monitoring one transaction from fiscal year 2021, involving financing provided to Mexico for satellites launched in 2012 and 2015.

UK Export Finance

The UK Export Finance (UKEF) plays a pivotal role in financing exports of defence and aerospace from the UK. The UKEF is in the process of working closely with the Department for Business and Trade, Ministry of Defence, and other Government agencies to strengthen relationships with overseas stakeholders and tailor their defence product offering accordingly.

Under UKEF's direct lending, wherein loans are provided to overseas buyers to facilitate the purchase of capital goods and services from exporters in the UK, an amount of £1 billion (US$ 1.3 billion) has been allocated for defence transactions. In aerospace particularly, UKEF has had a long working relationship with top aerospace companies like Airbus, Boeing and Rolls-Royce. In 2022-23, UKEF provided about US$ 2 billion of support for aerospace exports including US$ 724 million of support for Airbus deliveries, a US$ 1.2 billion Export Development Guarantee facility for Rolls-Royce and a US$ 7.5 million loan guarantee for the sale of flight simulators. However, given that there is need for the aerospace sector to decarbonise, UKEF has set targets to reduce its emissions exposure from the aerospace sector.

Export Finance Australia

Export Finance Australia (EFA) provides financial expertise and solutions to support Australian defence exports across various sectors, including advanced manufacturing, engineering, and software. EFA assists businesses

ranging from small and medium enterprises to large defence primes by offering financing options to help them enter and fulfil international defence contracts.

EFA manages the Australian Government's National Interest Account, which includes the Critical Minerals Facility, the Defence Export Facility, and loans for the Australian Infrastructure Financing Facility for the Pacific. The US$ 3 billion defence export facility administered by EFA is designed to enhance defence export capabilities. The facility offers financial support for Australian defence exports, including for dual-use goods or services intended for defence or national security-related end-users overseas.

In Conclusion

The evolving landscape of investment trends in the defence sector, both in India and globally, underscores a significant shift towards enhancing national security through technological innovation and self-reliance. Amid ongoing conflicts and geopolitical tensions, such as the Russia-Ukraine war and various regional disputes, nations are prioritising robust defence capabilities to safeguard their sovereignty and strategic interests. Global investment patterns reveal an increased emphasis on defence spending to address these emerging threats and geopolitical challenges.

Chapter

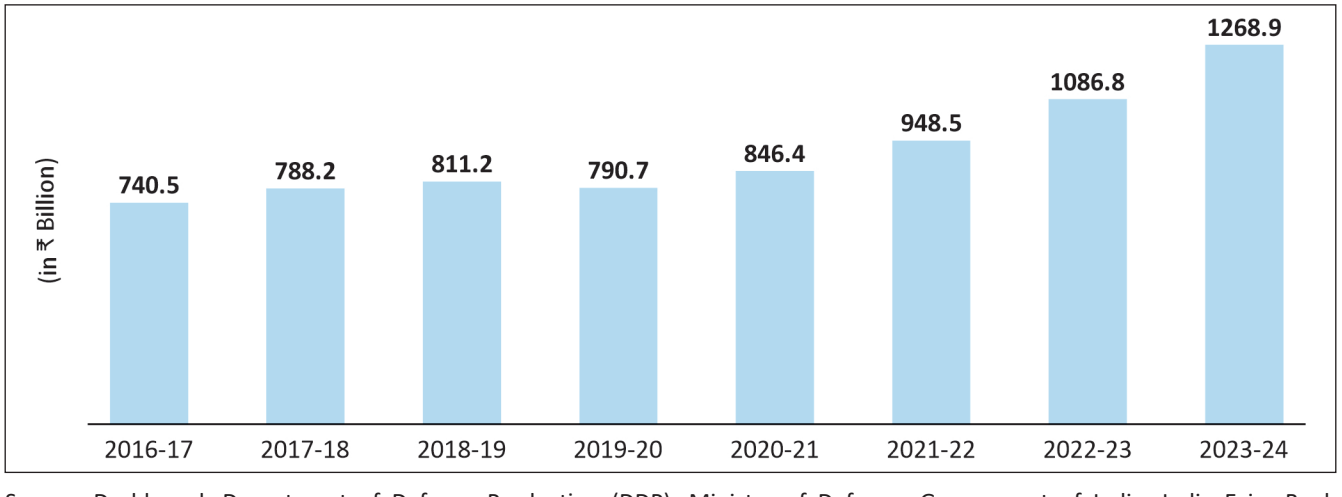
4 Defence Equipment Industry in India

The Government of India has identified the defence sector as one of the focus areas for its 'Aatmanirbhar Bharat' initiative, thus aiming to expand the indigenous manufacturing infrastructure and reducing India's arms import dependency with support from an improved R&D ecosystem. With the objective of developing the Indian defence industry, the Government is focusing on better indigenisation of the sector in ways of production and procurement by including both the public and private players.

Established in 1962, the country's defence manufacturing is overseen by the Department of Defence Production (DDP), Ministry of Defence. With the objective of developing a comprehensive domestic production infrastructure, the DDP has established a variety of production facilities pertaining to different defence equipment through several Defence Public Sector Undertakings (DPSUs). In 2021, the Government converted the previously functioning Ordnance Factory Board (OFB) into seven new DPSUs thereby increasing the number of Central Public Sector Undertakings under DDP to sixteen.

India's defence production has been on a gradual upward trajectory for the period 2016-17 to 2023-24 as shown in **Figure 4.1**. Over this time period, total production in the sector grew at an average of ₹ 892.1 billion, increasing almost two folds from ₹ 740.5 billion in 2016-17 before reaching its highest value at ₹ 1268.9 billion in 2023-24. As an exception to the otherwise increasing trend, defence production dipped in 2019-20 after being adversely impacted by the COVID-19 pandemic induced disruptions to manufacturing.

Figure 4.1: India's Defence Production



Source: Dashboard, Department of Defence Production (DDP), Ministry of Defence, Government of India; India Exim Bank Research

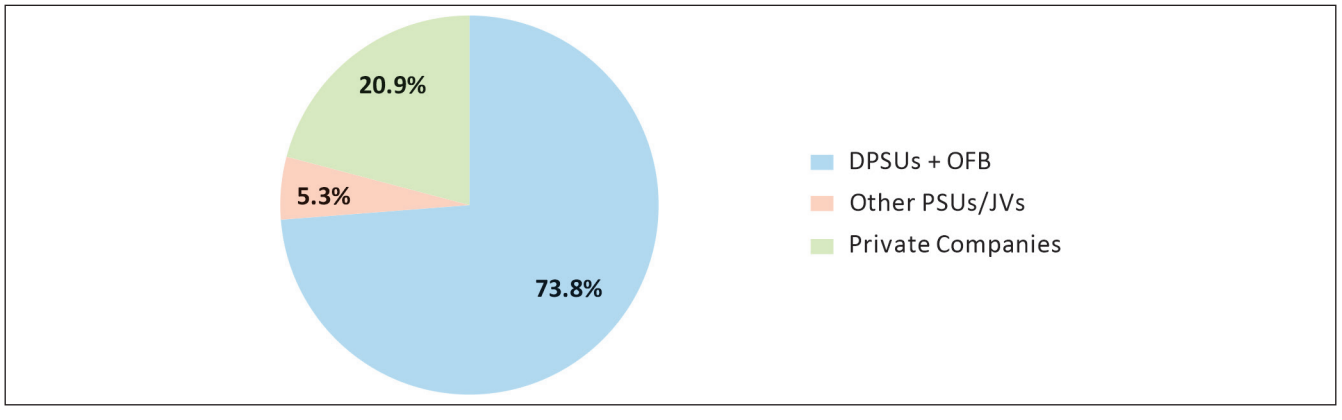
As seen in **Table 4.1**, India's defence production is predominantly attributable to the public sector entities which have been contributing consistently to the majority of the country's total defence production[23]. In 2023-24, public sector entities including any joint ventures, accounted for a share of 79% of all of India's defence production at ₹ 1003.8 billion, followed by private sector companies producing a value of ₹ 265.1 billion making up a share of 21%. The share of defence production attributed to public or private entities have mostly been maintained. The segment-wise break up for India's defence production in 2023-24 is shown in **Figure 4.1**.

Table 4.1: Contribution of Public and Private Sectors to India's Defence Production

Year	Defence Public Sector Undertakings (in ₹ billion)	New Defence Public Sector Undertakings (in ₹ billion)	Other Public Sector Undertakings/Joint Ventures (in ₹ billion)	Defence Private Companies (in ₹ billion)	Total Production (in ₹ billion)	Share of Public Sector Entities (%)	Share of Private Sector Entities (%)
2016-17	404.3	148.3	47.0	141.0	740.5	81.0	19.0
2017-18	434.6	148.3	51.8	153.5	788.2	80.5	19.5
2018-19	453.9	128.2	55.7	173.5	811.2	78.6	21.4
2019-20	476.6	92.3	63.0	158.9	790.7	79.9	20.1
2020-21	467.1	146.4	60.3	172.7	846.4	79.6	20.4
2021-22	557.9	119.1	72.2	199.2	948.5	79.0	21.0
2022-23	634.7	170.0	71.4	210.8	1086.8	80.6	19.4
2023-24	739.5	196.6	67.7	265.1	1268.9	79.1	20.9

Source: Dashboard, Department of Defence Production (DDP), Ministry of Defence, Government of India; India Exim Bank Research

Figure 4.2: Segment-wise Defence Production in 2023-2024



Source: Dashboard, Department of Defence Production (DPP), Ministry of Defence, Government of India, India Exim Bank Research

As per DDP, some of the products manufactured in India include arms and ammunition, armoured vehicles, heavy vehicles, fighter aircrafts and helicopters, warships, missiles, electronic equipment, earth moving equipment, among others.

[23] There are 16 Central Public Sector Undertakings under the administrative control of DDP, Ministry of Defence. These include Hindustan Aeronautics Limited, Bharat Electronics Limited, Bharat Dynamics Limited, Bharat Earth Movers Limited, Mazagon Dock Shipbuilders Limited, Garden Reach Shipbuilders and Engineers Limited, Goa Shipyard Limited, Hindustan Shipyard Limited, Mishra Dhatu Nigam Limited, Munitions India Limited, Armoured Vehicles Nigam Limited, Advanced Weapons and Equipment India Limited, Troop Comforts Limited, Yantra India Limited, India Optel Limited, and Gliders India Limited

In terms of production value of DPSUs, Hindustan Aeronautics Limited (HAL) held the largest share in 2020-21 at 34% of total defence production in India, followed by Bharat Electronics Limited (BEL) at 24%. Further, in line with the Government's Atmanirbhar Bharat initiative, HAL indigenised 1298 items in 2022-23 which is likely to have resulted in the annual foreign exchange saving of ₹ 160.30 crores.[24]

Notably, India's defence production also extends to several 'dual-use items' as listed under the nomenclature of Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET). Termed so, owing to its potential in both civilian/industrial applications and usage as weapons of mass destruction, goods in this list are subjected to export control under India's Foreign Trade Policy. Thus, export of these items is regulated by the Government in ways of either being prohibited or permitted under license issuance. As updated in September 2024, currently, both the Directorate General of Foreign Trade (DGFT) as well as the DDP are the licensing authorities for all items falling under Category 6 of SCOMET for military end use.

Budgetary Support in India

In the Union Budget 2024-25, the Government of India allocated ₹6.2 trillion for defence, which was an increase of 4.3% from the revised estimates of the previous year. The allocation accounts for 12.9% of the total budget for 2024-25. Of this, ₹1.7 trillion is earmarked for capital outlay in defence, a rise of 9.4% from the revised estimates of 2023-24. This expenditure majorly includes purchasing new weapons, aircraft, warships, and other military hardware.

Notably, funds equivalent ₹1.05 trillion in the capital outlay are meant for domestic capital procurement, aimed at further boosting self-reliance in the sector. A fund of ₹402.78 billion is earmarked for aircraft and aero engines, ₹238 billion for naval fleet, ₹16.97 billion for Air Force projects, ₹68.3 billion for naval dockyard/ projects, ₹46.38 billion for heavy and medium vehicles, and ₹621.98 billion for other equipment.

Coming to related areas, the budget allocation for space technology was ₹100.88 billion in 2024-25, up by 23% from the revised estimates of the previous year and for space applications was ₹16 billion, up by 5.6%.

Table 4.2: Select Allocations for Defence, Aerospace and Communication Sector

Segment	Budget Estimates 2024-25 (₹ billion)
Other equipment	621.98
Aircraft and aero engines	402.78
Naval fleet	238.00
Space technology	100.88
Naval dockyard projects	68.30
Heavy and medium vehicles	46.38
Projects of the Air Force	16.97
Space applications	16.12

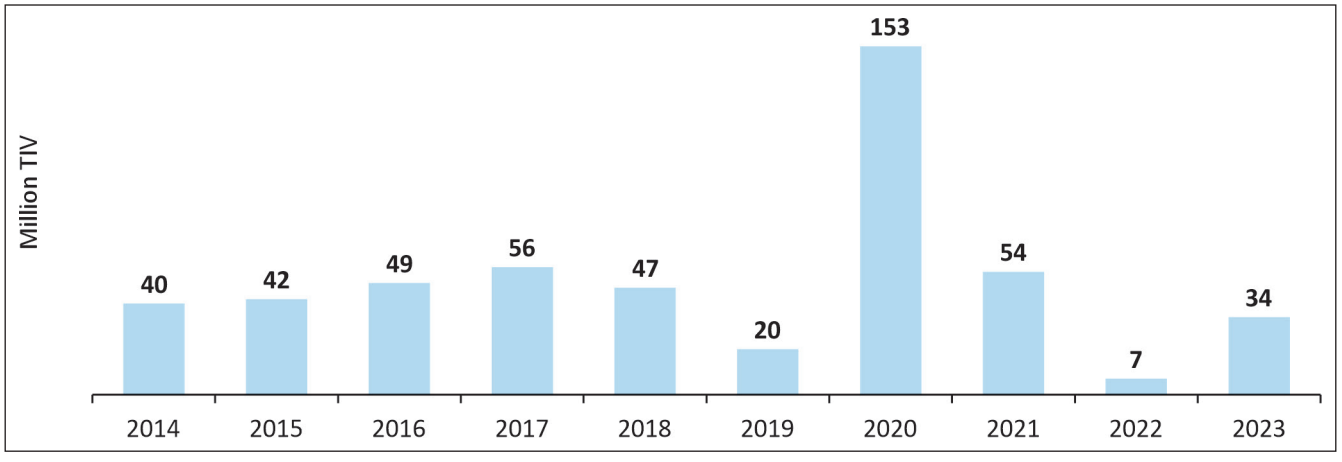
Source: India Union Budget Documents 2024-25

[24] Annual Report 2022-23, Hindustan Aeronautics Limited (HAL)

Foreign Trade

As reported by SIPRI, the volume of India's major arms exports expressed in million TIV, saw a fall from 40 million in 2014 TIV to 34 million TIV in 2023. Major arms exports skyrocketed in 2020 to reach 153 million TIV.

Figure 4.3: Volume of India's Arms Exports (in million TIV)

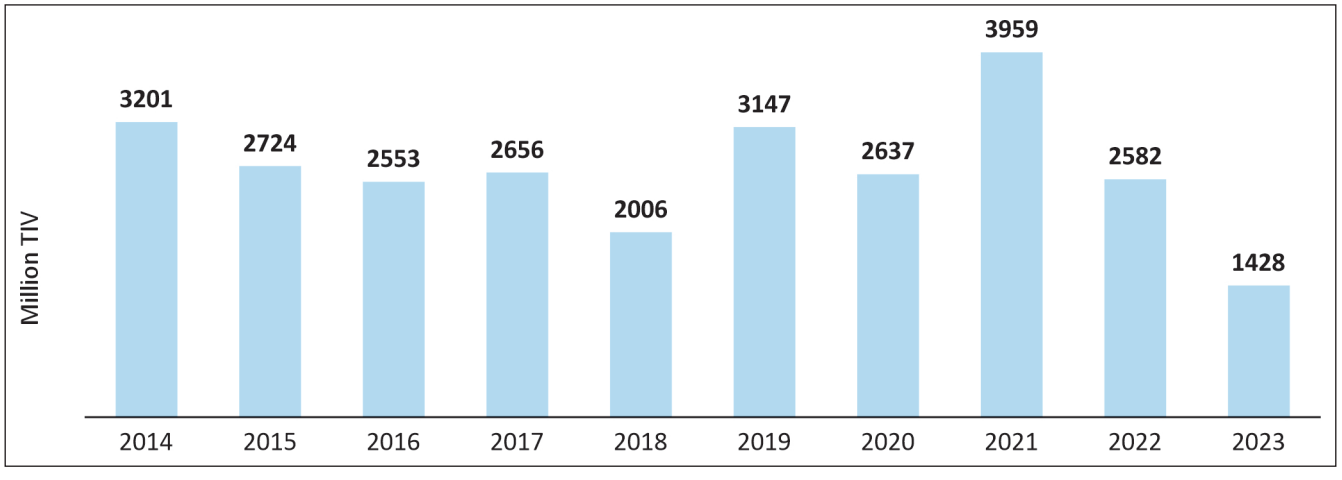


Source: Stockholm International Peace Research Institute (SIPRI); India Exim Bank Research

During 2014-2023, India's major arms imports have consistently far exceeded those of major arms exports. In terms of million TIV, India's volume of major imports has seen a fall from 3201 million TIV in 2014 to 1428 million TIV in 2023. The peak was reached in 2021 when India's major arm imports was 3959 million TIV.

In 2023, as per SIPRI, India's import of major weapons was topped by missiles with a share of almost 40%, followed by air defence systems at approximately 30% of all such imports in the year. At the start of the decade in 2014, however, imports of major weapons were heavily concentrated in aircrafts that held a share of almost 80% of such imports by India in the year. Notably, if the general import trend is studied for the period of 2014-2023, aircrafts make up more than half of all major weapon imports by India, followed by missiles.

Figure 4.4: India's Arms Imports (in million TIV)



Source: Stockholm International Peace Research Institute (SIPRI); India Exim Bank Research

Table 4.3: Weapon Category-wise Arms Imports by India (in million TIV)

Category	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Aircraft	2543	2090	1589	1288	954	1893	1597	1929	837	226
Missiles	277	240	416	499	425	385	449	652	679	542
Armoured vehicles	80	80	120	216	254	235	257	330	319	50
Air defence systems	-	-	270	270	270	-	-	177	130	412
Ships	-	-	-	300	-	300	-	599	300	-
Sensors	151	181	66	13	20	73	64	92	140	99
Engines	99	92	65	58	54	58	56	61	97	69
Artillery	-	-	-	2	30	204	203	91	49	-
Naval weapons	50	41	29	12	-	-	12	29	32	30
Total	**3200**	**2724**	**2555**	**2658**	**2007**	**3148**	**2638**	**3960**	**2583**	**1428**

Source: Stockholm International Peace Research Institute (SIPRI)

As for the top export destinations of India's major arms exports during the period of 2014-2023, Myanmar tops the list receiving 38% of all such exports over the decade. In 2014, Mauritius received the vast majority of these exports from India. In 2023, the list of recipient countries for such arms goods from India became less diverse with Vietnam alone accounting for an overwhelming majority of 88.2%, followed by Armenia at 11.8%.

Table 4.4: India's Top Export Destinations for Major Weapon Categories

Export Destination	Million TIV (2014)	Share in 2014 (%)	Export Destination	Million TIV (2023)	Share in 2023 (%)
Mauritius	28	68.3%	**Vietnam**	30	88.2%
Seychelles	6	14.6%	**Armenia**	4	11.8%
Nepal	5	12.2%	**-**	-	-
Namibia	2	4.9%	**-**	-	-
Total	**41**	**100.0%**	**Total**	**34**	**100.0%**

Source: Stockholm International Peace Research Institute (SIPRI); India Exim Bank Research

As per global trade trends in arms as reported by SIPRI, India was the world's largest arms importer for the time period 2019-2023, accounting for a share of 9.8% of global arms imports over the period, followed by Saudi Arabia (8.4%) and Qatar (7.6%).

India's import sources for major weapon categories have remained largely unchanged over the past decade, with Russia being the largest arms provider holding a share of almost 50% of all major arms imports by India during 2014-2023. In 2023, however, Israel was India's largest arms import source followed by Russia. Other recurring top arms import source for India include the USA, the UK and France.

Table 4.5: India's Top Import Sources for Major Weapon Categories

Import Source	Million TIV (2014)	Share in 2014 (%)	Import Source	Million TIV (2023)	Share in 2023 (%)
Russia	1582	49.4%	**Israel**	596	41.7%
USA	1115	34.8%	**Russia**	405	28.3%
Israel	155	4.8%	**France**	251	17.6%
UK	150	4.7%	**USA**	71	5.0%
France	54	1.7%	**Germany**	33	2.3%
Others	145	4.6%	**Others**	74	5.1%
Total	**3201**	**100.0%**	**Total**	**1430**	**100.0%**

Source: Stockholm International Peace Research Institute (SIPRI); India Exim Bank Research

Segment-wise Analysis

A. Aerospace Equipment

India's exports of aerospace equipment (HS 88) stood at US$ 1.9 billion in 2023, constituting a share of 0.6% in global exports of aerospace. Imports on the other hand equalled US$ 10.1 billion in 2023, a share of 4.5% in world imports of aerospace equipment. The top exported items in 2023 were parts of aircraft and spacecraft, with a share of 78% in India's aerospace exports and powered aircraft such as helicopters, aeroplanes and spacecraft but excluding unmanned aircraft (26%). India's imports in these segments are also high. India's imports of powered aircraft were to the tune of US$ 9.5 billion in 2023, leading to a trade deficit of (-) US$ 9 billion while in the parts of aircraft and spacecraft, India registered a trade surplus of US$ 1 billion.

Table 4.6: India's Trade in Aerospace Equipment: Segment-wise (in US$ million)

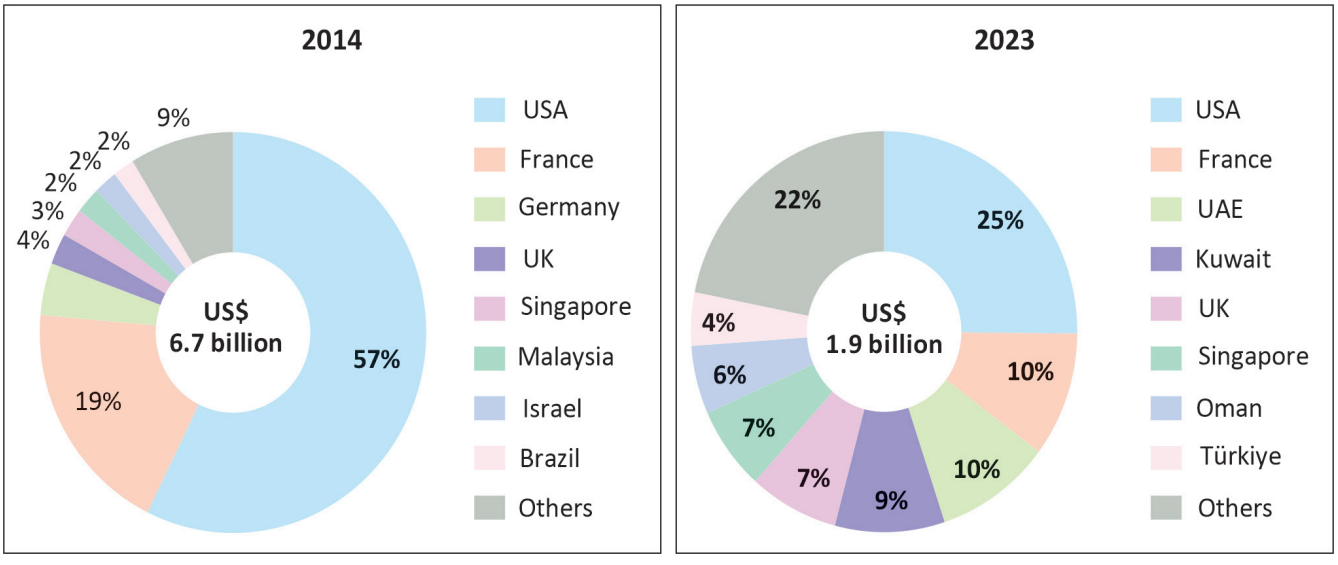
HS Code	Top Segments	Exports		Imports	
		2014	2023	2014	2023
8803/8807[25]	Parts of aircraft and spacecraft	1427.8	1513.3	1416.7	479.8
8802	Powered aircraft "e.g. helicopters and aeroplanes" (excl. unmanned aircraft); spacecraft, incl. satellites, and suborbital and spacecraft launch vehicles	5247.8	499.9	479.0	9544.2
8805	Aircraft launching gear	44.7	14.8	11.7	57.5
8806[26]	Unmanned aircraft	-	1.4	-	2.4
8804	Parachutes, incl. dirigible parachutes and paragliders, and rotochutes; parts thereof and accessories thereto, n.e.s.	0.5	1.4	0.3	1.2
8801	Balloons and dirigibles; gliders, hang gliders and other non-powered aircraft	0.5	0.6	0.05	0.4
	Total	**6721.2**	**1933.3**	**2091.5**	**10,085.4**

Source: ITC Trade Map; India Exim Bank Research

[25] The HS code for parts of aircraft and spacecraft changed from 8803 to 8807 in 2022.
[26] The HS code was created in 2022.

While the USA has remained India's top export destination for aerospace equipment over the years, its share in India's exports has decreased from 57% in 2014 to 25% in 2023. Similarly, France has remained the second largest export destination with its share in India's exports at 19% in 2014 and 10% in 2023. The other top export destinations for India in aerospace in 2023 were the UAE (10%), Kuwait (9%), the UK (7%), and Singapore (7%).

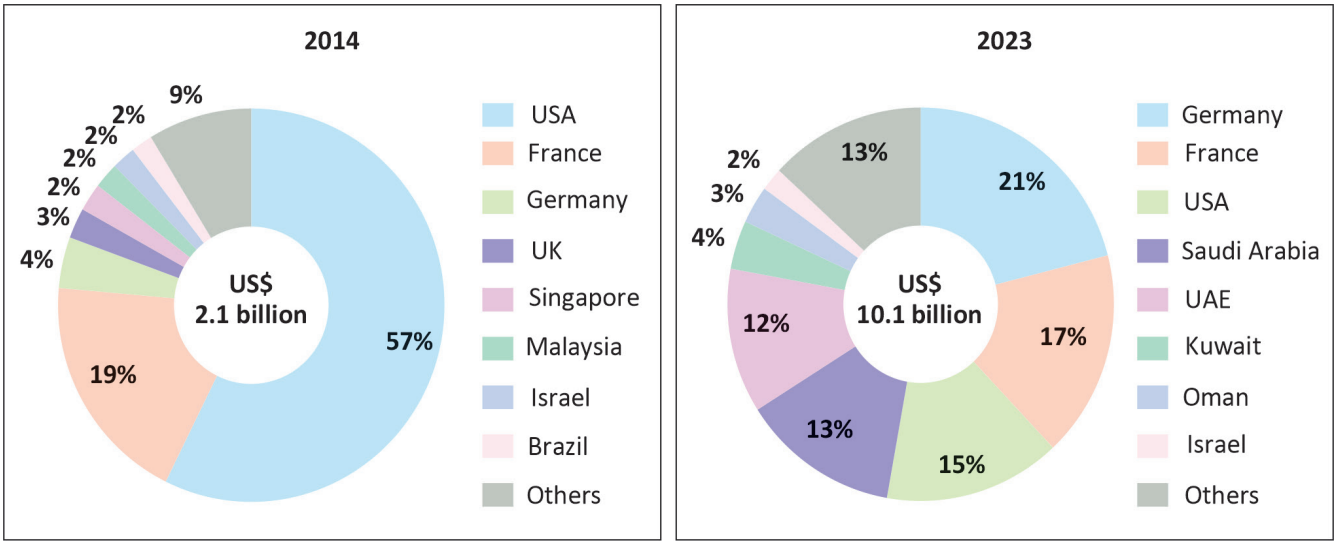
Figure 4.5: India's Top Export Destinations for Aerospace Equipment



Source: ITC Trade Map; India Exim Bank Research

With respect to imports, there have been changes in India's imports sources for aerospace equipment. While in 2014, the USA was India's top import source, accounting for 57% of India's global imports, in 2023, Germany was the top import source with a share of 21% in India's aerospace imports. India's other top imports sources for aerospace equipment in 2023 were France (16%), the USA (14%), Saudi Arabia (13%), and the UAE (11%).

Figure 4.6: India's Top Import Sources for Aerospace Equipment



Source: ITC Trade Map; India Exim Bank Research

India's top exported items in the aerospace sector at HS-6 digit in 2023 were parts of aeroplanes, helicopters or unmanned aircraft, with a share of 62.5% in India's aerospace exports; aeroplanes and other powered aircraft of an unladen weight greater than 15,000 kg (24.9%); parts of aircraft and spacecraft (7.7%); under-carriages and parts (2%); and propellers, rotors and parts (1%), among others.

Table 4.7: India's Top Exported Items in Aerospace Equipment in 2023 (in US$ million)

Code	Product Category	Value
880730	Parts of aeroplanes, helicopters or unmanned aircraft	1208.8
880240	Aeroplanes and other powered aircraft of an unladen weight > 15,000 kg	480.7
880790	Parts of aircraft and spacecraft, not elsewhere specified	148.7
880720	Under-carriages and parts thereof, for aircraft	39.2
880710	Propellers and rotors and parts thereof, for aircraft	20.0
880230	Aeroplanes and other powered aircraft of an unladen weight > 2,000 kg but <= 15.000 kg	13.8
880529	Ground flying trainers and parts thereof	9.4
880510	Aircraft launching gear and parts	3.9
880212	Helicopters of an unladen weight > 2.000 kg	1.7
880220	Aeroplanes and other powered aircraft of an unladen weight <= 2,000 kg	1.5

Source: ITC Trade Map; India Exim Bank Research

As regards India's imported items in aerospace sector at HS 6-digit, in 2023, the imports were the highest of aeroplanes and other powered aircraft of an unladen weight greater than 15000 kg, comprising 87.8% of India's total aerospace imports; parts of aeroplanes, helicopters or unmanned aircraft (3.5%); spacecraft, incl. satellites, and suborbital and spacecraft launch vehicles (2.6%); aeroplanes and other powered aircraft of an unladen weight greater than 2.000 kg but less than 15.000 kg; and helicopters of an unladen weight > 2.000 kg (1.4%).

Table 4.8: India's Top Imported Items in Aerospace Equipment in 2023 (in US$ million)

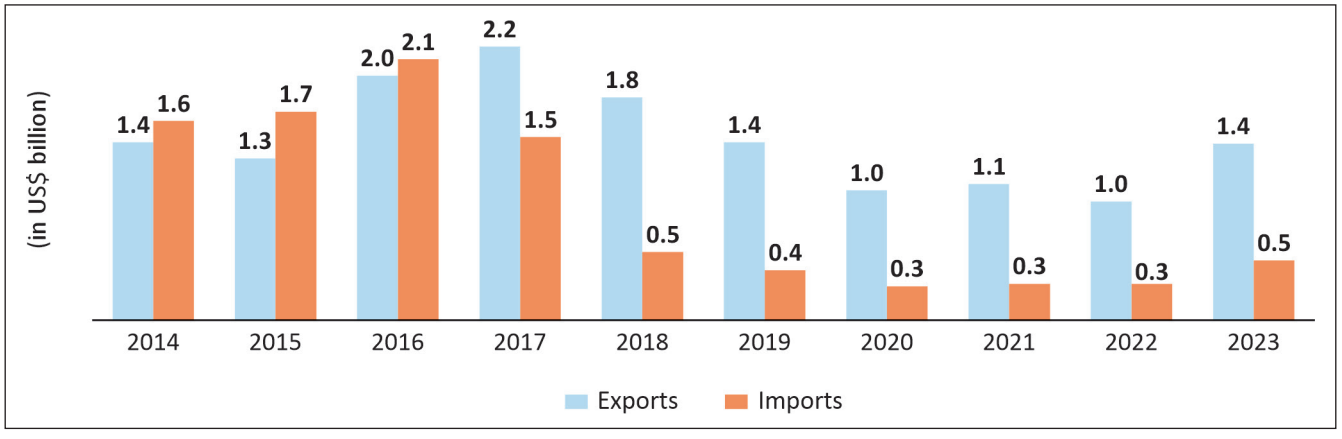
Code	Product Category	Value
880240	Aeroplanes and other powered aircraft of an of an unladen weight > 15,000 kg	8830.4
880730	Parts of aeroplanes, helicopters or unmanned aircraft	349.7
880260	Spacecraft, including satellites, and suborbital and spacecraft launch vehicles	258.9
880230	Aeroplanes and other powered aircraft of an unladen weight > 2,000 kg but <= 15,000 kg	257.3
880212	Helicopters of an unladen weight > 2,000 kg	144.3
880720	Under-carriages and parts thereof, for aircraft	75.9
880521	Air combat simulators and parts thereof	42.6
880790	Parts of aircraft and spacecraft	39.9
880220	Aeroplanes and other powered aircraft of an unladen weight <= 2,000 kg	30.4
880211	Helicopters of an unladen weight <= 2,000 kg	22.9

Source: ITC Trade Map; India Exim Bank Research

A.1. Parts of Aircraft and Spacecraft

India's exports of parts and aircrafts stood at US$ 1.4 billion in 2023, up from US$ 1 billion in 2022. From registering a trade deficit in the segment in 2014, to a trade surplus of US$ 0.9 billion in 2022, over the last decade, India's import dependence in the segment has reduced. In 2023, India's exports of parts of aircraft and spacecraft constituted 2.1% of global exports. India's share in global imports was lower at 0.6%.

Figure 4.7: India's Trade Performance in Parts of Aircraft and Spacecraft

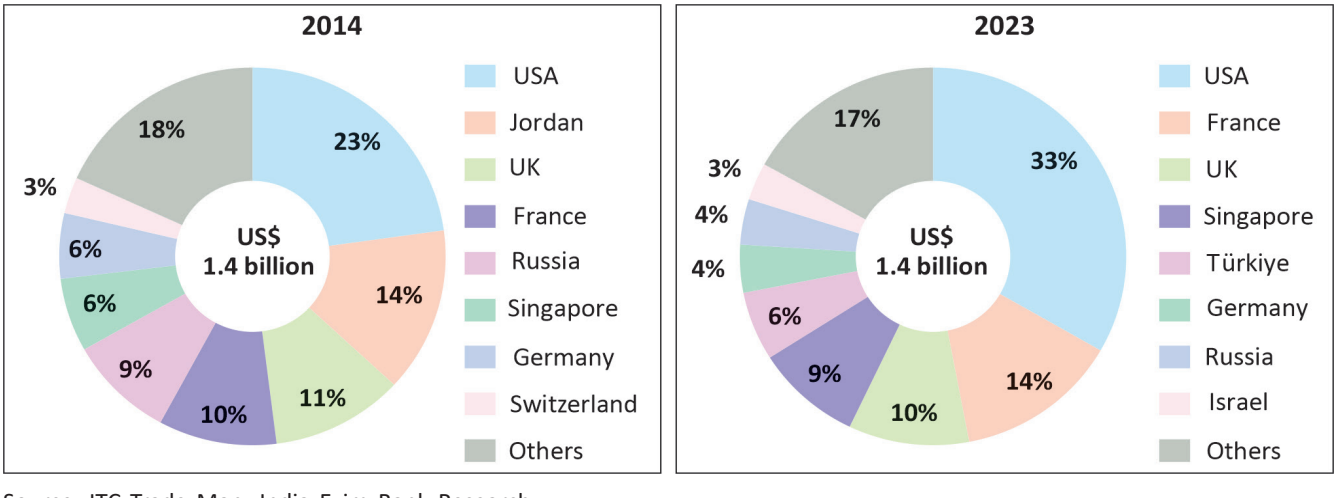


Source: ITC Trade Map; India Exim Bank Research

Within the category, India's exports of parts of aeroplanes, helicopters or unmanned aircraft were the highest, at US$ 1.2 billion in 2023, followed by parts of aircraft and spacecraft (US$ 148.7 million), under carriage and parts (US$ 39.2 million), and propellers, rotors and parts (US$ 20 million).

India's imports, in 2023, were also the highest in parts of aeroplanes, helicopters or unmanned aircraft at US$ 349.7 million, followed by under carriages and parts (US$ 75.9 million), parts of aircraft and spacecraft (US$ 39.9 million), and propellers, rotors and parts (US$ 14.2 million). The USA has remained India's top export destination for parts of aircraft and spacecraft. The share of the USA, has increased from 23% in 2014 to 33% in 2023. The other top export destinations for India in the segment in 2023 were France (14%), the UK (10%), Singapore (9%), and Turkey (6%).

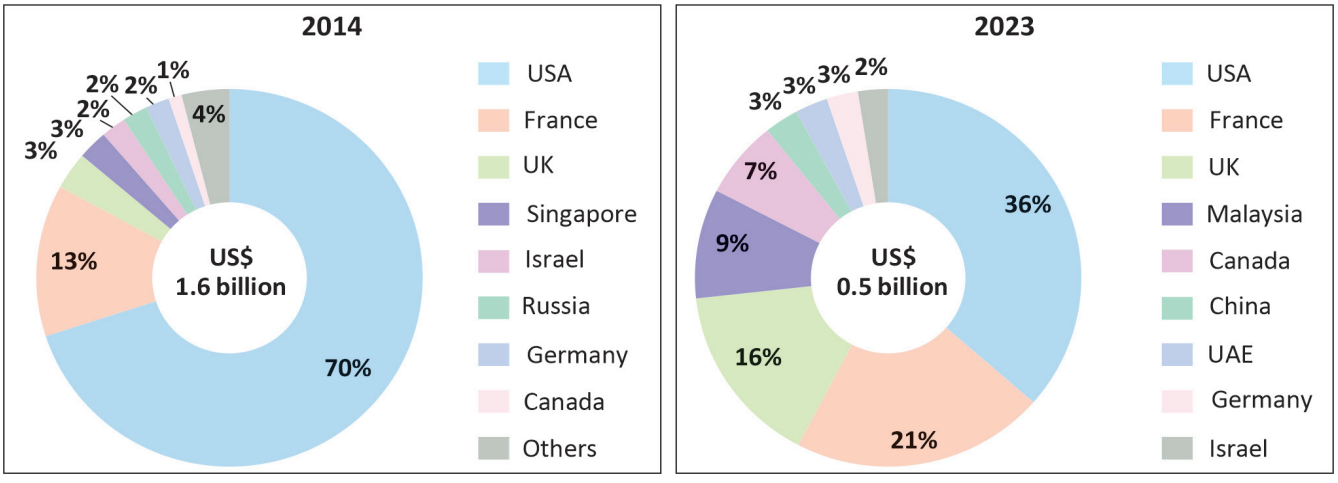
Figure 4.8: India's Top Export Destinations for Parts of Aircraft and Spacecraft



Source: ITC Trade Map; India Exim Bank Research

The USA has also remained the top import source for India for parts of aircraft and spacecraft although its share in India's total imports in the segment has shrunk from 70% in 2014 to 36% in 2023 with the fall in India's total imports in the segment. The other top import sources in 2023 were France (21%), the UK (16%), Malaysia (9%), and Canada (7%).

Figure 4.9: India's Top Import Sources for Parts of Aircraft and Spacecraft

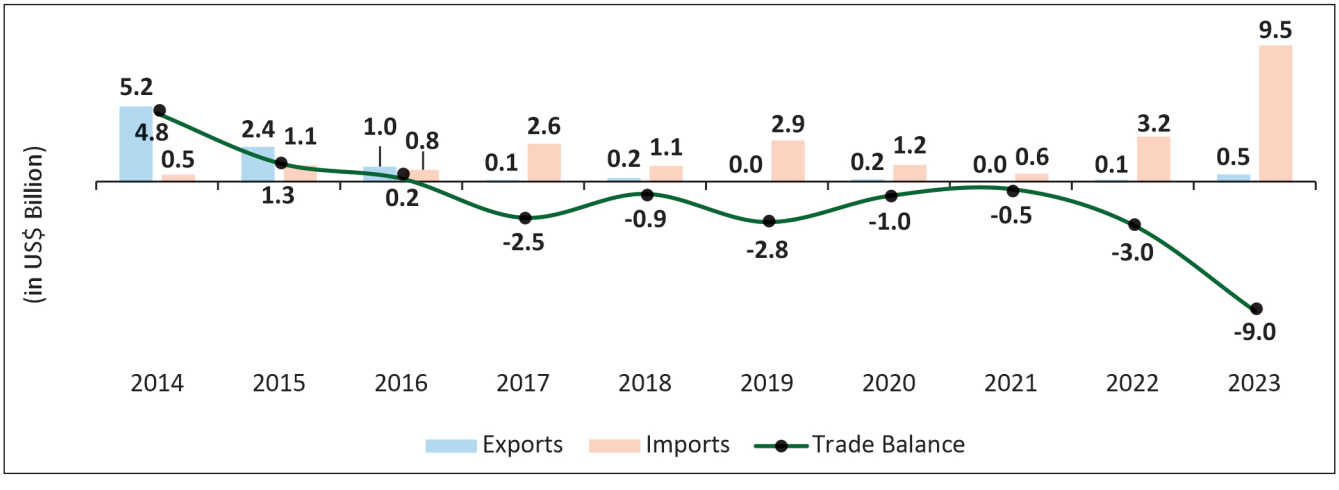


Source: ITC Trade Map; India Exim Bank Research

A.2. Powered Aircraft including Spacecraft, Satellites, and Suborbital and Spacecraft Launch Vehicles

India's exports of aircraft including helicopters, aeroplanes and spacecraft stood at US$ 0.5 billion in 2023, a marked decrease from exports of US$ 5.2 billion a decade ago. The imports on the other hand have increased from US$ 0.5 billion in 2014 to US$ 9.5 billion in 2023. India's trade deficit in the segment has thus ballooned to US$ 9 billion in 2023. It may be noted that India was the third largest importer of powered aircraft in 2023, after Ireland and the UK, accounting for 7.8% of global imports in the segment. However, India's share in global exports of powered aircraft in 2023 was low, at 0.5%.

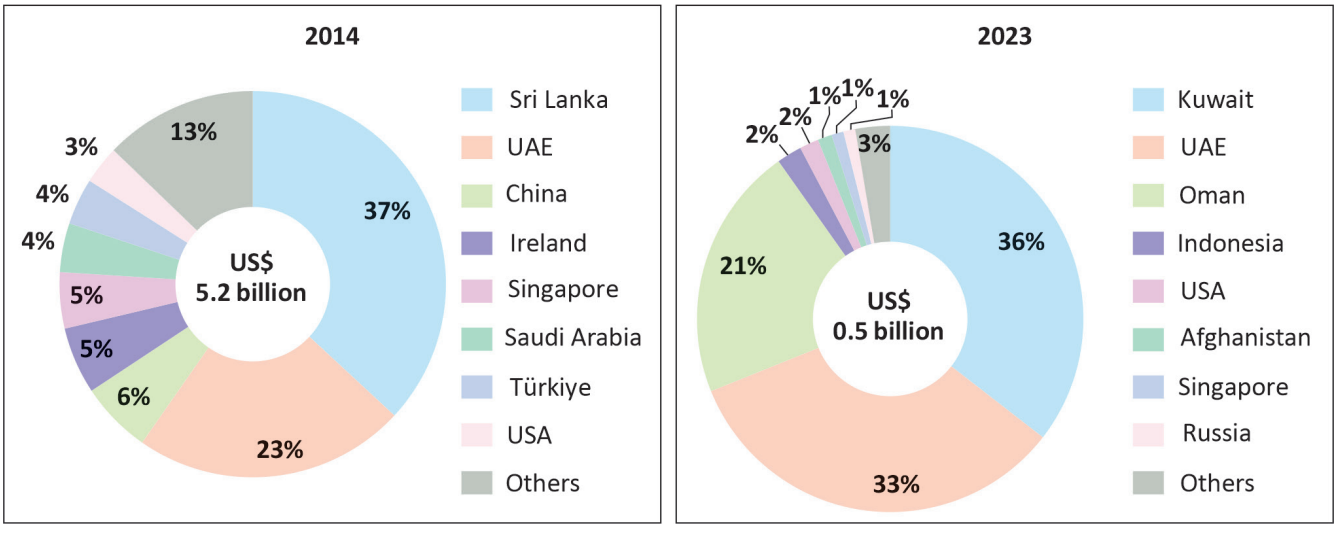
Figure 4.10: India's Trade Performance in Powered Aircraft including Spacecraft



Source: ITC Trade Map; India Exim Bank Research

India's top export destination for powered aircraft in 2023 was Kuwait, accounting for 36% of India's exports in the segment, followed by the UAE (33%), Oman (21%), and Indonesia (2%). In comparison, a decade ago, Sri Lanka was India's top export destination, with a share of 37% in exports, the UAE had a share of 23% in India's exports, and the other top exports destinations were China (6%), Ireland (5%), and Singapore (5%).

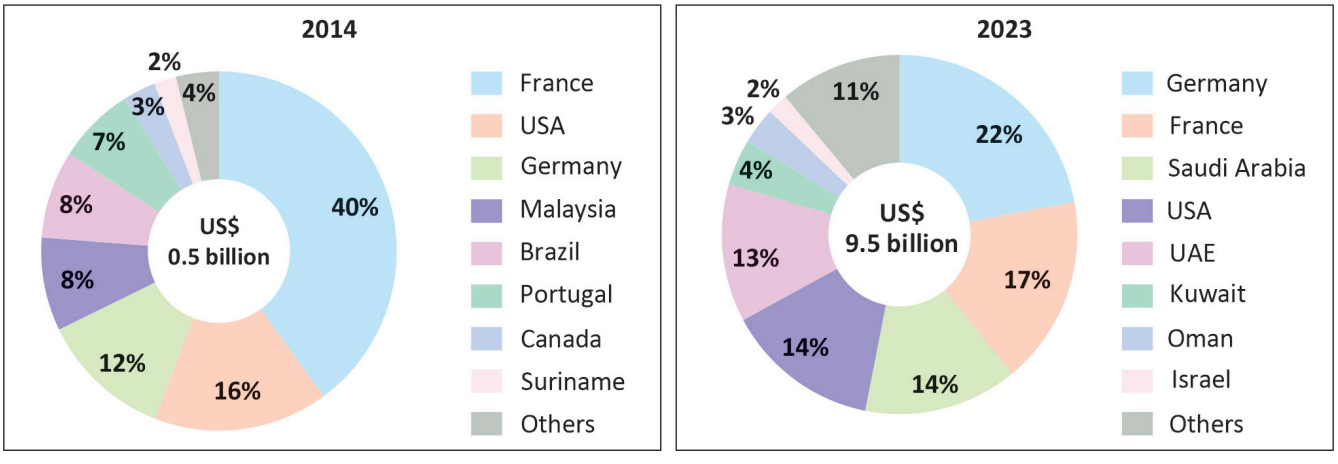
Figure 4.11: India's Top Export Destinations for Powered Aircraft including Spacecraft



Source: ITC Trade Map; India Exim Bank Research

India's imports sources for powered aircraft are fairly diversified. In 2023, Germany accounted for the highest share of 22% in India's imports, followed by France (17%), Saudi Arabia (14%), the UAE (13%), and Kuwait (4%).

Figure 4.12: India's Top Import Sources for Powered Aircraft



Source: ITC Trade Map; India Exim Bank Research

B. Arms and Ammunition

In the trade of arms and ammunition (HS 93), in 2023, India accounted for a share of 1.4% of global exports and 0.8% of global imports. India's exports of arms and ammunition amounted to US$ 358.6 million, up from US$ 65.1 million in 2014, registering an AAGR of 25.4% during the period. India's imports of the same also increased from US$ 16.5 million in 2014 to US$ 167.6 million in 2023.

As per the product-wise disaggregation, parts and accessories for weapons (HS 9305) accounted for a majority of India's arms and ammunition exports with a share of almost 60% in 2023, followed by bombs, grenades and torpedoes (41.4%). India's trade in arms and ammunition at the 4-digit HS Code level is listed in Table 4.8.

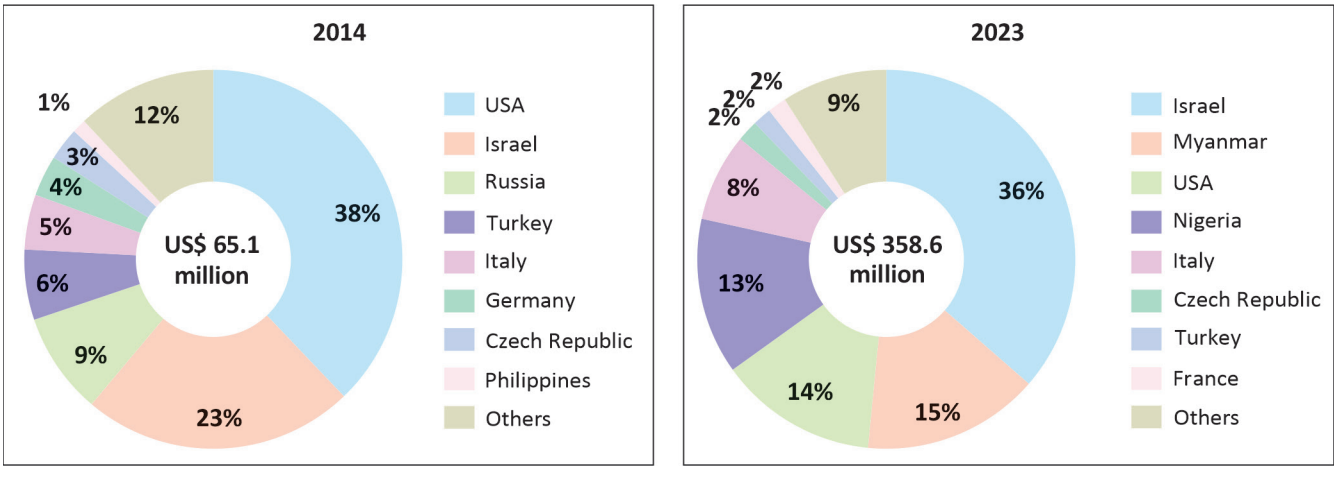
Table 4.9: India's Trade in Arms and Ammunition – Top Commodities

HS Code	Item	Exports		Imports	
		2014 (US$ million)	2023 (US$ million)	2014 (US$ million)	2023 (US$ million)
9305	Parts and accessories for weapons	40.3	201.3	2.4	6.2
9306	Bombs, grenades and torpedoes	12.7	161.1	7.8	149.0
9307	Swords, cutlasses and bayonets	4.9	8.8	0.014	0.009
9304	Spring, air or gas guns and pistols, truncheons and other non-firearms	0.03	0.6	2.3	9.5
9303	Firearms and similar devices which operate by the firing of an explosive charge	0.2	0.03	3.9	2.3

Source: ITC Trade Map; India Exim Bank Research

India's export destinations for its arms and ammunitions shows diversity across the time period of 2014-2023. The USA was India's largest export destination in 2014, receiving almost 38% of all the country's arms and ammunition exports while in 2023, Israel was India's largest export market with a similar share of 36%. Apart from the USA and Israel, countries like Turkey, Italy and the Czech Republic are other recurring export markets for India's arms and ammunition products across both years – 2014 and 2023.

Figure 4.13: India's Top Export Destinations for Arms and Ammunition

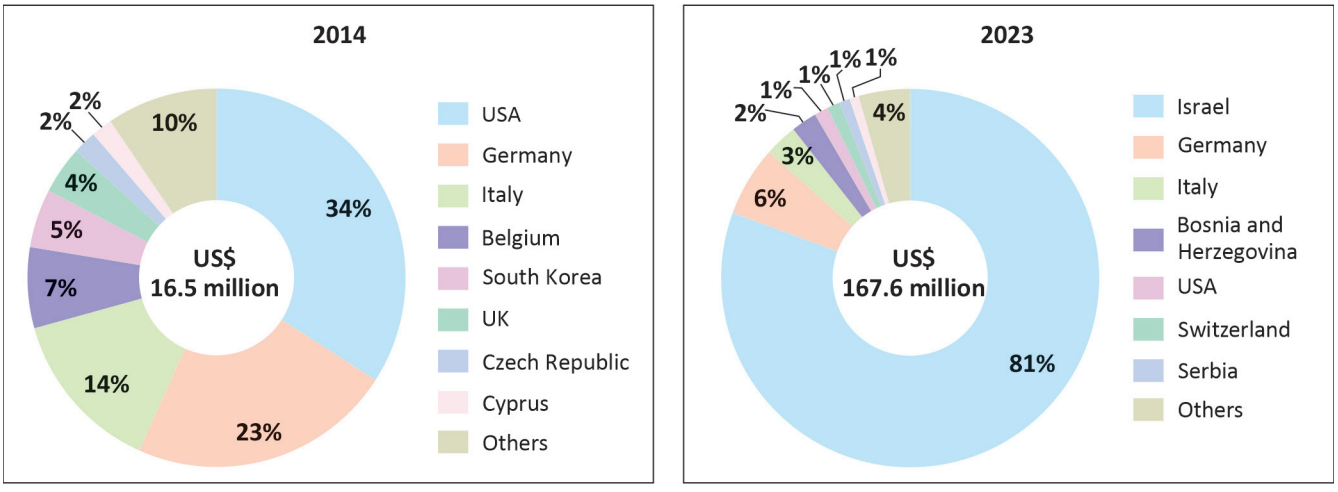


Source: ITC Trade Map; India Exim Bank Research

India's sources for its imports of arms and ammunition have seen drastic change in 2023 when compared to 2014. While India's import sources in 2014 were relatively diverse with the USA being the largest source contributing to 34.1% of India's arms and ammunition imports, in 2023, India saw a significant shift towards concentration of import sourcing from Israel. Since 2020, Israel has consistently been India's largest source for its imports of arms and ammunition with its share reaching the highest in 2023 at almost 81% of India's total

imports of arms and ammunition. India's imports from Israel are majorly of bombs, grenades and torpedoes (HS 9306). Notably, in 2014, the USA was India's largest trade partner of arms and ammunition, that is, both in terms of exports and imports. In 2023, it was replaced by Israel as the largest trade partner.

Figure 4.14: India's Top Import Sources for Arms and Ammunition



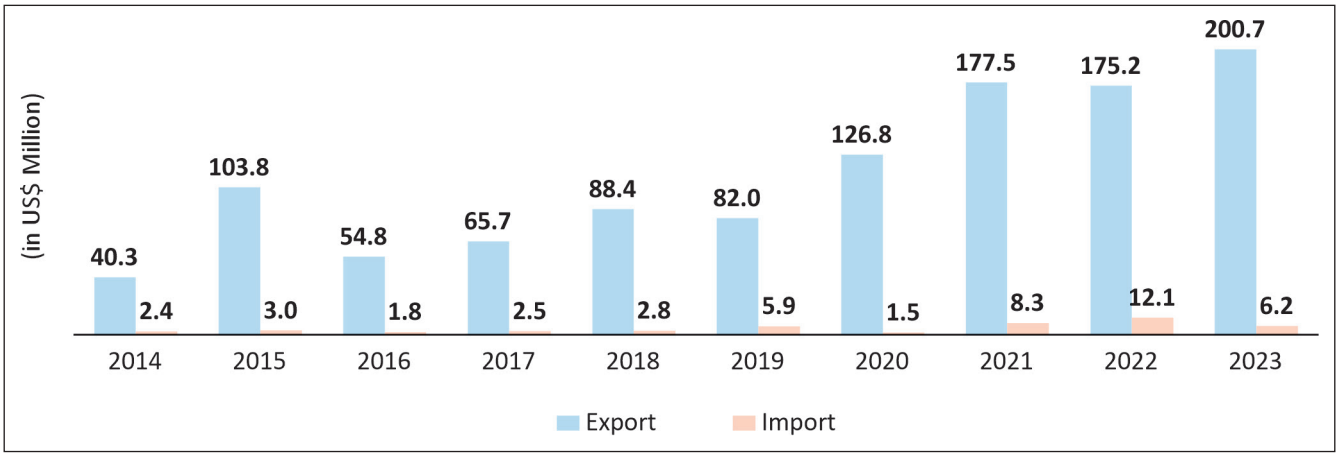
Source: ITC Trade Map; India Exim Bank Research

Within arms and ammunition, the Study analyses the top segments in further detail -

B.1. Parts and Accessories for Weapons

India is a net exporter of parts and accessories for weapons (HS 9305). During 2014-2023, India's exports of these commodities increased from US$ 40.3 million in 2014 to US$ 200.7 million in 2023, showing a growth of almost 30% as per the AAGR. In comparison, India's imports of parts and accessories for weapons grew at an AAGR of 56.8%, from US$ 2.4 million in 2014, reaching its peak at US$ 12.1 million in 2022, before falling to US$ 6.2 million in 2023. India's surplus in the trade of parts and accessories for weapons reached its highest value within the studied time period in 2023 amounting to US$ 194.5 million.

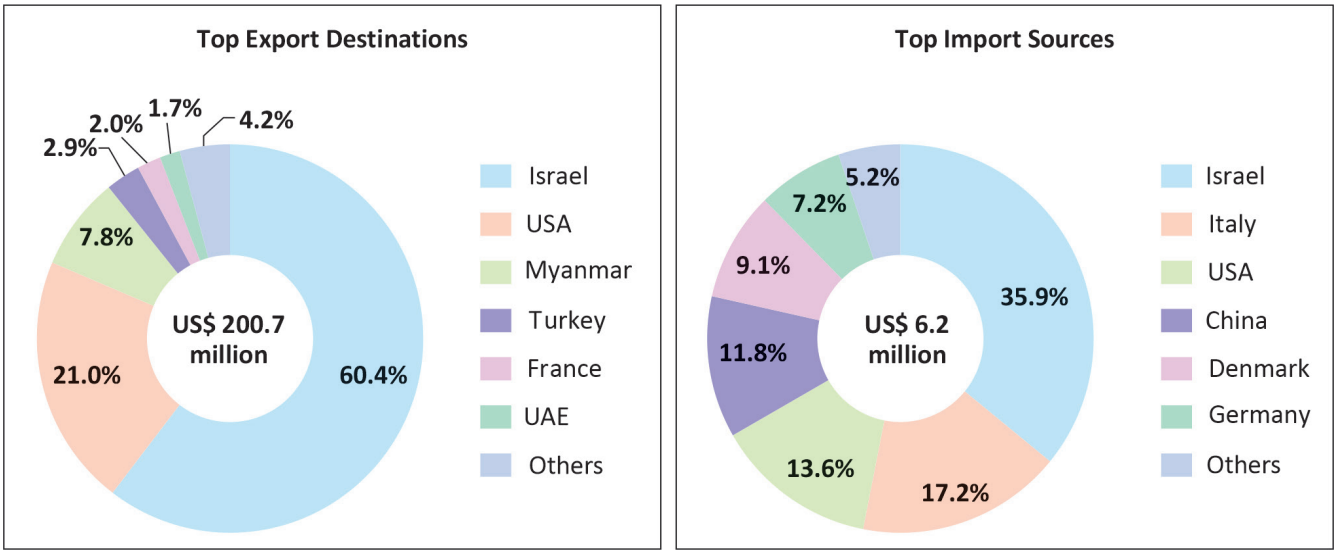
Figure 4.15: India's Trade Performance in Parts and Accessories for Weapons



Source: ITC Trade Map; India Exim Bank Research

Israel is India's top trade partner in parts and accessories for weapons, followed by the USA. In 2023, Israel received the major bulk of India's exports, holding a dominant share of 60.4%, followed by the USA (21.0%). As for imports of parts and accessories for weapons in the same year, India sourced around 36% of the same from Israel, followed by Italy (17.2%) and the USA (13.6%).

Figure 4.16: India's Top Trading Partners for Parts and Accessories for Weapons in 2023



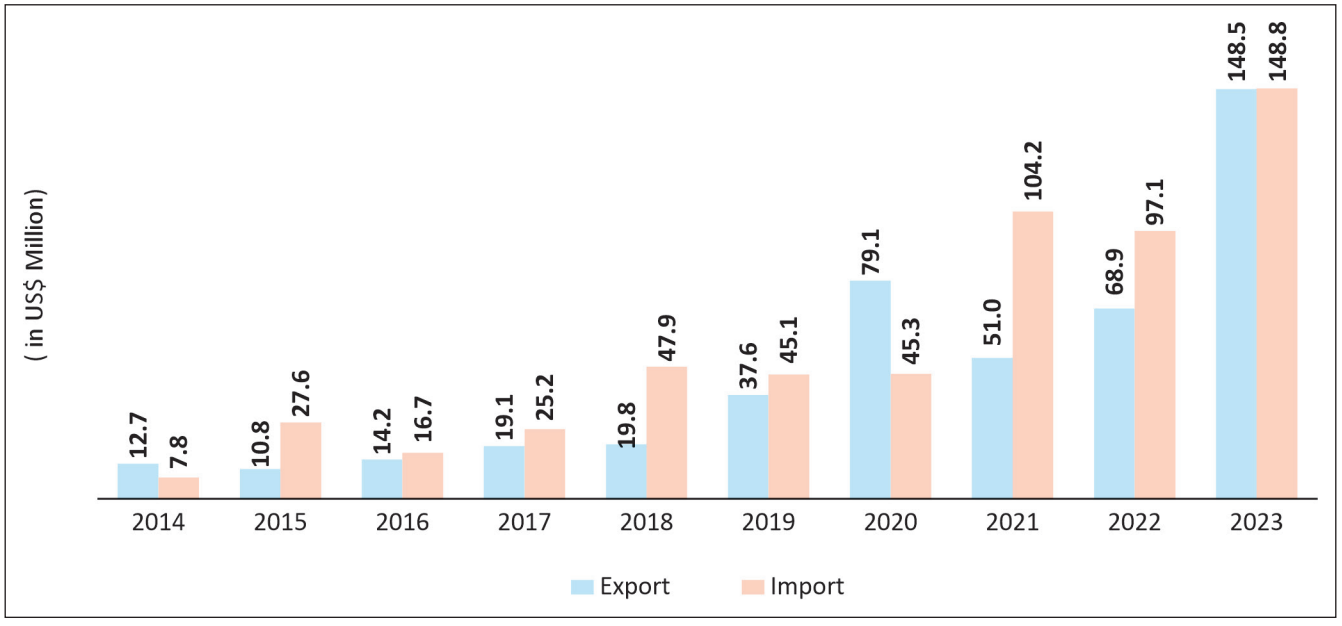
Source: ITC Trade Map; India Exim Bank Research

B.2. Bombs, Grenades and Torpedoes

During 2014-2023, India, for the most part, has been a net importer of bombs, grenades and torpedoes (HS 9306). Its exports as well as imports of these commodities have seen a marked jump through this time period. Exports of bombs, grenades and torpedoes from India have seen an over ten-fold rise at an AAGR of over 40%, from US$ 12.7 million in 2014 to US$ 148.5 million in 2023. India's imports of the same have shown relatively higher growth at an AAGR of approximately 59%, a glaring rise from US$ 7.8 million in 2014 to US$ 148.8 million in 2023. India's trade balance in these products, after reaching a surplus of US$ 33.7 million in 2020, turned to a deficit of (-) US$ 53.1 million in the next year. This deficit, however, has narrowed over 2021-2023.

At the product-wise disaggregation, bombs, grenades and torpedoes, excluding cartridges (HS 930690) was India's largest exported segment, contributing to an overwhelming share of almost 93% of all such exports under HS 9306 in 2023.

Figure 4.17: India's Trade Performance in Bombs, Grenades and Torpedoes

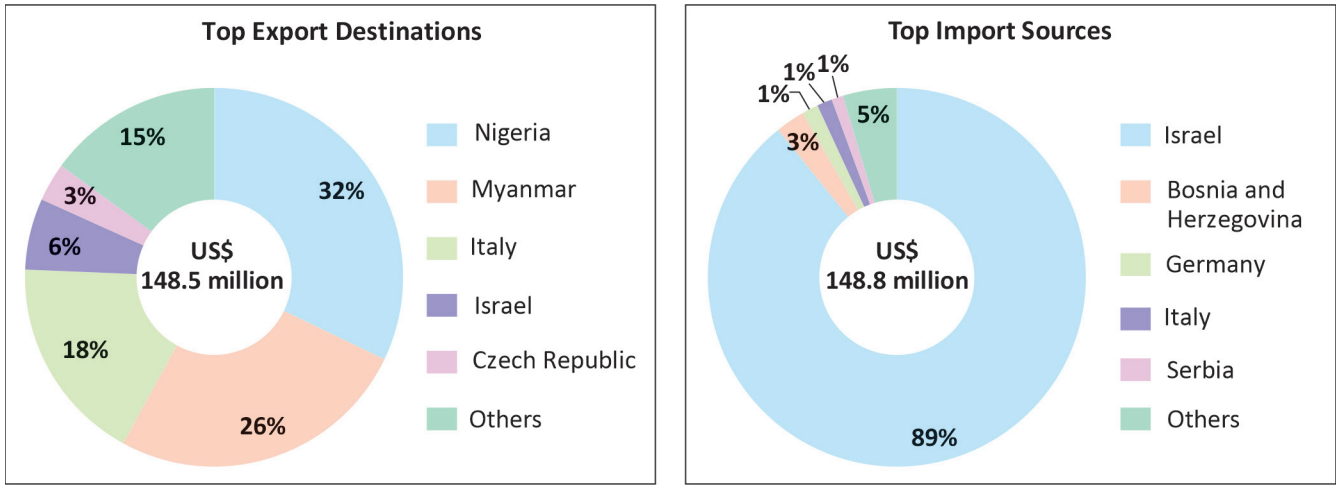


Source: ITC Trade Map; India Exim Bank Research

In 2023, around 80% of India's exports of bombs, grenades and torpedoes were directed to its top three export destinations alone. Nigeria was India's largest export destination receiving 32.2% of all such exports, followed by Myanmar (25.9%), and Italy (17.7%). This shows a drastic shift from the year prior when France alone received over 50% of such exports from India, along with Russia (about 13%).

As for imports of bombs, grenades and torpedoes, India shows overwhelming dependency on Israel with the latter consistently featuring among India's top two largest import sources post 2017. In 2023 too, almost 90% of India's such imports were sourced from Israel, followed by Bosnia and Herzegovina with a substantially lesser share of almost 3%.

Figure 4.18: India's Top Trading Partners for Bombs, Grenades and Torpedoes in 2023

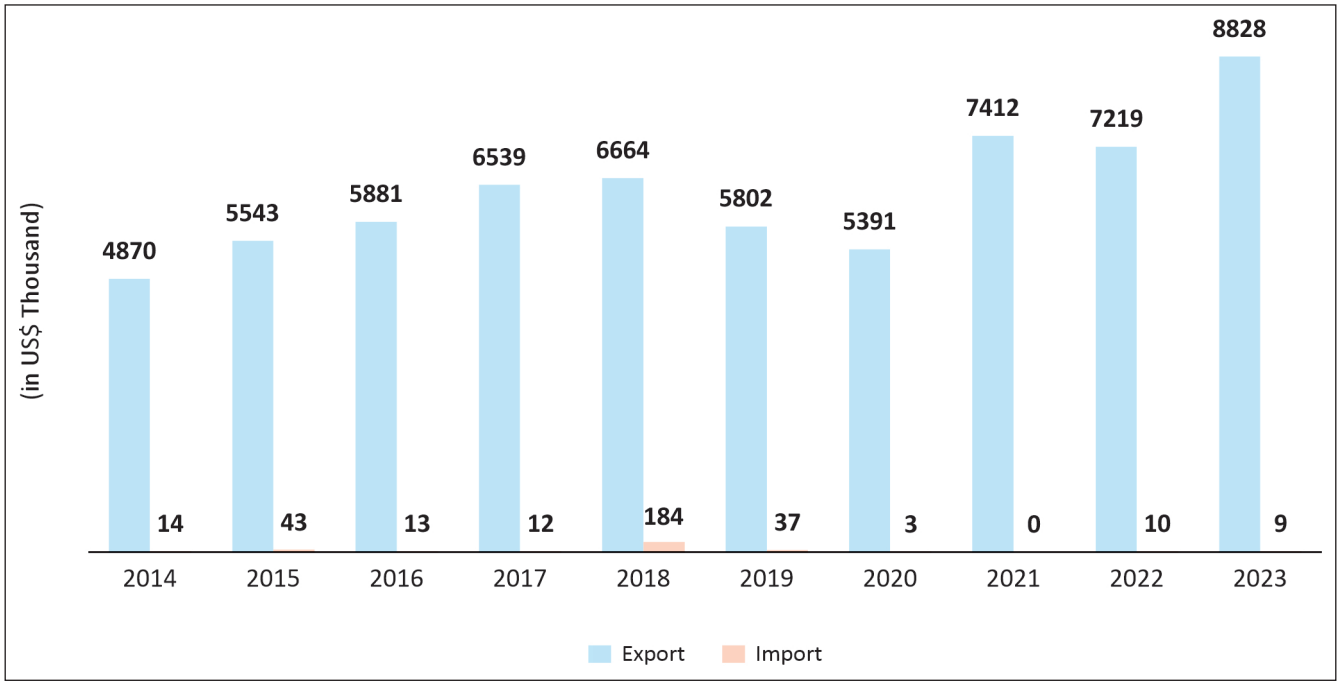


Source: ITC Trade Map; India Exim Bank Research

B.3. Swords, Cutlasses and Bayonets

India is a net exporter of swords, cutlasses and bayonets (HS 9307). Although the volume of trade in this product category is relatively less as compared to other defence equipment, India's exports have increased at an AAGR of 7.8% during 2014-2023, from US$ 4.8 million in 2014 to US$ 8.8 million in 2023. In comparison, imports have been miniscule and fluctuating – falling from US$ 14 thousand in 2014 to US$ 9 thousand in 2023. Imports peaked in 2018 at US$ 184 thousand while trade surplus was the highest in 2023 at US$ 8.8 billion.

Figure 4.19: India's Trade Performance in Swords, Cutlasses and Bayonets



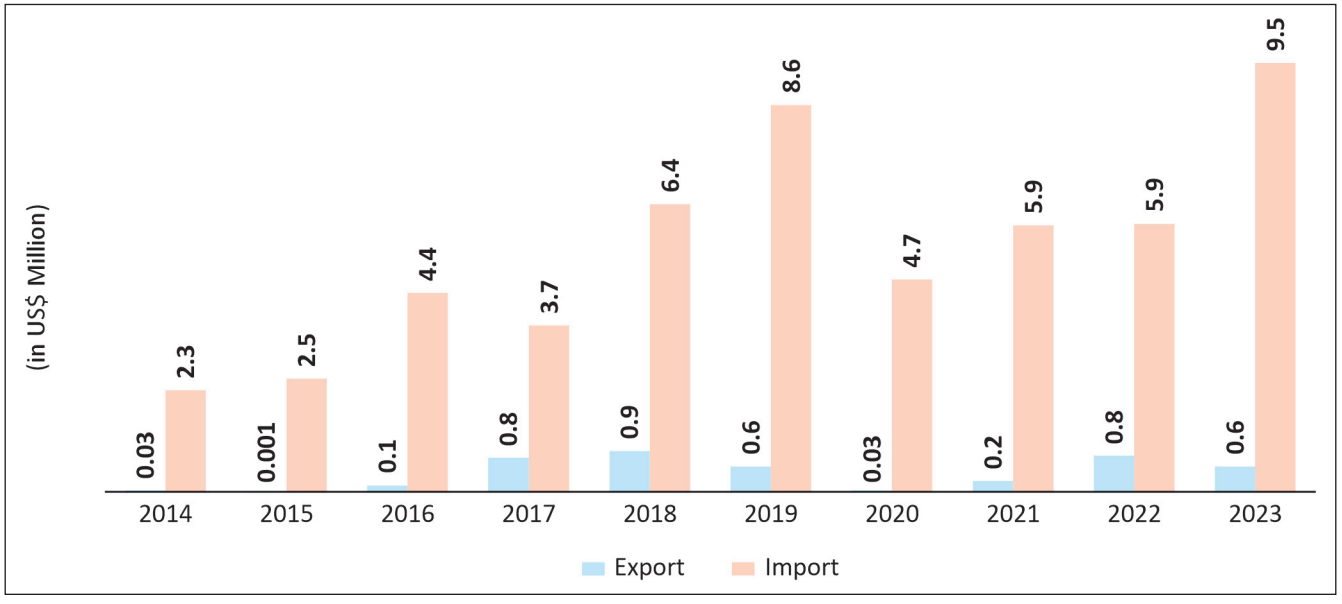
Source: ITC Trade Map; India Exim Bank Research

In 2023, the USA received almost 34% of India's exports of swords, cutlasses and bayonets, followed by Spain (18.1%), the UK and Germany each with a share of 10%.

B.4. Spring, Air or Gas Guns and Pistols, Truncheons and other Non-firearms

India shows dependence on the imports of small arms like guns and pistols (HS 9304). The exports, however, are negligible in comparison. India's exports of guns and pistols have been erratic over 2014 to 2023, rising from US$ 0.03 million in 2014 to US$ 0.6 million in 2023. Imports, on the other hand, have grown at an AAGR of 24.4% during 2014-2023, jumping from US$ 2.3 to US$ 9.5 million in 2023, the highest value in the considered time period. For the past few years, India's small arms production has been witnessing growing private sector participation, thus showing greater indigenous prospects. Despite the progress, the overall production of small arms in the country is still predominantly through tie-ups with foreign Original Equipment Manufacturers (OEM) or through joint ventures.

Figure 4.20: India's Trade Performance in Spring, Air or Gas Guns and Pistols, Truncheons and other Non-firearms

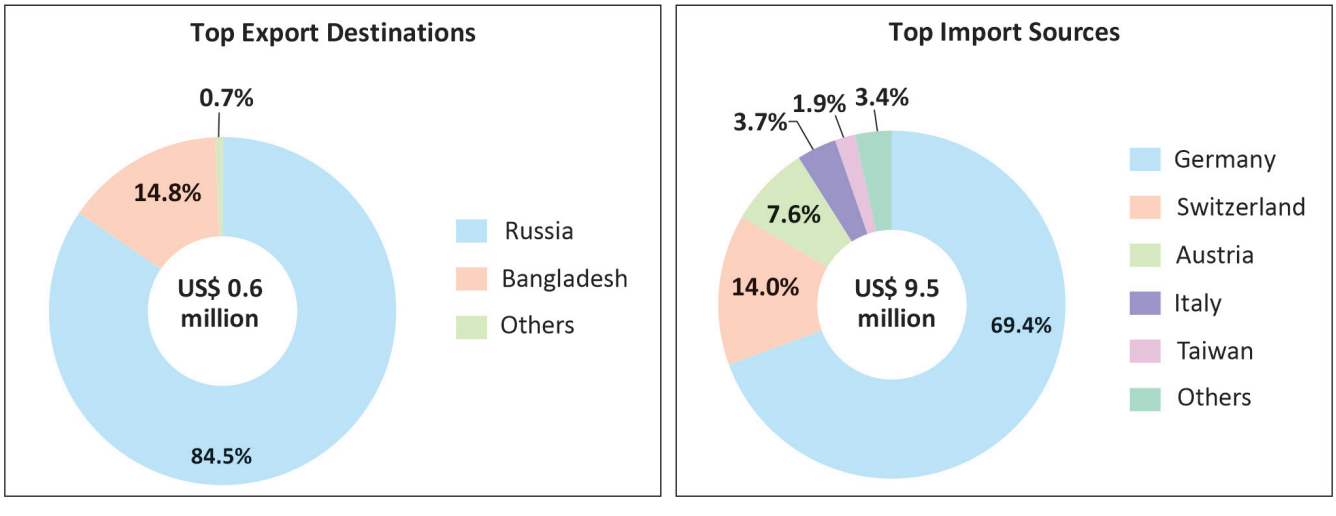


Source: ITC Trade Map; India Exim Bank Research

For India's export destinations and import sources for guns and pistols, there exists immense concentration in select countries. India's export market is dominated primarily by Russia that accounts for a share of approximately 85% of India's total guns and pistol exports in 2023, followed by Bangladesh holding a much lesser share of about 15%.

As for imports of guns and pistols, India shows heavy reliance on Germany that contributed to approximately 70% of total imports of guns and pistols in 2023. Notably, the government of Germany has relaxed its export policy of small arms to India which earlier had restrictions regarding the sale of the same to non-NATO countries. This shift will allow India's military, paramilitary and state police forces to import small arms like the MP5 submachine guns as manufactured by the German defence manufacturer, Heckler & Koch.

Figure 4.21: India's Top Trading Partners for Spring, Air or Gas Guns and Pistols, Truncheons and other Non-firearms in 2023

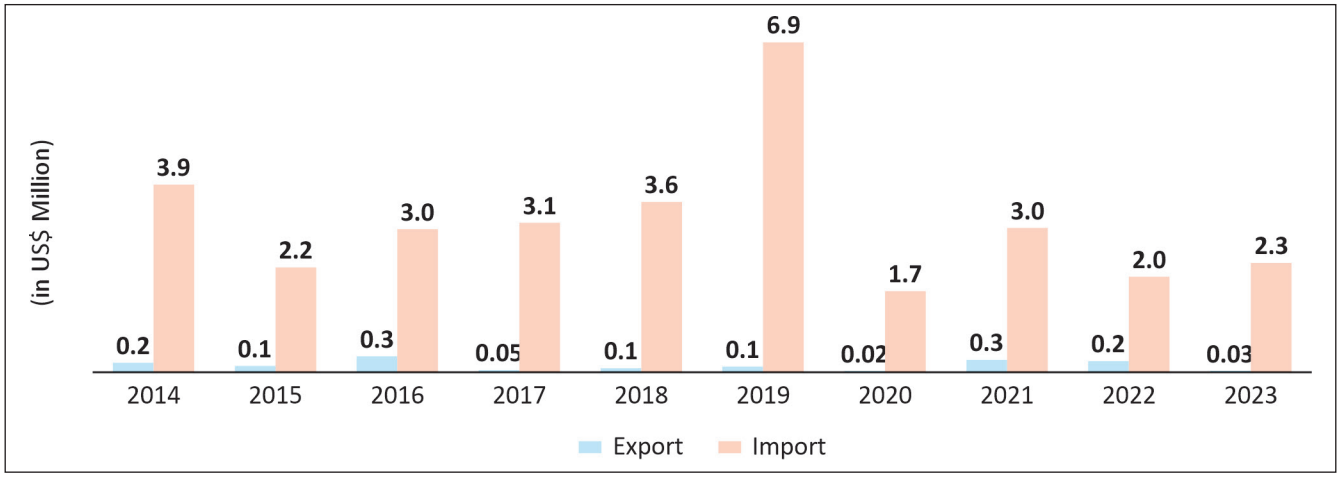


Source: ITC Trade Map; India Exim Bank Research

B.5. Firearms and Similar Devices which Operate by the Firing of an Explosive Charge

Firearms and similar devices (HS 9303) are India's fifth largest exported product category under arms and ammunitions. India is a net importer of the product with trade deficit in the same reaching its peak in 2019 at US$ 6.8 million. During the period of 2014 to 2023, India's exports have fluctuated to finally reduce from US$ 0.2 million in 2014 to US$ 0.03 million in 2023. Although India's imports of firearms exceed its exports greatly, the value of imports overall has also seen a fall. Imports decreased to US$ 2.3 million in 2023 from US$ 3.9 million in 2014. The year 2019 saw India's largest firearms imports amounting to about US$ 7 million.

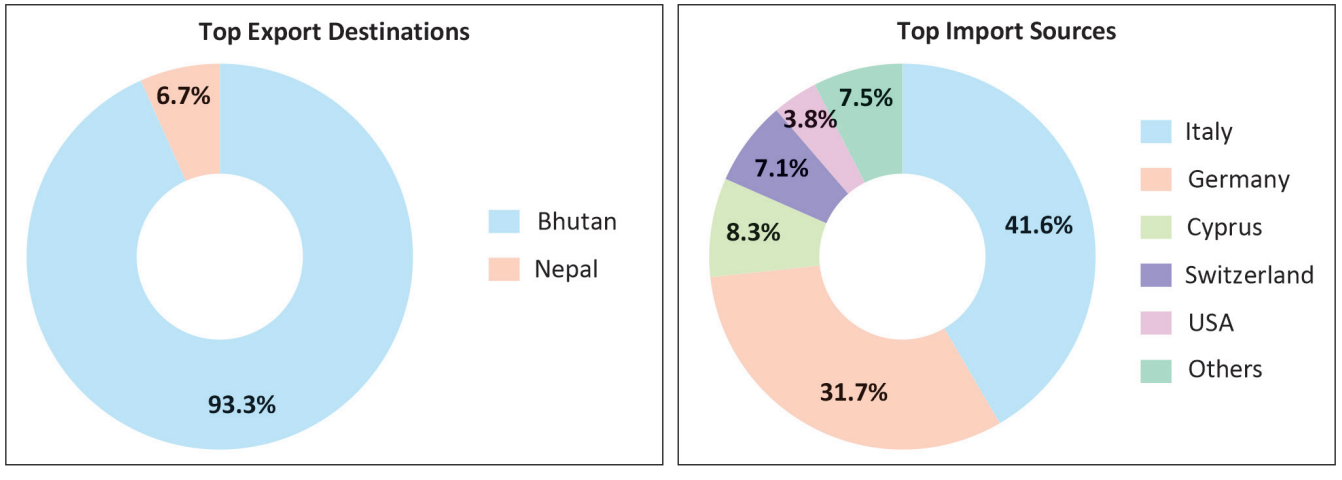
Figure 4.22: India's Trade Performance in Firearms and Similar Devices which Operate by the Firing of an Explosive Charge



Source: ITC Trade Map; India Exim Bank Research

In 2023, India exported its firearms predominantly to its neighbouring countries. Bhutan received an overwhelming share of 93.3% of India's firearm exports, followed by Nepal (6.7%). In the same year, Italy and Germany accounted for over 70% of India's import for firearms.

Figure 4.23: India's Top Trading Partners for Firearms and Similar Devices which Operate by the Firing of an Explosive Charge in 2023

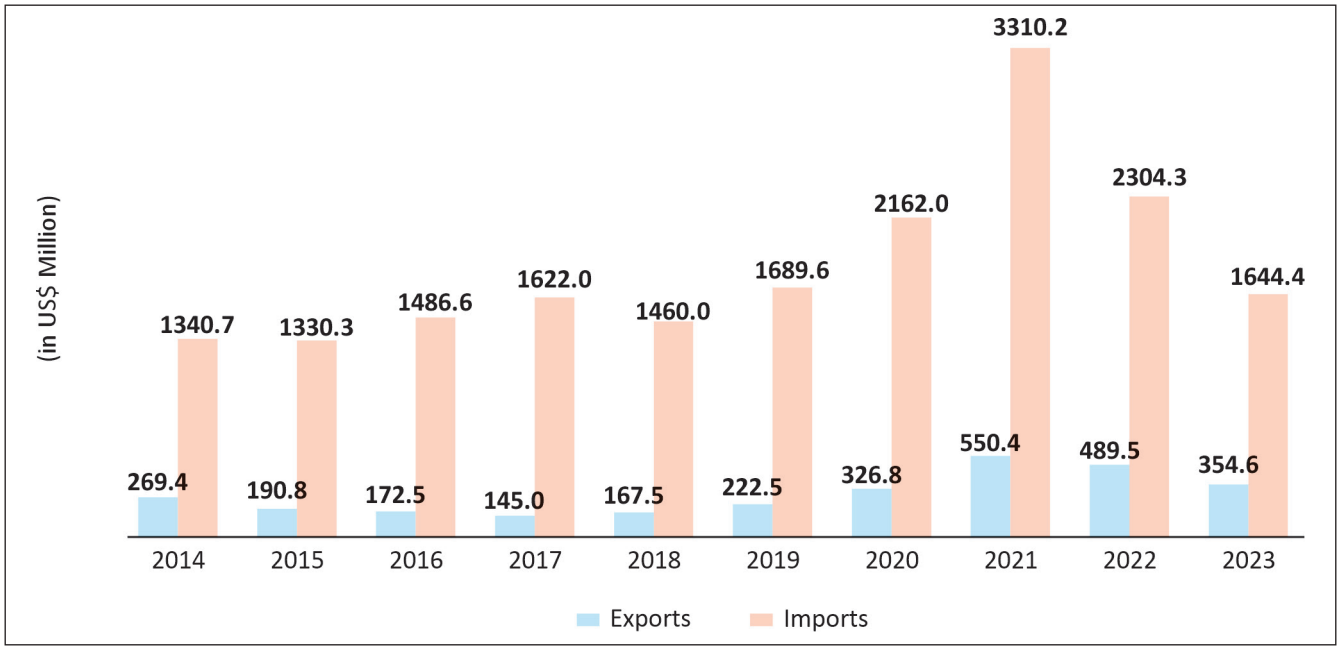


Source: ITC Trade Map; India Exim Bank Research

C. Communication Equipment

India is a net importer of communication equipment finding applications in defence services. Exports of communication equipment have increased from US$ 269.4 million in 2014 to US$ 354.6 million in 2023, growing at an AAGR of 7.8% over 2014-2023. Over the same time period, India's imports of communication equipment increased at an AAGR of 5.3%, from US$ 1340.7 million in 2014 to US$ 1644.4 million in 2023. Both India's exports as well as imports of communication equipment reached their highest values in 2021 at US$ 550.4 million and US$ 3310.2 million, respectively. Thus, trade deficit too widened to reach its peak of US$ 2759.8 million in the same year.

Figure 4.24: India's Trade Performance in Communication Equipment[27]

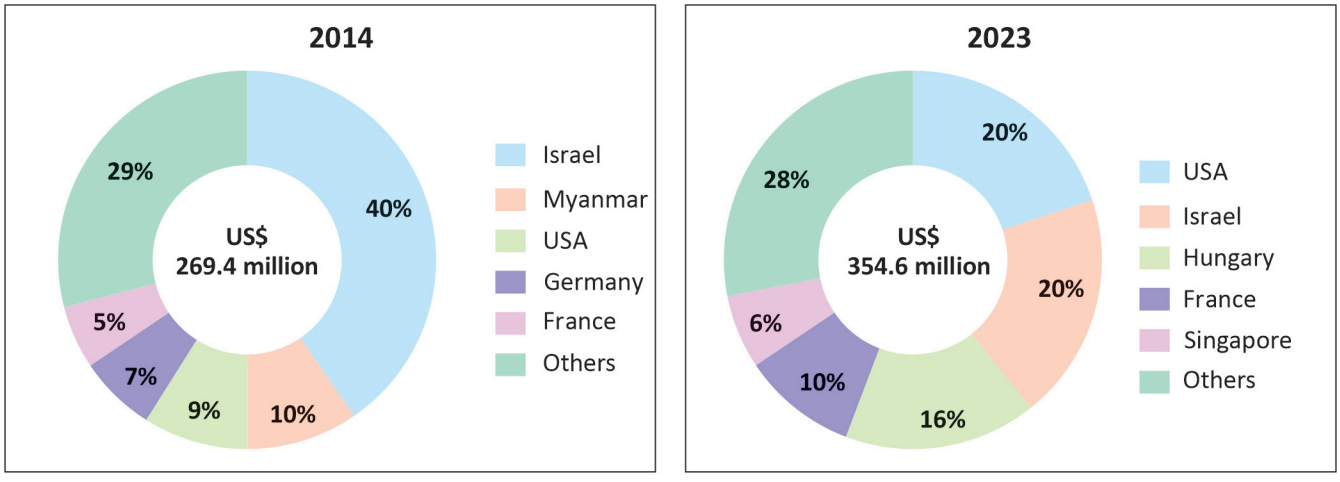


Source: ITC Trade Map; India Exim Bank Research

Upon comparing the top export destinations for India's communication equipment in 2014 and 2023, it is observed that the export markets have diversified with time. In 2014, Israel was India's largest export destination for its communication equipment receiving over 40% of total communication equipment exports. India's export to Israel in that year was majorly of aerials and aerial reflectors (HS 852910). In 2023, export market for India's communication equipment saw diversification with the USA being the largest destination with a share of around 20% of such exports. Israel still followed closely behind as a major export destination for India with a share of 19.4% in 2023. Other recurring export destinations for these products from across both years include France, Belgium and Russia.

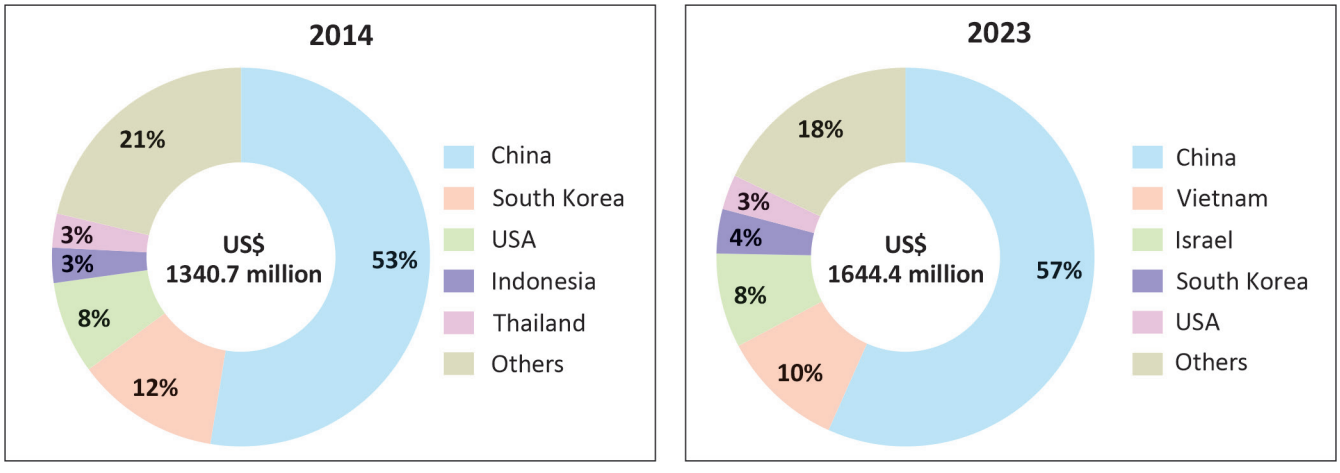
[27] Data included for HS 852550 (Transmission apparatus for radio-broadcasting or television, not incorporating reception apparatus); 852560 (Transmission apparatus for radio-broadcasting or television, incorporating reception apparatus); 852610 (Radar apparatus); 852691 (Radio navigational aid apparatus); 852910 (Aerials and aerial reflectors of all kinds); 852990 (Parts suitable for use solely or principally with flat panel display modules, transmission and reception apparatus for radio-broadcasting); and 854389 (Electrical machines and apparatus, having individual functions)

Figure 4.25: India's Top Export Destinations for Communication Equipment



Source: ITC Trade Map; India Exim Bank Research

Figure 4.26: India's Top Import Sources for Communication Equipment



Source: ITC Trade Map; India Exim Bank Research

For the sourcing of communication equipment, India shows considerable import reliance on several Asian countries, China being the consistent dominant player. In 2014, India procured over 50% of its communication equipment from China, the share of which only increased further to about 57% in 2023. Despite showing a fall in their respective shares, the USA and South Korea continue being other prominent import sources for India's communication equipment. India's largest communication equipment import from China has predominantly been parts suitable for use solely or principally with flat panel display modules, transmission and reception apparatus for radio broadcasting (HS 852990).

Foreign Direct Investment (FDI)

FDI limit in defence sector has been enhanced up to 74% through the automatic route for companies seeking new defence industrial license, and up to 100% through the government route wherever it is likely to result in access to modern technology. However, FDI into the defence sector in India has been modest. During April 2000-June 2024, India received FDI inflows to the tune of US$ 19.9 million, equivalent to 0.003% of total FDI received by India in all the sectors.

In Conclusion

India's trade performance and domestic production sees great variance across different defence product categories. As per SIPRI, over the past decade, from 2014 to 2023, India's import sources for major weapon categories have remained largely unchanged, with Russia being the largest arms provider. Other recurring top arms import sources for India include the USA, the UK, and France.

In aerospace and defence, India's export strength lies in the category of parts of aircraft and spacecraft leading to a trade surplus of US$ 1 billion in 2023. However, India's import dependence on powered aircraft still remains glaring as reflected in the trade deficit of US$ 9 billion registered in the same year. Further, for arms and ammunition, India shows consistency in maintaining a trade surplus over the time period of 2014-23. The country's import sources for arms and ammunition, however, have seen drastic shifts with time. In 2023, it was observed that Israel was India's largest trading partner replacing the USA which held that position at the beginning of the decade. Lastly, for the segment of communication equipment finding applications in defence services, India is observed to be a net importer, sourcing much of these commodities from Asian countries, with China only growing as a key supplier with time.

Overall, with increasing budgetary allocation, policy push and investment in the defence sector, India despite making progress, still has a long way in reducing import reliance in defence products and simultaneously strengthening its indigenisation capabilities.

Chapter

Indigenisation Push in India's Defence Sector

According to SIPRI, India was the largest arms importer worldwide holding a share of approximately 10% of total global arms imports over the period of 2019-23. Despite India being among the countries with the largest military expenditures globally – fourth largest in 2023 at US$ 83.6 billion – it is yet to establish for itself a self-sufficient indigenous defence procurement base.

The Government of India, in this regard, has undertaken defence sector specific policy initiatives guided by its flagship initiative of 'Make in India' and the Aatmanirbhar Bharat Abhiyan mission. These reforms aim to expand India's indigenous defence capabilities by promoting the design, development and manufacture of defence equipment in India, thereby reducing reliance on imports of defence equipment. Apart from achieving the objective of national security, indigenisation of the defence industry through, inter alia, priority procurement of capital items from domestic vendors and greater participation of domestic private players and MSMEs will assist in forex conservation.

In line with India's growing ambition to indigenise its defence sector, the Government in 2019, created the Department of Military Affairs (DMA) entrusted with the responsibility of promoting the use of indigenous equipment by the Services.[28] Following are the policy reforms initiated by the Government of India to facilitate the indigenisation of India's defence industry –

Figure 5.1: Select Policy Reforms for Indigenisation in India's Defence Sector

Defence Acquisition Procedure (DAP) 2020	**Positive Indigenisation Lists**	**Innovations for Defence Excellence (iDEX)**
SRIJAN Portal	**Defence Industrial Corridors**	**Defence Testing Infrastructure Scheme**

Source: Ministry of Defence; India Exim Bank Research

[28] Creation of New Department of Military Affairs, PIB (February 2020)

India's Defence Acquisition and Procurement

The Defence Acquisition Procedure (DAP) 2020, superseding the Defence Procurement Procedure (DPP) 2016, has been introduced with the intention of promoting the vision of 'Aatmanirbhar Bharat' by prioritising and streamlining defence procurement from domestic sources. The DAP 2020, among its other features, majorly focuses on achieving higher indigenous content in procurement and providing impetus to foreign investment in the sector while protecting domestic interests.

According to DAP 2020, the Indigenous Content (IC) is calculated on 'Base Contract Price', that is, the total contract price less taxes and duties, which is the required criteria differing as per the capital procurement category. These categories ranked in decreasing order of priority as stated by the Government is as follows -

Table 5.1: Priority-wise Defence Procurement Category

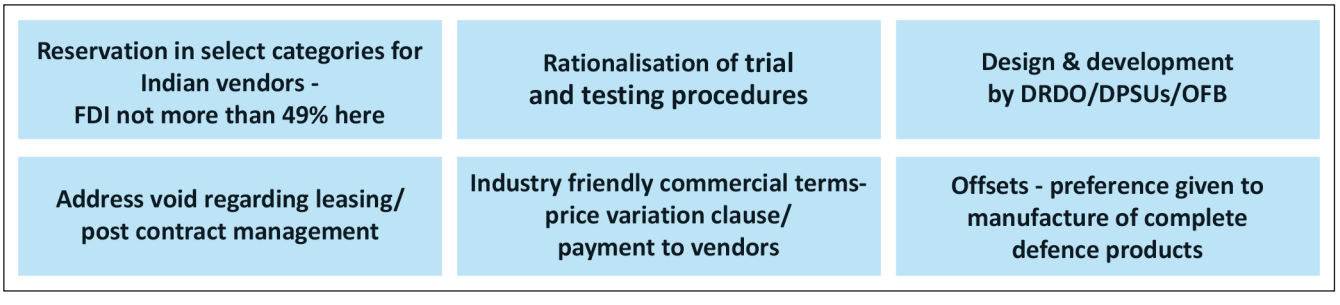
Priority Rank	Category	Indigenous Content (IC) Requirement	Vendors Involved
1	Buy (Indian – Indigenously Designed Developed and Manufactured) i.e. Buy (Indian-IDDM)	Indigenous Design & IC ≥ 50%	Indian
2	Buy (Indian)	If, Indigenous design – IC ≥ 50% Otherwise – IC ≥ 60%	Indian
3	Buy and Make (Indian)	IC ≥ 50% in the 'Make' portion	Indian
4	Buy (Global - Manufacture in India)	IC ≥ 50%	Indian/Foreign
5	Buy (Global)	If, Foreign Vendor - NIL Indian Vendor - IC ≥ 30%	Indian/Foreign

Source: Defence Acquisition Procedure 2020, Ministry of Defence, Government of India

Additionally, under DAP 2020, the offsets clause would be applicable for procurement categories of Buy and Make as well as the Buy (Global) where the estimated Acceptance of Necessity (AoN) cost of the Buy portion is ₹ 2000 crore or more. Indian vendors upon failing to meet the minimum 30% IC content, offset obligations must be discharged.

Select salient characteristics of DAP 2020 are as follows –

Figure 5.2: Salient Features of DAP 2020



Source: Ministry of Defence; India Exim Bank Research

The Government aims to foster indigenous defence manufacturing capabilities through improved domestic design and development as well as through greater private sector participation. Based on such objectives, segments like Make and Innovation, Strategic Partnership Model (SPM), among others, is pursued following which the developed defence items may be procured through either of the defence procurement categories of 'Buy' or 'Buy and Make'.

The solution categories to defence procurement as stated in DAP 2020 are listed in the **Table 5.2** below.

Table 5.2: Categorisation to Foster Indigenisation of Defence Capabilities

	Category	Features
Make	**Make I**	– Ministry of Defence (MoD) provides financial support up to 70% of prototype development cost or maximum of ₹ 250 crores per Development Agency (DA) – Government retains only a license in the Intellectual Property (IP) being generated under contract – Contractor retains title and all other IPR that is not granted to the Government, subject to conditions – Post development, procurement to be through Buy (Indian-IDDM) route i.e. IC ≥ 50%
	Make II	– No government funding instead it is industry funded for prototype development – Industry can submit a suo-moto proposal – Post development, procurement through the Buy (Indian-IDDM) route i.e. IC ≥ 50%
	Make III	– For import substitution purposes – No indigenous design/development but can be manufactured in India – No government funding – Post development, procurement through the Buy (Indian) route i.e. IC ≥ 60%
Innovation	**Innovations for Defence Excellence (iDEX)**	– Projects intended for start-ups, MSMEs characterised by low capital investments and high innovation – Suo-moto proposals can be submitted – DA retains IPR generated during project. However, Government shall have 'March-in rights' under set reasons – Procurement of the final product will be processed under the Buy (Indian-IDDM) category i.e. IC ≥ 50%
	Technology Development Fund (TDF)	– Projects supported through TDF of DRDO for leveraging the domestic capabilities available with Indian Industries especially MSMEs including Start-ups – Successful development under the scheme results in DAs jointly owning IPR with DRDO – Procurement will be made under the 'Buy (Indian-IDDM)' category i.e. IC ≥ 50%
	Internal Services Organisations	– Projects where prototype development of equipment/system will be processed by the Services through their internal R&D organisations, such as Base workshop/ Dockyards/ Base Repair Depots/ Internal Indigenisation Organisations/ Design Agency, etc – Products developed for 'in house' requirements – Procurement will be made under 'Buy (Indian-IDDM)' or 'Buy (Indian)' category i.e. IC ≥ 50% or IC ≥ 60%

	Category	Features
Design and Development (D&D)		– D&D by DRDO/DPSU/OFB including acquisitions of equipment/system/subsystem/ assembly/sub-assembly, major components, or upgrades – DRDO would select Development cum Production Partner(s) – In case of DPSU/OFB, D&D and subsequent production may be undertaken by themselves – Production agency from Indian industry may also be nominated – Procurement will be made under the 'Buy (Indian-IDDM)' category i.e. IC ≥ 50%
Strategic Partnership Model (SPM)		– Project seeks 'Strategic Partnership' between MoD and Indian private entity, especially those from the MSME sector, to enable greater private sector participation – Such Strategic Partners (SP) will require tie-ups with foreign OEMs to cover manufacturing, transfer of technology, assistance in training skilled human resources, among other support – SP required to put forth an indigenisation roadmap which includes IC commitments, development of domestic manufacturers, R&D, among other segments – Subsequent acquisitions through Buy (IDDM), Buy (Indian), Buy and Make (Indian) and Make categories
Lease	**Lease (Indian)**	– Lessor is an Indian entity and is the owner of the asset – Preferred category
	Lease (Global)	– Lease of equipment from foreign or Indian Lessors

Source: Defence Acquisition Procedure 2020, Ministry of Defence, Government of India

Positive Indigenisation List (PIL) to Curb Defence Imports

The launch of the SRIJAN portal in 2020 by the Ministry of Defence marked another initiative in the pursuit of self-reliance in India's domestic defence manufacturing capabilities and the systematic reduction in import dependency for defence equipment.

As an indigenisation portal, SRIJAN promotes private sector involvement in India's defence manufacturing by enabling concerned DPSUs/OFB/SHQs to display products which are regularly imported or will be imported for interested private vendors like MSMSEs and start-ups of the industry to take up for domestic design, develop and manufacture either through individual capabilities or through joint ventures with OEMs. The portal uploads the periodically released 'Positive Indigenisation Lists (PIL)' by the DDP which notifies the defence items that are to be indigenously manufactured and would face import embargo as indicated by timelines set against the same.

As on June 2024, MoD released the 5th PIL which identified additional 346 items including line replacement units/systems/sub-systems/assemblies/sub-assemblies/spares and components as well as raw materials, with import substitution value amounting to ₹ 1048 crore. The earlier released four PILs comprise a total of 4666 items as notified by DDP, of which 2990 items have been indigenised through various routes as of September 2024. The list-wise breakup of the total number of items released in the respective PILs and the corresponding indigenised status of the items is provided in **Table 5.3**.

Table 5.3: Positive Indigenisation Lists by Department of Defence Production

Positive Indigenisation List	Total Items	Indigenised Items
DPSU's First List	2851	2806
DPSU's Second List	107	31
DPSU's Third List	780	144
DPSU's Fourth List	928	9
DPSU's Fifth List	346	2
Total	**5012**	**2992**

Note: Updated as of 4th October 2024

Source: Srijan Dashboard, Department of Defence Production, Government of India

Table 5.4: Route-wise Indigenisation of Defence Items

Positive Indigenisation List	Route of Indigenisation (in number of indigenised items)	Total Indigenised Items
DPSU's First List	In House (736), Make-I (404), Make-II (159), iDEX/AI/Innovation/R&D (3), Others (1493), not available (6)	2806
DPSU's Second List	Make-II (13), Make-I (3), In House (3), Others (11)	31
DPSU's Third List	Make-I (82), In House (22), Make-II (18), Others (17)	144
DPSU's Fourth List	Make-II (3), In House (1)	9
DPSU's Fifth List	In House (2)	2

Note: Updated as of 4th October 2024

Source: Srijan Dashboard, Department of Defence Production, Government of India

Table 5.5: Select Make in India Targets (Number of Items)

Organisation	2024-25	2025-26
Hindustan Aeronautics Limited (HAL)	3131	1998
BEML Limited	280	585
Bharat Dynamics Limited (BDL)	66	57
Goa Shipyard Limited (GSL)	50	0
Munitions India Limited (MIL)	31	41

Note: Updated as of 5th August 2024

Source: Srijan Dashboard, Department of Defence Production, Government of India

As on August 2024, in addition to the five PILs released by DDP, the DMA has also released a total of five PILs containing 509 items that include highly complex systems, sensors, weapons and ammunition. The 5th PIL released by DMA in October 2023 contained 98 items at a value of exceeding ₹140000 crore focusing on import substitution of components of major systems besides important platforms, weapon system and sensors, and munitions, expected to translate into equipment orders within the next five to ten years.[29]

[29] Major announcements by Raksha Mantri during the plenary session of 'Swavlamban 2.0', PIB (October 2023)

India's Defence Corridors

The development of India's two Defence Industrial Corridors, namely, in Tamil Nadu and Uttar Pradesh was announced in the Union Budget of 2018-19. With investments from both government and private entities, these defence corridors are expected to foster indigenous production of defence and aerospace-related items, thereby reducing import reliance. The two defence corridors and their respective characteristics are listed in **Table 5.6**.

Table 5.6: India's Defence Industrial Corridor in Tamil Nadu and Uttar Pradesh

	Tamil Nadu Defence Industrial Corridor	Uttar Pradesh Defence Industrial Corridor
Select State Advantages	• Highest number of SEZs • Coastal line with 4 large seaports (3 government and 1 private) and 22 minor ports • Amongst the top 5 exporting states • Power surplus state • Major automobile, ICT, financial and electrical/ electronic hub	• Highest number of available labour force • Highest number of MSMSEs • Amongst the top 5 manufacturing and exporting states • Largest railway network spanning 8949 km in country • Junction of Western Dedicated Freight Corridor and Eastern Dedicated Freight Corridor at Dadri, Ghaziabad • Joint domestic Rail and export-import terminal at Moradabad
Nodes	Five nodal points – • Chennai • Coimbatore • Hosur • Salem • Tiruhirappalli	Six nodal points – • Agra • Aligarh • Chitrakoot • Jhansi • Kanpur • Lucknow
Select Incentives/ Policy for the Corridor	• Tamil Nadu Policy for Aerospace & Defence Sector Industry 2019 • Tamil Nadu government may be a co-investor for anchor projects • Common facilities and test centres	• Plug and Play support – o Assured water supply and uninterrupted electricity o Connectivity with 4-lane heavy-duty highway connected with Bundelkhand Expressway and Delhi-Jhansi o Single Window approvals and clearances to Defence and Aerospace manufacturing units • UP Defence & Aerospace Units & Employment Promotion Policy 2018

The Uttar Pradesh Defence Industrial Corridor (UPDIC) spans six nodes - Lucknow, Kanpur, Agra, Aligarh, Chitrakoot, and Jhansi. These locations were strategically chosen due to their existing industrial base,

availability of land, and proximity to significant defense establishments. The corridor aims to leverage Uttar Pradesh's existing infrastructure and skilled workforce to create a robust defense manufacturing ecosystem. As on December 2023, 138 Memorandum of Understanding (MoUs) have been signed with industries in UPDIC and investments of ₹26.6 billion have been made.

The Tamil Nadu Defence Industrial Corridor (TNDIC) encompasses five nodes- Chennai, Hosur, Coimbatore, Salem, and Tiruchirappalli. With well-established industrial base, presence of major defence public sector undertakings, and strong educational institutions, the corridor aims to build on the state's existing strengths in manufacturing and technology. Further, in Tamil Nadu, arrangements have been made through MoUs with 53 industries with investments to the tune of ₹40.9 billion have been made[30].

Innovations for Defence Excellence Scheme (iDEX)

Launched in 2018 by the Defence Innovation Organization (DIO) under the aegis of the DDP, the Innovations for Defence Excellence (iDEX) framework aims at evaluating innovations, funding pilot projects, coordinating with military leadership, and facilitating scaling and indigenisation efforts. The initiative aims to cultivate ongoing collaboration between innovators and the defence industry, fostering a culture of innovation within the military.

A scheme for iDEX was launched in May 2021 by DIO under the aegis of the DDP. The scheme provides grants up to ₹ 1.5 crores (up to ₹ 10 crores in case of iDEX Prime) to the Start-ups/MSMEs to fund the projects in many technological areas under Defence India Start-up Challenges (DISC); and Open Challenge through the Support for Prototype and Research Kick start (SPARK Framework).

The iDEX scheme, besides fostering innovation and technology development, is also a path to procurement for the Armed Forces as per the DAP 2020. Projects of start-ups, MSMEs etc. with low capital investments and high innovation would be pursued under the scheme. The Ministry of Defence has earmarked ₹498.8 crores for the iDEX scheme for the period 2021-22 to 2025-26.

Technology Development Fund (TDF) Scheme

TDF scheme, a key initiative of the Ministry of Defence executed by DRDO under the 'Make in India' program, aims to bolster India's defence capabilities by providing Grant in Aid to Indian industries, including MSMEs and start-ups, for the development of defence and dual-use technologies. It focuses on fostering a culture of design and development, supporting niche technologies, and creating collaborative ecosystems among the Armed Forces, academia, and private sector entities. As on December 8, 2023, 70 projects with a total cost of ₹ 291.25 crores have been sanctioned, resulting in the successful development of 16 defence technologies, thereby promoting self-reliance in defence technology.

Defence Testing Infrastructure Scheme (DTIS)

DTIS is a strategic initiative launched by the Ministry of Defence, aimed at enhancing the country's defence capabilities by developing state-of-the-art testing infrastructure. Launched to support the domestic defence manufacturing sector, DTIS envisages establishing 6-8 greenfield Defence Testing Infrastructure facilities spread across the country. These facilities are intended to serve as common testing centers for the defence sector,

[30] PIB. Ministry of Defence - Year End Review 2023

enabling the industry, particularly SMEs, to test their products efficiently and cost-effectively. The scheme, with a budgetary outlay of ₹400 crores aims to address the existing gaps in defence testing infrastructure.

The projects under the scheme are provided with up to 75% government funding in the form of 'Grant-in-Aid'. The remaining 25% of the project cost is borne by the Special Purpose Vehicle constituents of which are the Indian private entities and state governments.

Notably, recently an MoU was signed under DTIS to establish three state-of-the-art testing facilities for unmanned aerial systems, electronic warfare, and electro optics domains in Chennai along the Tamil Nadu Defence Industrial Corridor.

Indigenisation Efforts by Select DPSUs

India's defence PSUs are acknowledged to dominate the sector's production landscape. Accordingly, indigenisation thrust by these entities in the form of R&D, financial assistance, identification of vital defence imports, among others, is crucial for India to achieve reduction in its defence import dependency. Few policy initiatives and corresponding indigenisation results are stated in **Table 5.7**.

Table 5.7: Indigenisation Initiatives of Select Defence Public Sector Undertakings

Company	Indigenisation Initiative
Hindustan Aeronautics Limited (HAL)	– In FY 2022-23, 1298 items indigenised with expected result of annual foreign exchange saving of ₹160.3 crore – Creation of dedicated indigenisation fund by transfer of 3% operating profit after tax of company annually from FY 2022-23 onwards – Indigenisation using company funds by which development cost is being borne by HAL and supply orders are placed on need basis to address the challenges – Identification of critical items for indigenisation and inclusion in the PIL – a total of 430 imported items are included in the four PILs (PIL-1: 23, PIL-2: 22, PIL-3: 360, PIL-4: 25) issued by DDP – 19000 imported items uploaded on Srijan Defence Portal for indigenisation. Those to be indigenised specifically through Make-II also identified
Bharat Electronics Limited (BEL)	– As of FY 2022-23, 75% of BEL's turnover generated from indigenous technology – Implementation of Outsourcing & Vendor Development Policy – Product development through in-house R&D efforts and partnerships with DRDO, national R&D labs and academia – Boosting role of India's private sector through R&D partnerships and providing test facilities – ToT based manufacturing from foreign OEMs – Identification of critical items for indigenisation and inclusion in PIL – 269 imported items are included in the four PILs (PIL-1: 170, PIL-2: 21, PIL-3: 69, PIL-4: 9) issued by DDP – Items identified for indigenisation uploaded on the Srijan Defence Portal, specifically those to be indigenised through Make-II procedure

Company	Indigenisation Initiative
Bharat Dynamics Limited (BDL)	– In FY 2022-23, indigenisation target of 14 items exceeded; 16 items indigenised – Manufactures missiles under ToT from DRDO and foreign OEMs – Indigenisation levels of 80-90% achieved in multiple products designed by both foreign OEMs as well as DRDO – Designing and development underway for a 3rd generation indigenous Anti-Tank Guided Missile as a Make-II project – Over 1187 items identified and uploaded on Srijan Defence Portal for indigenisation, with vendors showing interest in 413 items
Mazagon Dock Shipbuilders Ltd (MDL)	– Initiated indigenisation program at the behest of MoD with 70% funding to industry partner to reduce imports – After setting up the Department of Indigenisation in 2015, a separate Indigenisation Fund was also created as per policy of amount ₹ 1039 lakhs. However, no provision has been made since FY 2020-21 – As of FY 2022-23, MDL indigenised 27 major items/system for ships and submarines, firefighting system for the magazines – Initiated a flagship R&D program with aim to design India's first Indigenous Conventional Submarine, the prototype for which is scheduled to be commissioned by December 2024 – Analysis conducted of 8000 equipment and material required for building submarines as part of mega indigenisation plan. Thereby, components have been mapped to 165 equipment, of which 35 items have been indigenised – Identified and uploaded 559 imported items worth ₹2474.31 crores to the Srijan Defence portal – Identification of critical items for indigenisation and inclusion in PIL – 148 imported items are included in the four PILs (PIL-1: 5, PIL-2: 6, PIL-3: 134) issued by DDP

Source: Compiled from Annual Report of FY 2022-23 of respective DPSU

Box 1: Swavlamban 2.0 – Indian Navy's Path to Self-Reliance

In recent years, the Indian Navy has made massive strides in the indigenisation of its equipment/systems/sub-systems for various naval platforms, thus successfully pursuing the vision of 'Aatmanirbhar Bharat'. This has led to the release of the second edition of Swavlamban document, namely, 'Swavlamban 2.0', a reference document for the relevant industry stakeholders like DPSUs, DRDO and private industry, outlining the indigenisation requirements and status of the Indian Navy.

The Indian Navy strategises its indigenisation efforts at three levels of complexity, namely, the levels of systems, subsystems and spares using indigenisation routes like Revenue Schemes, Make Schemes, Technology Development Fund Scheme, iDEX and DRDO Projects. The trajectory of indigenisation policy followed by the Indian Navy has shifted from the earlier followed import substitution through reverse engineering - which was limited to components/subsystem - to the present focus on technology development.

Overall, the ship-building materials, equipment and systems used onboard an Indian Navy ship are categorised into Float, Move and Fight, each currently having achieved indigenisation levels of 90%, 60% and 50%, respectively. Select indigenously developed major systems of the Navy are as follows –

Float	Move	Fight
• Hull Construction Materials • Silicon Rubber Seals • Foldable Hangar Door	• Steam Turbine • Submarine Batteries • Boilers	• Electronic Warfare Systems • Supersonic Missile System • Torpedo Tube Launchers

The Indian Navy has developed reasonable self-sufficiency in the hull design and construction of various types of warships, power generation and distribution systems, Sonars and Electronic Warfare Systems, among others. However, indigenisation efforts have to be intensified in areas of sensors, Fire Control Systems, Unmanned Systems, etc., while import dependency has to be reduced when it comes to underwater weapons and sensors, IT based systems, multifunction radars, among other products.

According to MoD, as of September 2024, the Indian Navy has utilised more than two-third of its modernisation budget on indigenous procurement in the last five years, further cementing its successful undertakings to achieve 'Atmanirbharta'. Continuing on this path of indigenisation will assist the Navy to transform from a 'Buyer' to a 'Builder' thereby achieve full self-sufficiency by 2047.

Source: Swavlamban 2.0; India Exim Bank Research

In Conclusion

Thus, the overall systematic approach being followed by the Government of India along with increasing private sector participation to boost domestic designing, manufacturing and procurement of defence products has shown visible progress over the years. However, with aims to achieve eventual self-reliance in defence products and shift away from being a net importer of defence arms, India's policy schemes and reforms across areas of defence acquisition and procurement and institutionals are required to be more steadfast.

Chapter

Strategies to Boost India's Defence Equipment Manufacturing and Export Capabilities

For India to position itself as a global defence equipment hub, a comprehensive and strategic approach is required. This chapter seeks to outline the critical areas where India may focus on to develop a globally competitive defence ecosystem. To ascertain these and to understand the prevailing challenges, Exim Bank has engaged with companies in this space, including both MSMEs and large enterprises. Accordingly, based on the survey inputs, interactions with key industry stakeholders, and extensive desk research, the Study presents possible forward-looking strategies for India's defence equipment industry to emerge as a leading manufacturer and to explore new frontiers of growth and development.

Figure 6.1: Strategies to Boost India's Defence Industry Capabilities

A. Expanding Defence Export Horizons

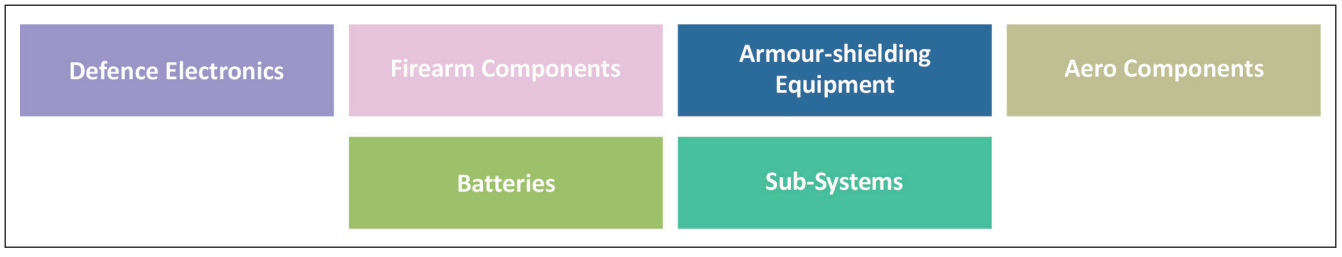
With growing emphasis on attaining self-reliance, India is actively strengthening its defence equipment industry. However, despite making significant progress, India's share in global defence exports remains modest. Given this background, the following strategies may be focused on to bolster India's position in the global defence equipment trade landscape:

A.1. Enhancing Strategic Engagement with Potential Countries

To achieve the target of exports worth ₹ 500 billion by 2029[31], India must strategically focus on defence exports that hold substantial indigenous content and tap into unexplored potential markets for the same.

Developed economies, for instance, with their advanced defence manufacturing capabilities, often outsource the labour-intensive portions of the defence supply chain to developing countries to benefit from cost-arbitrage. India must continue to leverage this export opportunity by focusing on supplying defence-related small parts and sub-systems/components to established defence manufacturing giants. Figure 6.2 shows a non-exhaustive list of potential defence exports to advanced economies.

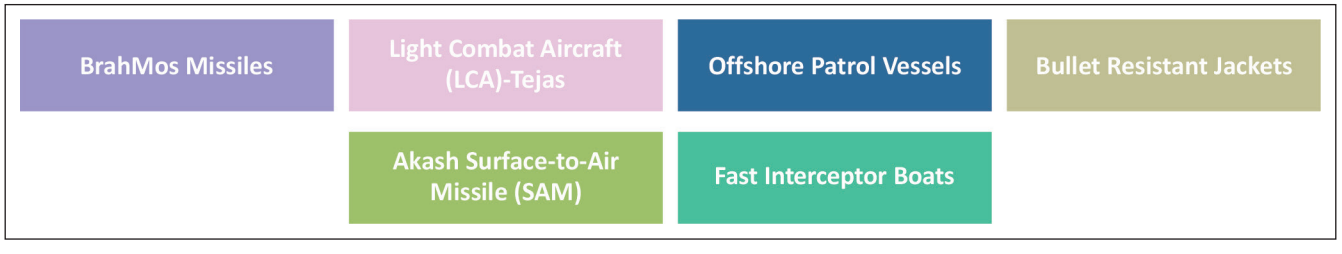
Figure 6.2: India's Select Potential Defence Equipment Exports to Advanced Economies



Source: India Exim Bank Research

India has the potential to meet the import demand for defence platforms and indigenously manufactured complete systems of developing or least-developed countries which otherwise lack the expertise to manufacture these. Securing contracts for such high-value defence systems would enable higher export earnings. India's major defence systems like the Light Combat Aircraft (LCA) Tejas, BrahMos cruise missile, etc. (Figure 6.3), are increasingly being sought by developing countries like Nigeria, Tanzania, Malaysia, Philippines, Vietnam, and Brazil, amongst others.

Figure 6.3: India's Select Potential Defence Exports to Developing Economies



Source: India Exim Bank Research

For a more granular analysis, the Study maps the defence import demands of several friendly countries to India's defence manufacturing capabilities. Taking into consideration their import demand and their policy incentives, select potential markets have been identified across different regions of the world (Table 6.1).

[31] PIB. (2024). Self-reliance is first condition for a strong economy; Giant strides being made to realise PM Modi's vision of 'Aatmanirbhar Bharat': Raksha Mantri.

Table 6.1: Select Potential Aerospace and Defence Export Markets for India

Region	Country	Growth Drivers
Africa	Nigeria	Biggest military spender in Sub-Saharan Africa; India-Nigeria Military Deal with respect to Defense Industries Corporation of Nigeria
	Kenya	Military modernisation initiative of US$ 236 million
Southeast Asia	Malaysia	Malaysian Aerospace Industry Blueprint 2030 (MAIB 2030); Presence of HAL offices
	Philippines	Successful BrahMos Deal; Convergence of geopolitical concerns
Middle East	Saudi Arabia	Attracting defence investments under its Vision 2030
	UAE	Tawau Economic Program (TEP); Bilateral private sector engagement
Europe	Czech Republic	Military modernisation and equipment maintenance initiatives
	Slovakia	Increase in military spending; Promotion of supply chain integration with foreign defence players

Source: India Exim Bank Research

These countries offer either completely unexplored markets or opportunities for higher exports, particularly of complete defence systems.

Africa

Cooperation in defence and counterterrorism has emerged as an important pillar of India-Africa relations. Africa's growing keenness in recognising India as a reliable defence equipment supplier was evident in the India-Africa Defence Dialogue held on the sidelines of DefExpo 2022 as well as by the promising Indian participation in the Africa Aerospace and Defence Expo held in South Africa in September 2024. However, while Africa accounted for around 15% of India's total arms and ammunition exports in 2023, for aerospace and communication equipment, Africa's share in India's exports equalled meagre 0.1% and 1.1%, respectively. This offers India an opportunity to diversify its defence equipment exports to the region, focusing on major defence systems.

Nigeria, in particular, as the largest arms and ammunition importer in Africa and the biggest military spender in Sub-Saharan Africa (US$ 3.2 billion in 2023), offers promising market potential. India's US$ 1 billion agreement with the country to assist the Defence Industries Corporation of Nigeria (DICON) to attain 40% self-sufficiency in local manufacturing and production of defence equipment in coming years, may be suitably leveraged.

Besides, Kenya too has been deepening defence engagements with India. However, despite being the second largest arms importer in Africa, Kenya still holds negligible share in India's defence exports. In this regard, Kenya's ambitious military modernisation investment plan with an annual budget of approximately US$ 45 million (7 billion Kenyan shillings), provides India opportunities to cater to its import demand, particularly, for communication equipment and bulletproof jackets.

Furthermore, India has also been strengthening defence cooperation with South Africa, Kenya, Tanzania, Mauritius, Seychelles, and Madagascar within the framework of Indian Ocean Rim Association (IORA). The rise in maritime security challenges in the Western Indian Ocean region particularly offers possibilities for India to strengthen its naval exports to the region. India, in alignment with its SAGAR (Security and Growth for

All in the Region) Policy, may assist African countries in accessing critical naval defence equipment including offshore patrol vessels, interceptor boats, and unmanned underwater systems.

Southeast Asia

India's maritime engagement with Southeast Asia is on the rise, as reflected by the ASEAN-India Maritime Exercise held in May 2023. In 2023, Indonesia and the Philippines were also the second and fourth largest global importers of warships (HS 890610), with shares of 22.2% and 3.1%, respectively. This provides opportunity for India to leverage its ship-building capabilities to intensify exports in these markets.

In the aerospace equipment category, India's BrahMos Aerospace Private Limited (BAPL) and the Department of National Defence of the Republic of Philippines signed a contract deal for the supply of Shore Based Anti-Ship Missile System in 2022. This may serve as a blueprint for India's increased deals of the BrahMos Missile in the region.

Malaysia also offers potential for defence collaborations. The Malaysian Aerospace Industry Blueprint 2030 (MAIB 2030) envisages strengthening of the domestic aerospace industry across the sub-sectors of Maintenance, Repair, and Operations (MRO), manufacturing, engineering and designing services, and education and training. This provides India an opportunity to foster greater bilateral research collaborations and supply aerospace components to the country.

Middle East

As per SIPRI, Saudi Arabia and Qatar were the second and third largest global importers of major arms with shares of 8.4% and 7.6%, respectively, over 2019-23. Saudi Arabia, Qatar and the UAE, together accounted for over 85.0% of all arms and ammunition imports into the Middle East in 2023.

Under its Vision 2030 economic diversification program that aims to localise 50% of its military procurement, Saudi Arabia is attracting greater foreign investment flows and partnerships. This opens gateways for India's defence engagements in the region. Similarly, the UAE's Tawau Economic Program which aims to strengthen the aerospace and defence industry, is also providing defence partnership opportunities to India. Furthermore, India may also enhance defence engagements with Qatar to support the country's efforts towards modernisation of its naval fleet. Given Qatar's focus on upgradation of its fleet of patrol and interceptor boats, among other equipment, India may strengthen partnership in building robust shipbuilding capabilities.

Other Markets

The European countries of Czech Republic and Slovakia are among other potential markets identified for India's arms and ammunition exports. Both countries featured among the top ten arms and ammunition importers globally in 2023. However, India's arms and ammunition exports to the two countries are modest. India's defence capabilities may contribute to Slovakia's efforts of military modernisation and equipment maintenance in the identified areas of vehicle platforms, rifles, anti-drone systems and purchase of military clothing. Further, given that the Czech Republic is seeking partnerships for integration of its domestic industry to global defence supply chains and for increasing and maintaining defence spending at 2% of GDP, 2024 onwards, India may step in as a committed partner.

Besides, given the strategic importance of the South Asian region, India may further expand defence cooperation with countries in the region in alignment with its Neighbourhood First Policy. India may push for joint-ventures and improved collaboration in the adoption of defence-related new technologies in the region.

A promising way to further strategic cooperation with the identified countries is through the posting of Defence Attachés in these countries. As India is exploring this route to deepen defence partnership with countries like Tanzania, Mozambique, Djibouti, Ethiopia, and the Ivory Coast, similar arrangements may be intensified with all identified countries where India's defence equipment industry has markets. Thus, strengthening Government to Government (G-to-G) sales with countries whose defence equipment demand matches with India's capabilities may prove to an effective way of bolstering India's exports and engagement overseas.

A.2. Enabling Greater Export Facilitation

There is an ongoing proposal towards setting up a much-needed defence export promotion council, referred henceforth as DEPC, to accelerate India's defence export growth and provide holistic support to the industry. In this regard, the Study suggests the following focus areas for the council –

Facilitating Capacity Building

The proposed DEPC may contribute towards the capacity building of the stakeholders in the defence industry through outreach programmes including workshops, seminars and sensitisation programs to, inter alia, spread awareness about funding mechanisms, highlight relevant opportunities in the sector, and identify and encourage adoption of important technologies, particularly for MSMEs. DEPC could also play an enabler role for companies to tap new opportunities by organising frequent defence exhibitions, both at the national and international levels.

Establishing One-stop Shop for Trade Related Information

DEPC may facilitate increased defence exports from India by acting as a one-stop shop for all defence trade related information queries. The information asymmetry may be reduced by consolidating all relevant information including segment-wise trade performance, all licensing requirements including for SCOMET[32] listed goods, and other important regulations crucial for exports. Systematic updates may also be provided regarding the global defence arms trends, country-specific quality assurance procedures and standards, among other relevant information, to the concerned manufacturers, exporters and importers. An export handbook focusing particularly on state-wise segmentation may be developed by the proposed council and updated at scheduled intervals.

Role in India's Missions Abroad

DEPC may work closely with the embassies abroad towards showcasing India's growing defence capabilities resulting in possible demand therein. Such a help desk could be a one-point contact source to access all required information regarding India's trade in defence equipment and related commodities.

Bridge between Domestic Stakeholders

By serving as a link between the different domestic stakeholders, like the DPSUs, private manufacturers, armed services, certification agencies, Ministry of Defence, among others, the DEPC may contribute towards

[32] As discussed in Chapter 4, in Foreign Trade Policy, dual-use items have been given the nomenclature of Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET). Export of dual-use items and technologies under India's Foreign Trade Policy is regulated.

streamlining of processes and in faster exchange of information such as the grievances of the industry to the relevant authorities or concerning the pressing needs of the services to the manufacturers.

A.3. Exploring Countertrade Arrangements

Countertrade refers to the exchange of goods and services in whole or part, with other goods and services as payment, rather than with money. The growing prevalence of countertrade practices may be suitably utilised for trade in defence equipment. While countertrade in the form of offset policy is implemented in India's defence industry, the arrangement in the form of barter is still largely unexplored.

Indonesia is known to have participated in countertrade arrangements for the procurement of defence platforms from Russia. In 2003, Indonesia acquired the Russian Sukhoi SU-27 SK and SU-30 MK combat aircraft with the deal involving a downpayment of 13.5% of the total contract value of US$ 192 million, while the remaining was settled through the countertrade of commodities. In 2017 too, Indonesia offered to trade local commodities like rubber, coffee, palm oil, tea, etc., in exchange for Russia's SU-35 jet fighters. The deal involved a local content and offset arrangement of 35%, along with a countertrade arrangement of exports equal to 50% of the total US$ 1.14 billion contract. China is also known to have entered countertrade arrangements with several developing and least developed economies to secure its arms exports in exchange for either oil or other natural resources as a medium for settling transactions.

A barter set up under a countertrade arrangement may thus allow for the exchange of India's defence equipment exports either with that of the partner country's defence exports or with agreed upon non-defence goods and services. Such arrangements may be particularly considered for settling defence trade transactions between India and its neighbouring countries where finance is often an impediment to trade. The payment for India's defence equipment exports may be fulfilled either partly or fully with exchange of natural resources or agricultural commodities. Sri Lanka, for instance, is India's second largest source for imports of coffee, tea, maté and spices. This offers both the countries to enter into a countertrade arrangement for defence transactions.

A.4. Developing Vendor Development Programmes

The Ministry of Defence may formulate a vendor development programme that identifies, assesses, and enlists potential vendors, facilitating indigenisation and consequently higher exports. The vendors may be identified through a meticulous vendor assessment process encompassing evaluation criteria like field visits for comprehensive assessments of the manufacturing facilities. This could involve evaluating infrastructure and technology capabilities; assessing production capacity, quality control measures, and adherence to safety standards; and verifying test facilities for product validation and certification. Besides, capability evaluation may be conducted through evaluation of the vendor's research and development initiatives and compliance with national and international standards, among others.

After completing assessments, potential vendors may be classified based on their capabilities and performance metrics. The list of vendors such approved may be made accessible on the Ministry's website so that it is accessible to all the relevant stakeholders and serves as a comprehensive database for easy reference during vendor selection. The platform may also be promoted at the various workshops, seminars, and other outreach programs to create awareness among the stakeholders.

The identified vendors could then find it relatively easy to apply for procurement contracts given that it establishes credibility. The vendors may also be provided support for realising export opportunities by inter alia, disseminating the vendor lists at global platforms and facilitating the vendors' participation in trade fairs and exhibitions overseas.

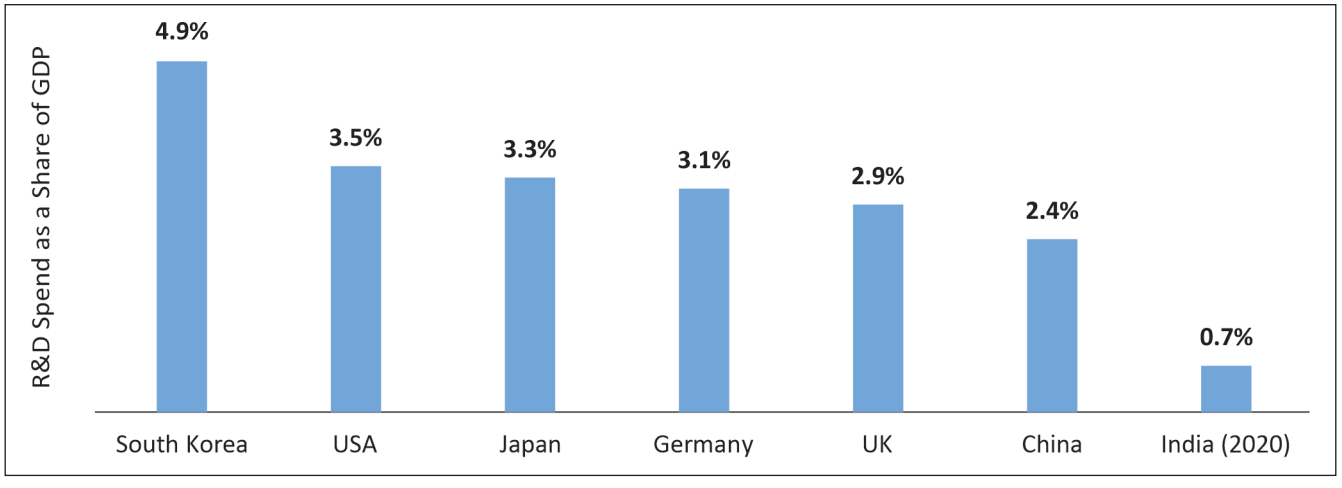
Thus, by systematically identifying, assessing, and approving potential vendors, India can foster a competitive ecosystem that supports indigenous manufacturing, enhances participation of MSMEs and enables India to position itself as a reliable player in the global defence market.

B. Bolstering the R&D Ecosystem

Research and development (R&D) in defence manufacturing plays a crucial role towards maintaining national security, technological superiority, and military readiness. It drives innovation in advanced weaponry, communication systems, and defence technologies, enabling nations to stay competitive and adept in mitigating threats. R&D also boosts self-reliance by reducing dependency on imports. Besides, defence innovations often have civilian applications, leading to positive ripple effects in other sectors of the economy such as transportation, communication, healthcare etc.

However, vis à vis, top military powers like the USA and China, India lags in spending on R&D. India's R&D spend as a share of GDP was estimated at 0.7% in 2020, considerably lower than other countries (Figure 6.4). This has hitherto led to a lacklustre performance in high tech exports, evident by high tech exports constituting a share of 12% in India's exports in 2022 as against the USA's share of 18%, China's 23%, the UK's 27%, and South Korea's 17%, among others[33].

Figure 6.4: R&D Spend as a Share of GDP of Select Countries in 2022



Source: World Bank; India Exim Bank Research

The following strategies may be considered to strengthen the R&D ecosystem in defence:-

B.1. Increasing Budgetary Allocation for R&D in Defence

Looking at the allocation for R&D in defence, according to the report of the Standing Committee on Defence (2023-24), India's budget allocation for defence R&D out of its total budget for defence was around 5.89% in

[33] World Bank

2021-22, much lower than the global norm of 10-15%. Further, in the Union Budget 2024-25, the budgetary allocation for DRDO accounted for less than 4% of the total defence budget. The committee has flagged that the budgetary allocation for DRDO is not commensurate with the growing ambitions of the country in the sector.

Given that DRDO is the R&D wing of Ministry of Defence, serving as an anchor of India's R&D network, increased budgetary allocation for DRDO's R&D operations are crucial for fostering innovation and enhancing India's indigenous defence capabilities. While DRDO has shown commendable progress in matching its global peers by acquiring existing technologies, higher R&D allocations are crucial for it to lead in pioneering new technologies and setting future trends.

As one of DRDO's key objectives is to accelerate Innovation through private sector collaborations, enhancing its funding would help create more platforms like iDEX[34] and the Technology Development Fund[35], thereby encouraging private players, particularly MSMEs to participate in defence innovation. Thus, India's R&D expenditure with respect to the percentage of defence budget needs to increase so that India can position itself as a global leader in defence technology.

B.2. Encouraging Cutting Edge Dual-use Technologies

There is a concerning gap in R&D intensity in India's defence industry. According to the "State of Industry R&D in India" report by FAST India and IIFL Securities, Indian defence firms exhibit a notably low R&D intensity of 1.2%, below the global average of 3.4%. This lack of investment in R&D not only hampers innovation but also limits the generation of patents. Besides, Indian defence sector firms lag considerably in patent output, with 7.3 patents per US$ billion revenue compared to the global average of 240. Further, the proportion of PhD employees in Indian defence firms, at 0.1%, is lower than the global average of 0.3%.

To cultivate a more vigorous R&D climate at the firm level, the Government may incentivise projects focused on developing dual-use technologies as this could stimulate innovation and attract investment from both defence and civilian sectors.

Countries across the globe are working towards tapping the potential of dual-use goods. For instance, the EU, included research and innovation in dual-use technologies in its Strategic Agenda 2024-2029 for the first time. Besides, earlier this year, the EU published a white paper titled, "On Options for Enhancing Support for Research and Development Involving Technologies with Dual-Use Potential", emphasising the need to strengthen the intersection between civil, defence, and space sectors to enhance innovation and security.

As the nations are increasingly embracing the potential of dual-use goods, it is crucial for India to provide dedicated R&D support for realising the tremendous opportunities present in the space. India may foster stronger cooperation between civilian and defence industries through joint research initiatives, public-private partnerships, increased knowledge exchange and earmarking adequate funds and programmes for enabling rigorous R&D in dual use goods.

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[34] Innovations for Defence Excellence (IDEX) is an initiative by the MoD, aimed at promoting innovation and supporting startups in the defense sector. It aims at evaluating innovations, funding pilot projects, coordinating with military leadership, and facilitating scaling and indigenisation efforts.

[35] The Technology Development Fund (TDF) scheme, part of the 'Make in India' initiative, aims to enhance India's defence capabilities by providing financial support to industries, MSMEs, and startups for developing indigenous defence technologies. Under the scheme, grants in aid are provided to MSMEs and startups, for the development of defence and dual use technologies that are currently not available with the Indian defence Industry.

The Government may launch a National Mission on dual use technologies to encourage, guide and support the development and adoption of emerging cutting edge technologies including cybersecurity technologies, augmented reality and virtual reality, robotics and automation, among others. The mission may also focus on enhancing manufacturing capabilities in advanced design, maunfacturing techniques, and materials including specialised alloys of titanium, aluminium, tungsten, copper etc. along with composite materials.

The Mission may provide an all-encompassing support to the industry including guidance regarding the kind of technologies and materials in demand, infrastructural support such as incubation centres, and marketing support for exports, among others. Leveraging these areas may lead to development of groundbreaking patents and enhance national defence capabilities.

Table 6.2: Select Emerging Dual-use Technologies

Technology	Commercial Applications	Defence Applications	Leading Countries
Artificial Intelligence	Autonomous vehicles, healthcare (diagnostics), smart cities	Autonomous drones, surveillance, autonomous weapons	USA, China, Israel
Quantum Computing	Drug discovery, cryptography, financial modelling	Cryptanalysis, secure communication, advanced simulations	USA, China, Germany
Cybersecurity	Protecting financial systems, e-commerce, data privacy	Defence systems protection, military communications	USA, Israel, Russia
Robotics and Automation	Industrial automation, healthcare (surgery), logistics	Unmanned systems, bomb disposal, logistics support	South Korea, Singapore, Germany
Advanced Materials	Aerospace, automotive, electronics	Ballistic protection, stealth technology, lightweight armour	China, USA, Germany
6G Communication	High-speed internet, IoT, smart manufacturing	Secure communications, battlefield networks	South Korea, China, USA
Hypersonic Technology	Commercial aviation (future potential)	Hypersonic missiles, high-speed reconnaissance	USA, Russia, China
Biotechnology	Gene editing, personalised medicine	Biodefence, combat medicine, bio-enhancement of soldiers	USA, EU, China
Additive Manufacturing (3D Printing)	Manufacturing, healthcare (prosthetics), construction	Rapid prototyping, spare parts production in the field	USA, Germany, China
Space Technologies	Satellite communications, space tourism	Military satellites, missile defence systems	USA, Russia, China

Source: India Exim Bank Research

As evident in Table 6.2, the USA leads in leveraging new technologies. This may be attributed to the paramount role that the country accords to R&D and also to the proactive participation of private sector in undertaking rigorous R&D programmes. In 2021, the USA was the largest R&D spender with US$ 806 billion, constituting a share of 3.5% in the GDP. The USA spent 15% of its total R&D expenditure on basic research, 18% on applied research, and a considerable 67% on experimental development. It is worthwhile to note that over the years, the contribution of private sector to R&D has increased so much so that in 2021, the business sector funds accounted for 75% of USA's R&D funding[36].

The collaborative role of government and private sector in the defence sector is driven by its institutions such as the Defense Advanced Research Projects Agency (DARPA) which boasts an innovation ecosystem of academic, corporate and governmental partners, with a constant focus on tapping breakthrough technologies for national security; its initiatives such as the Small Business Innovation Research (SBIR) program which provides non-dilutive funding to businesses to develop technology and enable commercialisation; and the overall conducive environment for businesses to develop and reap gains from dual use technologies. On similar lines, India too needs to develop a thriving ecosystem for businesses for tapping the unexploited potential of new age technologies for defence as well as commercial applications.

Furthermore pubic private partnerships may also be facilitated in dual use technologies with leading technology-driven countries such as the USA and Germany in areas such as space, advanced communication, semiconductors, and biotechnology.

B.3. Protecting Intellectual Property Rights-

Intellectual property (IP) plays a pivotal role in defence acquisition and procurement contracts as it governs the ownership, use, and commercialisation of technologies developed for defence purposes. The DAP 2020 provides for IP related safeguards across the acquisition categories and states the compliance requirements for Transfer of Technology (ToT) i.e. movement of innovations, ideas, knowledge, and techniques from one entity or country to another. ToT is recognised as a key factor in achieving self-reliance.

For 'Make I' projects, the DAP provides elaborate Guiding Principles on the allocation of IP rights under which, in most circumstances, the contractor retains the ownership of the IP generated under the contract, with the Government only retaining a license as per the terms given herein. It may be noted here that as per the guiding principles, the ownership of any rights by the contractor does not include an absolute right to transfer any software, product or documentation. Such transfer, including exports, are governed by the export policy, other applicable laws.

While the ToT arrangements have paved the way for greater indigenous production, there are several issues with the arrangements particularly for "Make II" and "Make III" projects. The "Make II" ToT arrangements in DAP 2020 encounter issues concerning the clarity of ownership and usage rights. Due to the lack of specific guidelines on IP transfer, OEMs often impose restrictive practices that hinder the capabilities of Indian Production Agencies (IPAs). These practices include limitations on the field of use, volume, and territory for the technology; prolonged validity periods that prevent further development by IPAs; restrictions on their ability to conduct research and development; non-competition clauses; and unilateral pricing. Besides, ToT

[36] The State of U.S. Science and Engineering 2024

arrangements in India are seen as costly for IPAs due to high costs from royalties, trademark fees, inflated parts prices, among others. Similarly, in "Make III", there is lack of clear guidelines on IP ownership and usage rights, which can lead to one-sided agreements favouring foreign OEMs.

Besides, the legislative processes for IPR enforcement are often lengthy and fraught with uncertainty, posing significant challenges for industries reliant on strong IP protections. The extended timeframes may deter companies from pursuing legal action against infringement, as the costs may outweigh the potential benefits of enforcing their rights.

Ensuring the protection and retention of IPRs is essential as it secures the legal framework around innovations, prevents unauthorised use, and facilitates further development. Thus, to address the IP protection concerns in India, formulating a comprehensive strategy is essential. Establishing clear and transparent guidelines for IP ownership and usage rights in ToT agreements would ensure equitable terms for both foreign OEMs and IPAs. Standardised agreements may help limit excessive royalties and restrictive clauses, promoting fair negotiations and preventing inflated costs. A robust monitoring mechanism is also crucial to oversee compliance with ToT agreements and protect the rights of IPAs.

C. Addressing the Financing Needs

Based on the inputs received from stakeholders, it is gauged that access to quality finance remains a significant challenge across the defence industry. However, this issue is particularly acute for MSMEs, which face greater difficulties in securing adequate funding. The inability of these companies to obtain sufficient financial support has, over time, perpetuated a culture of risk aversion within the industry. With limited access to capital, companies are often hesitant to invest in new product development and cutting-edge technology initiatives, prioritising short-term survival over long-term innovation. This constrained financial environment stifles technological advancement and inhibits the industry's ability to compete globally, especially in an era where defence sectors worldwide are driven by rapid technological progress.

A few of the specific challenges faced by the industry are: -

- **Delayed payments-** MSMEs encounter challenges in receiving timely payments from buyers, which exacerbates their working capital constraints and hampers their operational efficiency. Delayed payments can lead to cash flow shortages, making it difficult for these enterprises to meet their financial obligations, and sustain day-to-day operations.
- **Lack of support for product trials-** For capital procurements, the Ministry of Defence follows the principle of "No Cost No Commitment" wherein it neither bears the cost of trials undertaken by the potential vendors nor is it obliged to purchase the equipment post-trial. As a result, companies, particularly MSMEs, face considerable financial burdens when developing prototypes and conducting trials. These evaluations often involve extensive testing, quality assurance, and compliance with stringent defence standards, all of which can be expensive and resource-intensive. If a company invests substantial resources into these trials but ultimately does not secure a contract, it faces a complete loss of that investment without any form of compensation or financial recourse. This uncertainty creates a significant deterrent for companies considering participation in the procurement process, as the associated financial risks can be daunting.

- **High Transfer of Technology (ToT) fees-** High ToT fees charged by foreign OEMs poses a significant burden for defence companies in India. High ToT fees directly inflates the overall production costs for defence manufacturers, leads to diminished profit margins, which is particularly challenging for MSMEs owing to their limited financial resources.
- **Collateral related issues-** Many a times, MSMEs face difficulty in obtaining finance due to lack of collateral. Situations also arise wherein the existing securities of the companies are charged to the banks, making issue of fresh loans for product development challenging.

In view of these challenges, the Study proposes a few strategies that could assuage the financing issues faced by the businesses.

C.1. Designing Defence-specific Financing Programmes

Defence companies face unique challenges in securing funding and resources. Defence firms typically face long project timelines, complex regulatory environments, and substantial upfront capital requirements. The broad-based financial programmes offered by financial institutions (FIs) often fail to meet the specific needs of defence companies due to the unique challenges they face. Thus, there is a pressing need for tailored financial programmes specifically designed for defence companies. These may include early-stage support, working capital finance, and growth finance, among others.

Figure 6.5: Select Programmes Proposed to Support Indian Defence Companies

Source: India Exim Bank Research

a. Early-stage Support

Early-stage support for defence companies, including for campus-based startups, is crucial for fostering a culture of innovation in India. These startups often possess cutting-edge ideas and technologies but they require targeted resources and mentorship to navigate regulatory complexities, secure funding, and effectively transition from research to application in a highly competitive landscape.

The FIs may, in this regard, partner with incubators engaged with defence companies such as FORGE Coimbatore, Pilani Innovation & Entrepreneurship Development Society, Incubation Centre IIT Patna, among others, to identify and support promising companies that have financing requirements, owing to their high R&D intensities. Such interventions by FIs may also strengthen the overall supply chain ecosystem, as by improving cash flow for MSMEs, larger companies can ensure that their suppliers have the resources needed to maintain production levels, thereby enhancing overall efficiency and competitiveness.

Besides, it has been observed that many startups face significant challenges when it comes to financial awareness and navigating the funding landscape. While these startups may excel in innovation and technology development, they typically lack the financial literacy necessary to identify and leverage appropriate funding products. Many founders are more focused on their technical projects than on understanding financial

instruments, leading to missed opportunities or mistakes in choosing their funding instruments. FIs may thus aspire to fill this knowledge gap by designing and conducting extensive financial awareness programmes which acquaint the identified startups with all the viable funding routes.

b. Working Capital Finance

Factors like delayed payments by buyers and the "No Cost No Commitment" clause for procurement impede the working capital flows of defence firms. It has also been observed that despite being recipients of grants under schemes like the iDEX and Technology Development Fund, companies still struggle with cash flow constraints due to high R&D intensity. Accordingly, banks may come up with products that address the working capital needs of the defence companies particularly MSMEs. One possible solution is to extend working capital loans by considering purchase orders (POs) obtained from the suppliers as a collateral. By offering financing based on confirmed POs, MSMEs can access the necessary working capital without having to wait for payments from buyers. This improves their liquidity and allows them to purchase raw materials, components, and other inputs required for production promptly, enabling them to meet production schedules and fulfil contractual obligations efficiently. FIs may also offer technology enabled working capital financing solutions to help defence companies manage their cash flows.

c. Growth Finance

For companies to scale their operations, invest in research and development, and expand to new segments, access to finance for growth and diversification is required. Such programs can provide the necessary resources for hiring skilled personnel, enhancing production facilities, and exploring new market opportunities. For this, banks may provide long term debt to the companies that is mapped with their growth cycles. Such programmes would facilitate sustainable growth and empower companies to realise their ambitions.

Box 2: Exim Bank at the Forefront of Harnessing Technologies

Exim Bank has over the years played a catalytic role in facilitating India's increasing integration with the global economy by promoting, financing and facilitating India's international trade and investment. Notably, since its inception, the Bank has played an instrumental role in supporting promising Indian companies across verticals during their formative years, through its various financial programmes, thereby contributing to their emergence as global leaders.

In the defence innovation space in the country, Exim Bank has supported a few companies under its newly launched Ubharte Sitaare Programme (USP). The Bank under USP, aims towards identifying small and medium Indian enterprises with differentiated technology, products, or processes, that have the potential to emerge as future export champions through a mix of structured support.

For instance, the Bank has been a catalyst in the exponential growth of a defence oriented MSME engaged in Unmanned Aerial Vehicle (UAVs). The company supported by Exim Bank has been the first to indigenously develop and manufacture Vertical Take-Off and Landing UAVs in India. Exim Bank's support has enabled the company to execute large supply contracts, bolstering its credibility in handling large-scale contracts and strengthening its international competitiveness. The assisted company has since not only emerged as India's largest manufacturer of UAVs for security, surveillance and industrial applications, but has also been listed in 2023 in the Indian market.

In another example, the Bank has supported a defence technology-based firm which designs, builds, and deploys advanced imaging and sensor systems to sense, understand and control complex environments. It offers an array of solutions that addresses critical market needs in military reconnaissance, critical infrastructure security and transportation safety. The facility enabled the firm to successfully execute contracts awarded by the Ministry of Defence. As a result, the firm's credentials and the reputation of its products were fortified in international markets such as the USA, the EU (mainly France and Germany), Asia Pacific, Middle East, and Africa.

Military training simulators are important both for civil security and defence industry. Exim Bank has assisted a company, engaged in manufacturing of land based military training simulators, driving simulators and live range equipment. The company has supported over 40 different live fire, live instrumented, virtual and constructive training systems to support individual and collective training capabilities. The company has, along with its subsidiary, developed and commercialised the anti-drone technologies with soft kill and hard kill options. The Bank has extended support to the company to execute deemed exports/ export contracts. With the Bank's support, the company remains well-positioned to tap the global market for anti-drone technologies.

Hydroforming machines are used in the defence industry to create lightweight, durable, and complex parts for military equipment. Hydroforming is a deep drawn process that uses high-pressure rubber to shape metal into desired forms. In the process, the Bank has supported an MSME, manufacturing hydroforming machines and products, using hydroforming technology. The company also provides turnkey solutions for defence sector. The Bank's support helped the company in capacity expansions for fulfilling contractual quantity requirements of a large buyer in Germany.

Exim Bank has also supported financing acquisition of machineries used in communication-based technology. The Bank has funded a company engaged in manufacturing of critical precision components for space, defence and clean energy sectors. It may be mentioned that the assisted company provided critical inputs for the Chandryaan-3 lunar mission. The company has also tapped global clients in the clean energy space, supplying hot boxes that use methane to generate electricity. The Bank financed acquisition of machineries by the company to scale up operations and execute large orders for its clients.

Further, as evident the defence sector is witnessing remarkable advancements in deep-tech innovations as well. Exim Bank has supported a deep-tech MSME engaged in designing, development and manufacturing of Global Navigation Satellite System (GNSS) based products and solutions for strategic defence and space industry. The Bank part financed the R&D expenditure for the 2nd generation chipsets of the company. Upon completing the R&D phase, the Company will be able to deploy its chipsets in the Indian commercial market, as well as international market.

Given the strategically important role of the defence sector for the Indian economy, Exim Bank endeavours to continue to provide all-rounded support to the companies that are developing dual use technologies.

C.2. Encouraging Financing Support by Defence OEMs to their Suppliers

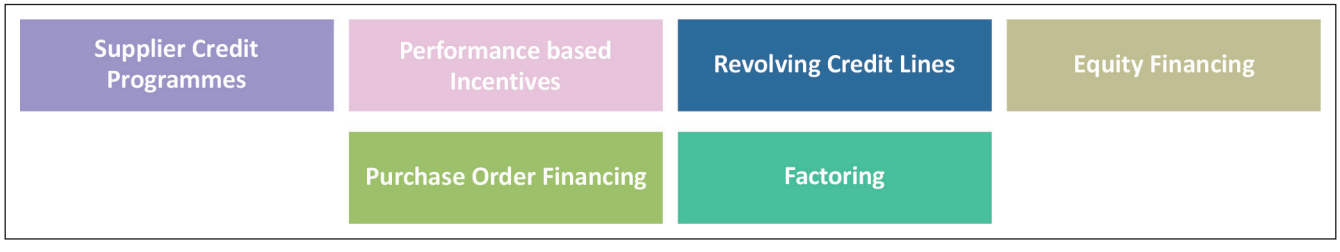
Defence OEMs in India generally provide limited financial support to their suppliers, often focusing more on collaboration than direct financing. While some OEMs offer flexible payment terms, loans, or credit lines, these are not widespread. This has led to excessive reliance of the suppliers, particularly MSMEs on traditional banking institutions for financing.

In this regard, to enhance local manufacturing, the Government may facilitate a conducive framework wherein the OEMs are encouraged to enhance their financial backing of the suppliers and the FIs are encouraged to offer innovative financial products to support the OEMs in doing so. Given that it is the FIs who will extend financing to OEMs for supporting their suppliers, FIs and OEMs may collaborate to better understand the needs of the suppliers across the product stages and design relevant products accordingly.

The OEMs, in collaboration with FIs could offer structured financing programs, tailored to meet the financing needs of the suppliers such as longer payment terms for cash flow management, guarantees etc. For instance, defence OEMs in the USA such as Lockheed Martin and Boeing have well established mechanisms for financing suppliers, including dedicated supplier financing programs which include extending guarantees of contractual performance of suppliers[37]. This is done in collaboration with banks through programs like the Supplier Credit Program. Such arrangements foster long-term relationships with their suppliers, leading to enhanced production capabilities.

Figure 6.6 lists select financing support offered by defence OEMs across countries like the USA and the UK. These include supplier credit programmes wherein OEMs offer loans to suppliers, allowing them to finance their operations or specific projects; performance based incentives which entail payments to suppliers based on specific performance metrics such as on-time delivery, quality standards, or production milestones; revolving credit lines allowing them to draw funds as needed to manage operational expenses or invest in capacity; equity investments; financing against specific purchase orders from OEMs; and establishment of factoring arrangements of OEMs with factoring institutions to aid the suppliers, among others.

Figure 6.6: Select Financing Support Offered by Defence OEMs along with Financial Institutions



Source: India Exim Bank Research

Creation of a vibrant mechanism for such financing support arrangements would ensure development of more robust supply chains for the OEMs as well as spur capabilities enhancement of the suppliers. To ensure adoption, the Government could also introduce regulatory frameworks under DAP 2020 to mandate OEMs to provide a minimum amount of financial support to the suppliers, especially MSMEs, during defence contracts.

India's defence equipment industry stands at a critical juncture, where the convergence of robust capabilities, innovative technologies, and a strategic vision for self-reliance presents opportunities to enhance domestic production and boost exports. By strengthening its flourishing R&D ecosystem alongside its industrial capabilities, India stands to emerge as a significant player in the global defence market.

For India to unlock new frontiers in the defence equipment and allied industry, it is vital to cultivate a vibrant public-private ecosystem that fosters a resilient financial framework, accelerates technological advances and streamlines regulatory processes. Such an integrated approach will enhance India's defence manufacturing prowess and ensure its competitiveness on the world stage.

[37] Lockheed Martin corporation 2023 Annual Report, Contractual Commitments, Pg.45; The Boeing Company 2023 Annual Report, Supply Chain Financing Programs, Pg. 23

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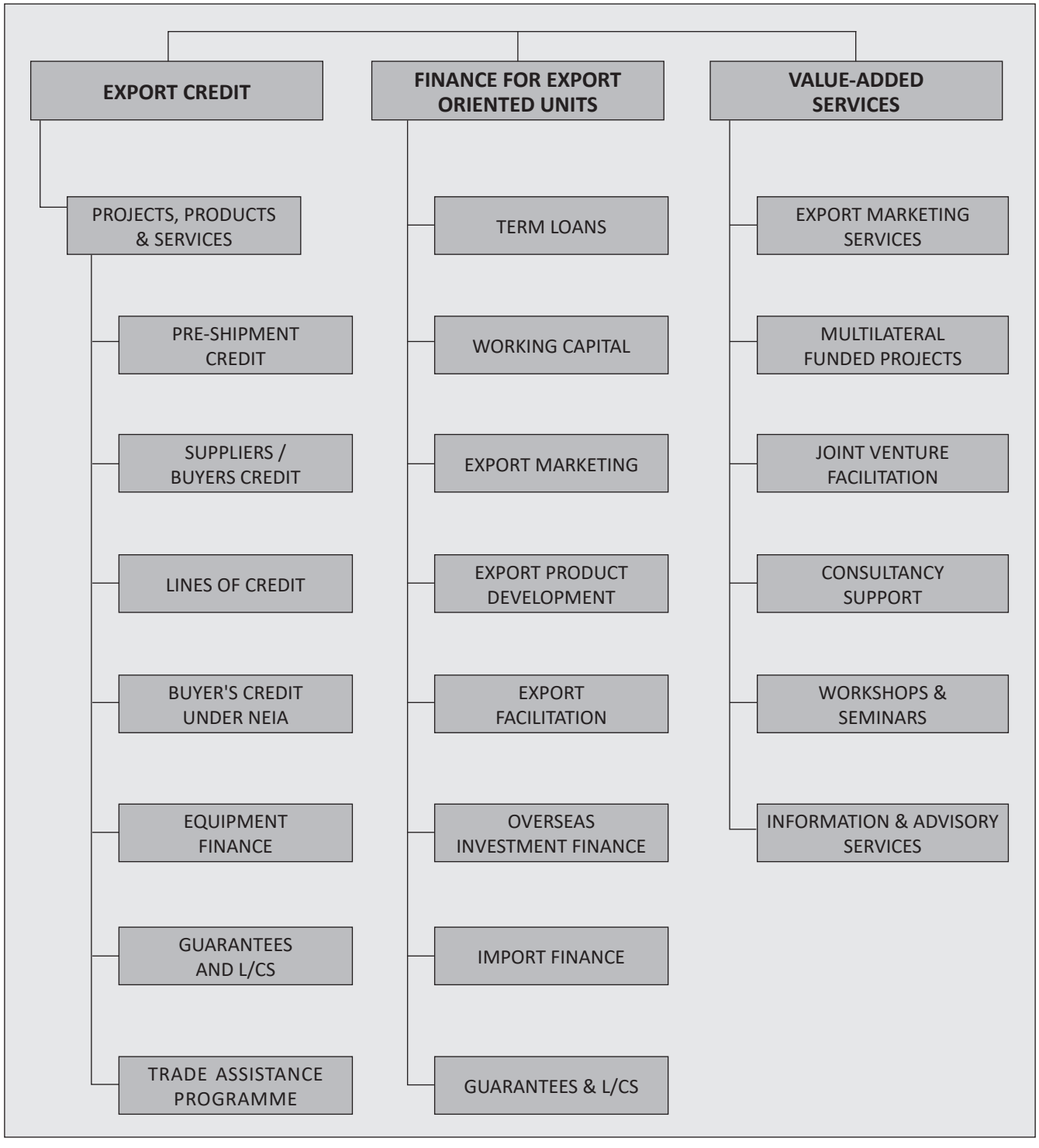

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