

DEFENCE MANUFACTURING



August 2022

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Executive summary

Indian defence
production target
in 2025

~US\$ 25.00 billion

% share of
Defence Public
Sector
Undertaking and
Ordnance Factory
Board in FY22

67.16%

% share of private
sector to the total
production value
in FY22

24.79%

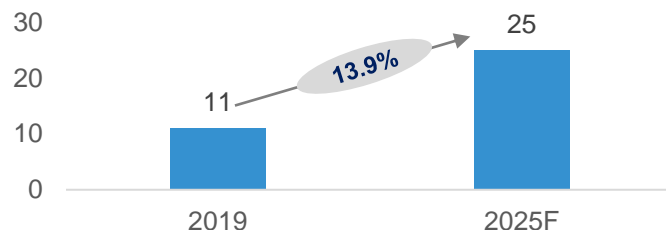
Indian defence
export target in
2025

~US\$ 5.00 billion

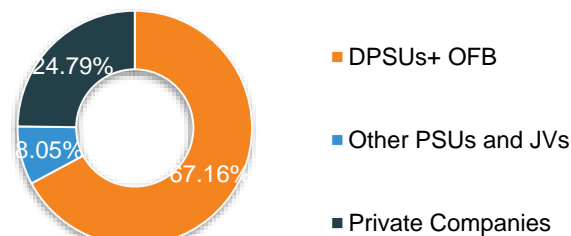
Foreign direct
investment equity
inflow in the
defence industry
(from April 2000-
March 2022)

US\$ 12.51 million

Defence Production in India (US\$ billion)



Defence Production in India by Sector (US\$ billion)



- Defence production in FY 2021-22 stood at Rs. 92,708 crore (US\$ 11.85 billion).
- The Indian government has set the defence production target at US\$ 25.00 billion by 2025 (including US\$ 5 billion from exports by 2025).
- The government is taking several initiatives to encourage domestic manufacturing and reduce its external dependence for defence procurement.
- In January 2021, Defence Research and Development Organisation (DRDO) announced that it will support at least 30 start-ups every year to develop innovative products for Indian defence forces.
- The government announced measures under the 'Make in India' initiative, including raising foreign direct investment (FDI) limit from 49% to 74% via the automatic route; this resulted in significant FDI inflows in the defence and aerospace sector.

Notes: F - Forecast;

Source: Ministry of Defence, Government of India, DD News, Live Mint, Defence News, Department for Promotion of Industry and Internal Trade



Advantage India

1. Competitive advantage

- Government of India changed the automatic route limit for FDI in the defence sector to 74%; to boost national security, self-sufficiency in product design, increase investments, income and employment.
- The Government of India opened the defence industry for private sector participation to provide impetus to indigenous manufacturing
- India has the world's third-largest defence expenditure, as of 2021, and expects to export equipment worth US\$ 15.00 billion by 2026.

2. Growing Demand

- Demand growth is likely to accelerate with rising concerns of national security.
- There is a critical need to build technological capabilities over countries such as China, Pakistan due to the ongoing territorial disputes over the ownership of the Northern State of Kashmir and the North Eastern State of Arunachal Pradesh, respectively.



4. Government support investment

- In November 2021, Defence Acquisition Council (DAC) boosted the 'Make in India' initiative by according Acceptance of Necessity (AoN) — to capital acquisition proposals worth Rs. 7,965 crore (US\$ 1.07 billion) — for modernisation and operational needs of armed forces.
- On October 15, 2021, Prime Minister, Mr. Narendra Modi, dedicated the seven defence public sector undertakings (PSUs)—created through the restructuring of the Ordnance Factory Board (OFB)—to improve functional autonomy, efficiency, growth potential and innovation in the defence sector.

3. Opportunities

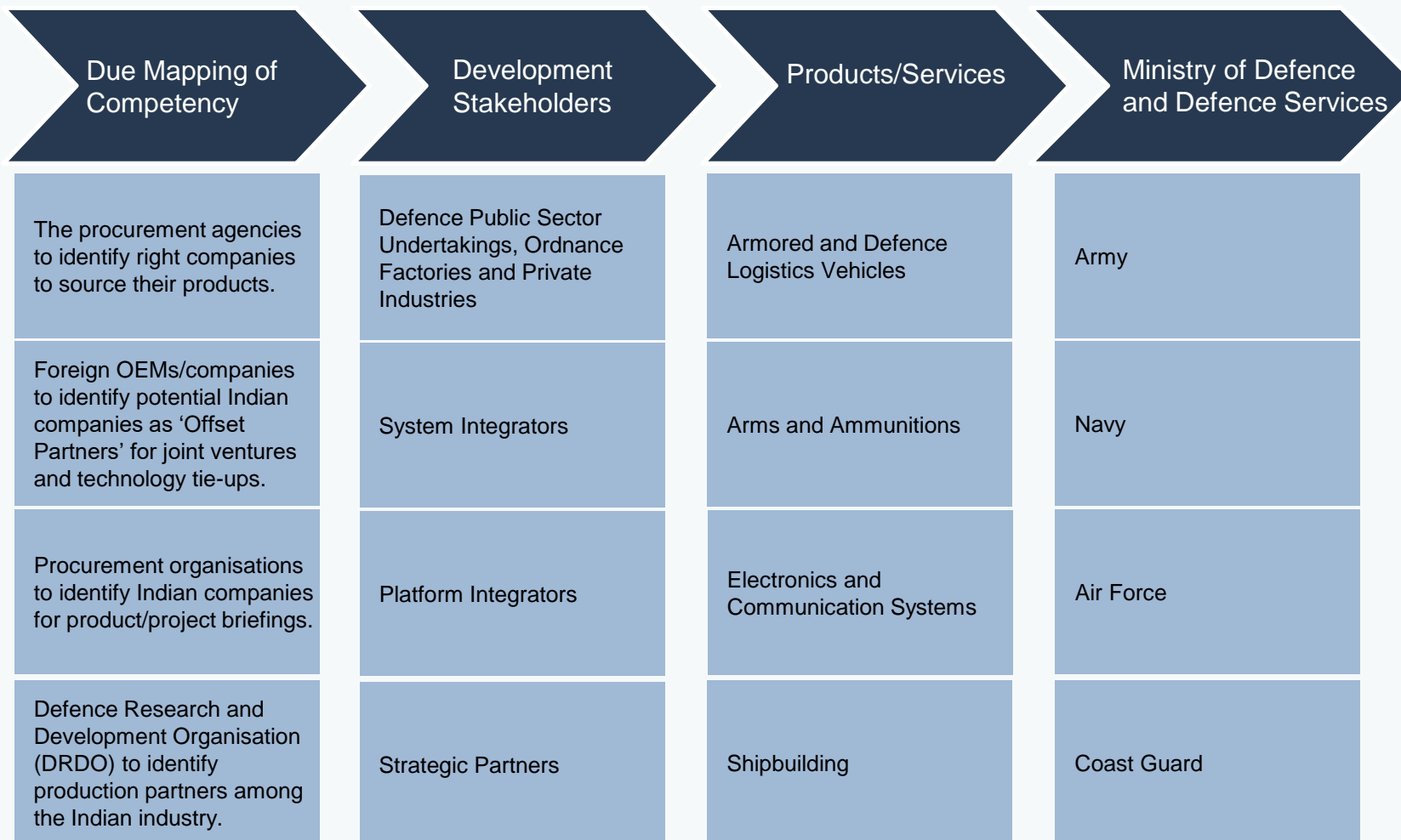
- India's proactive approach towards foreign mutual trade and rising joint agreements with foreign countries such as UAE, Kazakhstan and the US for joint defence manufacturing and strengthening defence ties—offer huge potential growth opportunities to boost defence manufacturing in India.

Source: Live Mint, DD News, Hindustan Times, Defence News, Financial Express

Market Overview



Defence manufacturing landscape

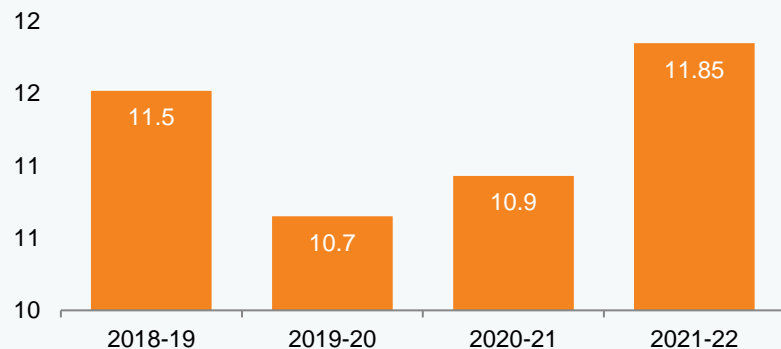


Note: (T) Targeted ; Public Sector Undertakings (PSUs)

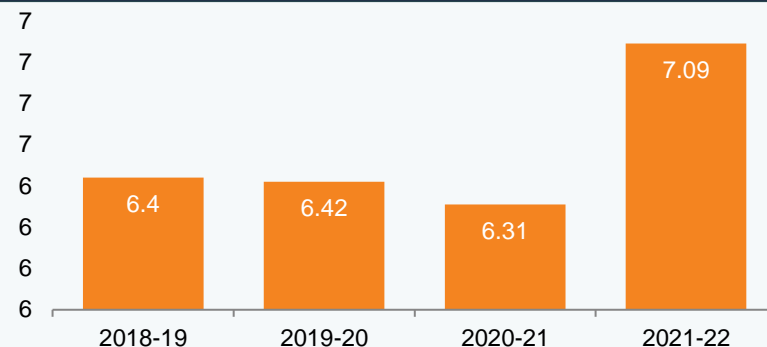
Source: Indian Defence Production & Exports. (IANS Infographics), Ministry of Defence, Government of India

Indian Defence Production Value

Indian Defence Production (US\$ billion)



Value of Production by Defence PSUs (US\$ billion)



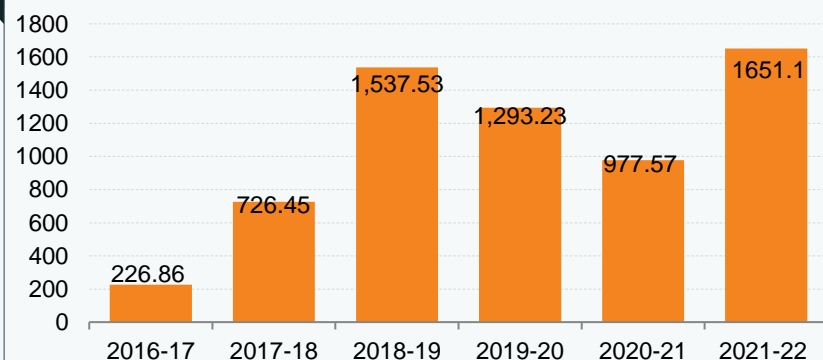
- India's defence production stood at Rs. 17, 885 crore (US\$ 2.24 billion) in FY 2022-23 (until 1 August, 2022)
- Defence production by PSUs stood at Rs. 10,831 crore (US\$ 1.36 billion) in FY 2022-23 (until 1 August, 2022)
- The overall production sector decreased in 2019; however, growth was observed in the value of production by Defence PSUs due to numerous key product developments through research and development initiatives, in addition to various products and equipment being manufactured through transfer of technology.
- Ordnance factories recorded a slight decline in the value of production as 275 items, which were earlier reserved for ordnance factories, were notified for open industry procurement.
- The country plans to spend US\$ 130.00 billion on military modernisation in the next five years and is also achieving self-reliance in defence production.
- The Government of India opened the defence industry for private sector participation to provide impetus to indigenous manufacturing.
- In India, 100% FDI is allowed in the defence industry, wherein 74% is allowed the under automatic route and beyond 74% is through the government route.

Note: (T) Targeted ; Public Sector Undertakings (PSUs)

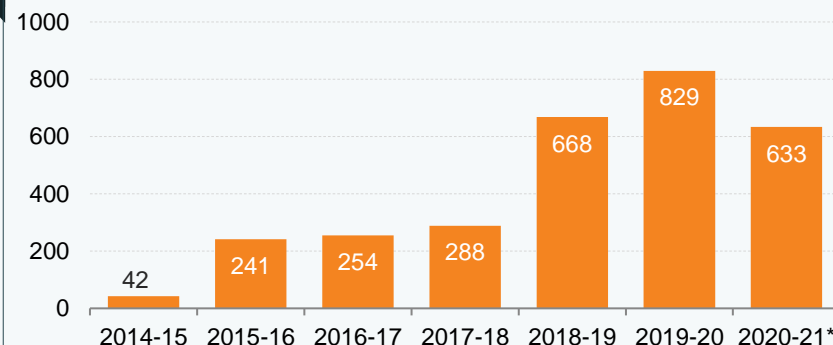
Source: Indian Defence Production & Exports. (IANS Infographics), Ministry of Defence, Government of India, Union Budget 2021-22

Defence exports

Defence Exports (US\$ million)



No. of Defence Authorisations



- Defence exports in the country stood at Rs. 1,381 crore (US\$ 173.32 million) in FY 2022-23 (until 1 August, 2022)
- Defence exports in the country witnessed strong growth in the last two years. India targets to export military hardware worth US\$ 5.00 billion (Rs. 35,000 crore) in the next 5 years.
- The 12th edition of DefExpo, India's flagship event showcasing land, naval, air and homeland security systems will be held in Gandhinagar, Gujarat, from March 10 to March 13, 2022. The aim of DefExpo-2022 is to build and achieve 'Aatmanirbharta' (self-reliance) in defence and increase defence exports to US\$5 billion by 2024.
- To boost the domestic defence sector manufacturing, the Ministry of Defence, in December 2020, approved the export of indigenously-developed surface-to-air Akash missile system and set up a panel to ensure faster approvals for acquisition proposals by various countries.
- With an emphasis on promoting defence exports from the country, India Pavilion at Aero India 2021 - Bengaluru will showcase a range of indigenously developed helicopters.
- In October 2020, India and the UAE have agreed to take their defence cooperation further through joint production and mutual trade. This move is expected to boost domestic defence exports and achieve defence export targets worth US\$ 5 billion in the next five years.

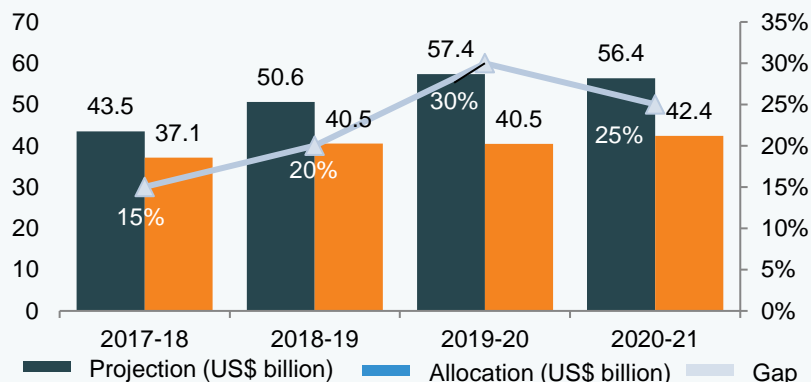
Source: Department of Defence Production, Ministry of Defence, Ministry of Defence, Government of India

Recent Trends and Strategies

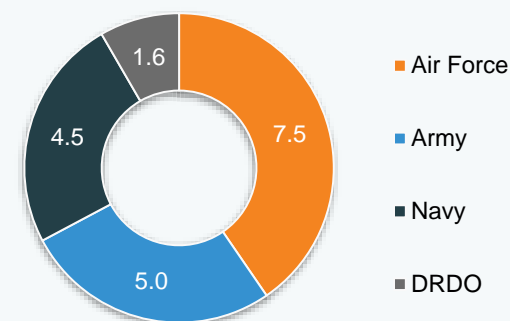


Capital Allocation

MoD's Resource Projection and Allocation under Defence Services Estimates



Breakdown of Defence Services in Defence Budget 2021-22 (US\$ billion)



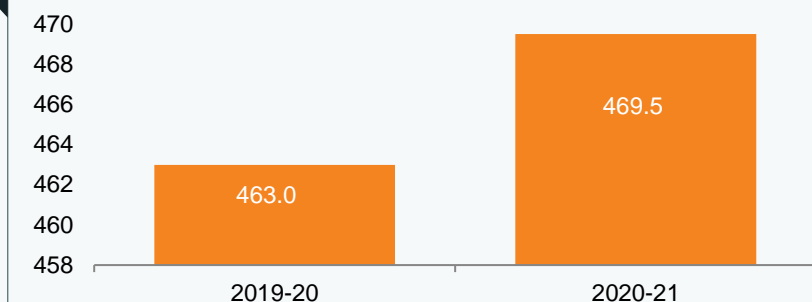
- In the Union Budget 2022-23:
 - Ministry of Defence has been allocated Rs. 525,166 crore (US\$ 67.66 billion)
 - This includes expenditure on salaries of armed forces and civilians, pensions, modernisation of armed forces, production establishments, maintenance, and research and development organisations.
 - The allocation to the Ministry of Defence is the highest (13%) among all ministries of the central government.
- Ministry of Defence (MoD's) gap between resource requirement and allocation, which briefly narrowed from a high of 30% in 2018-19 to 25% in 2019-20.
- Considering the requirements and various programmes of the three pipeline defence services, including submarines and capital allocation (present and projected), a huge gap exists and will remain, until there is increased government support for higher funding

Note: Army includes Military Farms, Ex-Servicemen Contributory Health Scheme (ECHS), Directorate General Quality Assurance (DGQA), Rashtriya Rifles and National Cadet Corps (NCC). Navy includes Joint Staff

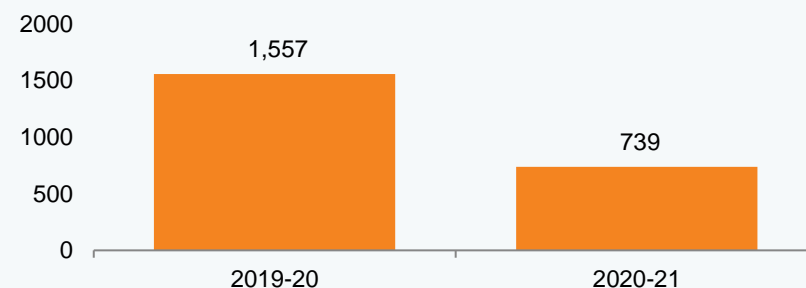
Source: Department of Defence Production, Ministry of Defence, Ministry of Defence, Government of India

Defence Import

Value of Imports in US\$ million



No. of Items Displayed by DPSUs/OFB/SHQs



- India's defence import value stood at US\$ 463 million for FY20 and is expected to be at US\$ 469.5 million in FY21.
- In February 2020, Defence Minister Mr. Rajnath Singh at Aero India 2021 announced to reduce defence imports by at least US\$ 2 billion by 2022.
- In August 2020, Defence Minister Mr. Rajnath Singh announced to ban imports of 101 defence items to bolster the Prime Minister, Mr. Narendra Modi's resolve to make India self-reliant. This embargo on imports is planned to be progressively implemented between 2020 and 2024.
- In September 2016, India agreed to purchase 36 Rafale fighter jets from France for ~US\$ 7.70 billion. Following this deal, France delivered a set of three Rafale fighters to India in July 2021, boosting the Indian Air Force fleet.
- In August 2020, Defence Minister, Mr. Rajnath Singh, launched the indigenisation portal 'SRIJAN', a one-stop shop, online portal for vendors interested to take up items for indigenisation.
- In the first stage, the portal displayed those items that were imported in 2019-20 and are expected to import in 2020-21. This information could be helpful for the Indian manufacturers to design and develop defence products.
- In November 2020, Hindustan Times reported that India leased two MQ-9B Sea Guardian drones from the United States, under the new Indian defense acquisition guidelines, which now permits the Indian Army to temporarily lease hardware as opposed to buying the equipment outright.

Note: Army includes Military Farms, Ex-Servicemen Contributory Health Scheme (ECHS), Directorate General Quality Assurance (DGQA), Rashtriya Rifles and National Cadet Corps (NCC). Navy includes Joint Staff

Source: Department of Defence Production, Ministry of Defence, Ministry of Defence, Government of India

Notable trends in the defence manufacturing sector...(1/2)

1. Focusing on Supply Chain Management

- Key defence manufacturing players are focusing on supply chain management, for example, HAL implemented the 'Public Procurement Policy' for micro and small enterprises (MSEs) and achieved >25% procurement from MSE Entrepreneurs.

2. Automating Armed Forces Medical Stores Depot

- Radio-based telemedicine will connect isolated posts to Regimental Aid Post (RAP). Telemedicine equipment such as 'Portable Physiological Vital Para Monitor (PPVPM)' can ensure efficient operations to aid battlefield nursing assistants.

3. Developing AI-based Capabilities

- According to data released by the Department of Defence Production, 68 artificial intelligence (AI) projects in the field of defence have been planned upto March, 2024, with 40 AI projects already completed as on 30 April, 2022.
- Key defence manufacturing players are focusing on developing AI-based technologies for their platforms/equipment. E.g., designing and prototyping remotely operated vehicles (ROV), sleep/fatigued operator alert system on dump trucks.



5. Local designing and development of products

- Key defence manufacturing companies are currently focussing on designing and developing various indigenous weapons and essential products to boost domestic manufacturing capabilities and align with Hon'ble Prime Minister's vision of Aatmnirbhar Bharat.

4. Leveraging IT for Efficient Defence Production Operations

Development of an indigenisation portal for all defence PSUs and ordnance factories can ensure seamless search experience for stakeholders for processes such as online registration of vendors expressing interest for indigenising a product.

Source: PIB, Live Mint, DD News, Hindustan Times, Defence News, Financial Express

Notable trends in the defence manufacturing sector...(2/2)

- Indigenously developed Laser-Guided Anti-Tank Guided Missiles (ATGM) were successfully test-fired from Main Battle Tank (MBT) Arjun by Defence Research and Development Organisation (DRDO) and Indian Army at KK Ranges with support of Armoured Corps Centre & School (ACC&S) Ahmednagar in Maharashtra on 4 August 2022.
- In June 2022, the Ministry of Defence approved the procurement of military equipment and platforms worth Rs. 76,390 crore (US\$ 9.84 billion) from domestic industries.
- In June 2022, Ministry of Defence signed a deal for the Astra Mk 1 Beyond Visual Range (BVR) AAM and associated equipment, at a cost of Rs. 2,971 crore (US\$ 382.79 million).
- In order to promote private industry, MSMEs and start-ups in defence production ecosystem, the Ministry of Defence has allocated 25% of domestic capital procurement/ acquisition Budget, amounting to Rs. 21,149.47 crore (US\$ 2.72 billion), for domestic private industry in FY 2022-23.
- Under Mission Raksha Gyan Shakti, 1391 Intellectual Property Rights (IPRs) (until 31 May, 2022) have been granted/registered by the Indian Patent office.
- The government has established two Defence Industrial Corridors (DICs) in the country, one in Uttar Pradesh called the Uttar Pradesh Defence Industrial Corridor (UPDIC) and the other in Tamil Nadu called the Tamil Nadu Defence Industrial Corridor (TNDIC), with the goal of attracting Rs 10,000 crore (US\$ 1.31 billion) in investment in each.
- In November 2021, Defence Acquisition Council (DAC) boosted the 'Make in India' initiative by according Acceptance of Necessity (AoN) — to capital acquisition proposals worth Rs. 7,965 crore (US\$ 1.07 billion) — for modernisation and operational needs of armed forces.

No. of Start-ups' Responses to Defence Services

| Services | No. of Start-ups' Responses |
|------------------|-----------------------------|
| Indian Army | 159 |
| Indian Air Force | 222 |
| Indian Navy | 173 |

- In August 2021, Defence Minister, Mr. Rajnath Singh, approved the launch of Defence Testing Infrastructure Scheme (DTIS) with an outlay of Rs. 400 crore (US\$ 54 million) to create state-of-the-art testing infrastructure and boost domestic defence & aerospace manufacturing.
 - The five-year scheme is predicted to set up 6-8 new test facilities in partnership with private industries and facilitate indigenous defence production
 - The projects under the scheme will be given up to 75% government funding in the form of 'Grant-in-Aid'. The remaining 25% of the project cost will be borne by a Special Purpose Vehicle (SPV) comprising members from Indian private entities and state governments.
- According to official sources, India is set to finalise a long-conceived proposal to procure 30 multi-mission armed Predator drones from the US for the three services — Army, Navy, Airforce at an estimated cost of ~US\$ 3 billion (~Rs. 22,000 crore).

Source: Live Mint, DD News, Hindustan Times, Defence News, Financial Express

Strategies adopted

2. INNOVATION IN DEFENCE MANUFACTURING

- Indian defence tech start-ups are developing innovative solutions such as automated robots, individual protection systems, navigation systems and drones, among others to increase effectiveness of the armed forces and enhance overall technological capabilities.
- On May 17, 2021, the Defence Ministry unveiled the first batch of anti-COVID drug, 2-deoxy-D-glucose (2-DG) developed by the Institute of Nuclear Medicine and Allied Sciences (INMAS), a lab of Defence Research and Development Organisation (DRDO), along with Dr. Reddy's Laboratories (DRL), Hyderabad.

1. DIGITAL TECHNOLOGIES

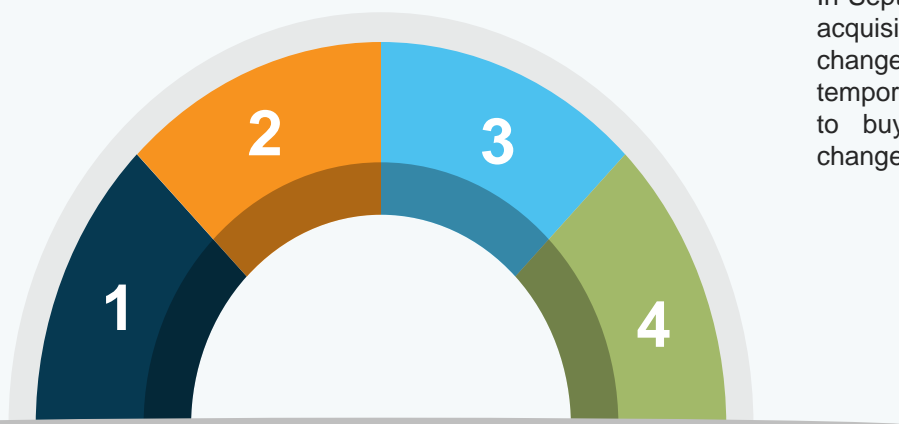
- To increase efficiency, the Indian government is focusing on adding digital technologies in operations in the defence sector.
- Union Defence Minister, Mr. Rajnath Singh, launched a web portal to boost opportunities for the 'Make in India' initiatives in the defence sector via video conferencing, as a part of 'Atmanirbharta Saptah'.
- Bihar's Defence Production Unit launched an indigenous online portal for defence items, components and spares to attract vendors.

3. LEVERAGING STRATEGIC PARTNERSHIPS TO BUILD CAPABILITIES

- To increase overall capabilities, Indian defence companies are focusing on leveraging long-term strategic partnerships with the global equipment manufacturers to seek technology transfer.
- For example, India plans to build six conventional submarines for the Indian Navy to narrow the gap with China's growing naval competencies.
- In June 2021, BEL signed an agreement with the Indian Navy to build emerging technologies in the areas of quantum computing, artificial intelligence and robotics.

4. PROCUREMENT OF MILITARY HARDWARE & SOFTWARE

- The Indian government is procuring military hardware and software to improve firepower in the Indian Navy and enhance capabilities to perform against fast maneuvering targets such as missiles and 'Fast Attack Crafts'.
- In February 2021, Ministry of Defence (MoD) and Defence Public Sector Undertaking (DPSU) Bharat Electronics Limited (BEL) signed a contract for procurement of Software Defined Radio Tactical (SDR-Tac) worth Rs. 1,000 crore (US\$ 137.50 million).
- In September 2020, the Indian defense acquisition guidelines underwent a change, permitting the Indian Army to temporarily lease hardware as opposed to buying equipment outright. This change is aimed at managing costs.



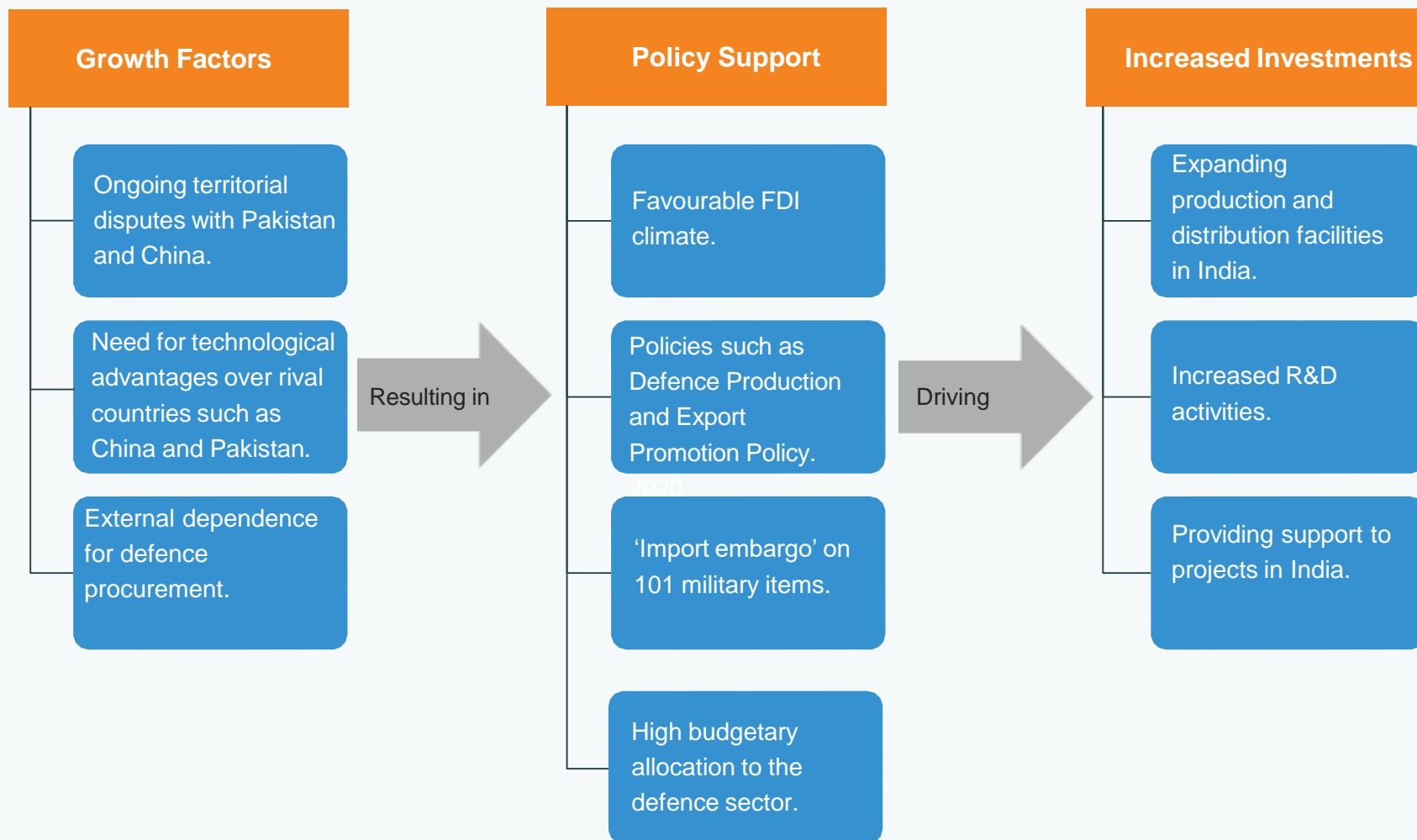
Notes: Defence Acquisition Council (DAC)

Source: News Articles

Growth Drivers



Growth drivers for defence manufacturing in India



Notes:, R&D - Research and Development

Source: Live Mint, DD News, Hindustan Times, Defence News, Financial Express, Union Budget 2021-22

Strong demand and policy support driving investments...(1/3)

1

Growth Factors

- Demand for defence equipment in India has been growing due to the ongoing territorial disputes with Pakistan and China over the ownership of the Northern State of Kashmir and the North Eastern State of Arunachal Pradesh, respectively.
- Over the last five years, India has been ranked among the top importers of defence equipment to gain technological advantages over rival countries such as China and Pakistan.
- The government is focusing on strengthening border infrastructure to enhance the country's security. In line with this, in June 2021, Defence Minister, Mr. Rajnath Singh announced the introduction of 63 bridges, established by Border Roads Organisation (BRO), in six states and two union territories (UTs).

2

“Import Embargo” on 101 Military Items

- Defence ministry plans to put 101 defence items (artillery guns and assault rifles) under import embargo to offer potential military hardware manufacturing opportunities to the Indian defence industry.
- The defence ministry estimates potential contract worth ~Rs. 4 lakh crore (US\$ 57.20 billion) for the domestic industry in the next 5-7 years (2025-2027).

3

Capital Procurement

- In order to support domestic defence manufacturing, the Indian armed forces are projected to spend ~US\$ 130 billion in capital procurement in the next five years (2021-2026).

Strong demand and policy support driving investments...(2/3)

4

Defence Policy Support

- As part of efforts to promote the domestic defence industry, the ministry has separated the capital procurement budget for 2020-21 between domestic and foreign capital procurement routes.
- The government has established two Defence Industrial Corridors (DICs) in the country, one in Uttar Pradesh called the Uttar Pradesh Defence Industrial Corridor (UPDIC) and the other in Tamil Nadu called the Tamil Nadu Defence Industrial (TNDIC), with the goal of attracting Rs 10,000 crore (US\$ 1.31 billion) in investment in each. Corridor

5

Defence Production and Export Promotion Policy 2020

- Government formulated the 'Defence Production and Export Promotion Policy 2020' to provide impetus to self-reliance in defence manufacturing under the 'Aatmanirbhar Bharat' scheme.
- The ministry aims to achieve a turnover of Rs. 1 lakh 75 thousand crore (US\$ 25 billion), including an export of Rs. 35 thousand crore (US\$ 5 billion) in the aerospace and defence goods and services by 2025.

6

FDI in Defence Manufacturing

- FDI inflows in the defence industries reached US\$ 12.51 million between April 2000-March 2022.
- To increase defence manufacturing in India and make the country a reliable weapon supplier to friendly countries, the Indian government allowed the following FDI limits in September 2020.
- For new licensees - FDI allowed up to 74% through automatic route; FDI beyond 74% would need to be permitted under the Govt. route.
- For existing Licensees - Infusion of new foreign investments up to 49% can be added by making declarations of change/transfer within 30 days.

Strong demand and policy support driving investments...(3/3)

7

Skill Development

- India established a state-of-the-art skill development centre with a focus on promoting applied research for development of materials used in aerospace, defence, nuclear, space and other strategic weapons.

8

Procurement Manual 2020

- To encourage more participation from start-ups and micro, small & medium enterprises (MSMEs) in Defence Research & Development (R&D) in achieving the 'Atmanirbhar Bharat' goal, the Defence Minister Mr. Rajnath Singh released a new version of 'Defence Research and Development Organisation (DRDO) Procurement Manual 2020' on October 20, 2020.

9

Green Channel Status Policy (GCS)

- The Government of India has launched numerous policies to facilitate 'ease of doing business' and promote the 'Make in India' mission, with special focus on defence manufacturing. Many established manufacturers are keen to enter into Defence manufacturing sector through various opportunities created by Government policies. Green Channel Policy from Ministry of Defence is aimed to promote 'Make In India' with reference to Defence manufacturing.
- By end of 2020, green channel status was granted to 14 firms.

10

DefExpo

- In July 2021, the government announced that DefExpo, the flagship military exhibition of India, is scheduled to be held in Gujarat in March 2022. The exhibition would focus on projecting India as a defence manufacturing hub, promoting self-reliance initiatives and positioning the country as a military hardware exporter.

Developments in defence manufacturing industry...(1/7)

1

Restructuring of the Ordnance Factory Board (OFB)

- On October 15, 2021, Prime Minister, Mr. Narendra Modi, dedicated the seven defence public sector undertakings (PSUs)—created through the restructuring of the Ordnance Factory Board (OFB)—to improve functional autonomy, efficiency, growth potential and innovation in the defence sector.
- The seven new defence companies are: Munitions India Limited (MIL); Armoured Vehicles Nigam Limited (AVANI); Advanced Weapons and Equipment India Limited (AWE India); Troop Comforts Limited (TCL) (Troop Comfort Items); Yantra India Limited (YIL); India Optel Limited (IOL) and Gliders India Limited (GIL).

2

Software for Infrastructure Management

- On October 28, 2020, the Indian Army introduced 'Infrastructure Management System (IMS)' software to empower defence stakeholders; make operations more efficient, transparent and enhance accountability.

3

Major Milestones in Fighter Jets and Missiles

- On October 27, 2021, India successfully launched the surface-to-surface ballistic missile, Agni-5, from the APJ Abdul Kalam Island, Odisha. The missile has the capacity and range to strike targets up to 5,000 kilometres with a very high degree of accuracy.
- In July 2021, India received three more Rafale fighter jets, which boosted the strike capability of the Indian Air Force (IAF).

4

Submarine Building Activity

- In June 2021, Defence Minister, Mr. Rajnath Singh, approved a proposal for the construction of six submarines at an estimated cost of ~ Rs. 43,000 crore (US\$ 5.76 billion).

Developments in defence manufacturing industry...(2/7)

5

Capacity Building Program for IDES Officers and Technical Staff of DGDE

- On October 18, 2021, Defence Secretary, Dr. Ajay Kumar, inaugurated a training program on the latest survey technologies and mapping of defence land boundaries, using remote sensing and Geographic Information System (GIS), for the officers of Indian Defence Estates Services (IDES) and Technical Staff of Directorate General Defence Estates (DGDE).

6

Karnataka Government Attracting Investments

- In July 2021, the Karnataka government signed multiple memorandum of understanding (MOUs) with 23 companies from varied sectors, including electric vehicles, data centres, aerospace and defence, to attract investments worth >Rs. 28,000 crore (US\$ 3.77 billion) and create ~15,000 direct jobs. according to officials, the govt. aims to make Karnataka as a leading investment destination.

7

Swarm Drone System Project

- India is reportedly planning to develop an air-launched swarm drone system to overwhelm Chinese air defenses, giving their fighter jets an edge in any potential conflict. The development process of the project is expected to take four years. State-owned aerospace and defense manufacturing company, Hindustan Aeronautics Ltd. is partnering with two start-ups to work on the project, according to the Economic Times.

8

Basic Trainer Aircraft

- In February 2021, Hindustan Aeronautics Limited (HAL) received a request for proposal (RFP) from the Indian Air Force for their 70 HTT-40 Basic Trainer Aircraft requirement at Aero India 2021 in Bengaluru.

Notes: R&D - Research and Development

Source: Press Information Bureau, Government of India

Developments in defence manufacturing industry...(3/7)

9

High Altitude UAVs

- The Economic Times has reported that India is developing high-altitude, long-endurance unmanned aircrafts for surveillance and reconnaissance applications. The vehicle is being designed to fly 70,000 ft. for several days, providing real-time feedback to controllers, while remaining beyond the range of most air defense systems.

10

Bilateral Cooperation, Agreements and Dialogues

- **India- Vietnam Cooperation-** The 3rd Edition of Vietnam India Bilateral Army Exercise “Ex VINBAX 2022” is scheduled to be conducted at Chandimandir from 1-20 August 2022.
- **India and Japan defence Cooperation-** India and Japan have agreed to enhance bilateral security and defence cooperation, including in the area of defence manufacturing in May 2022.
- **US-India defense Cooperation -** The US-India defense collaboration is progressing well via knowledge sharing, liaison officers, rising defence activities such as Malabar and defense-enabling contracts, such as the secure communications pact COMCASA. As of 2020, the US has authorised defence sales worth >US\$ 20 billion to India.
- In October 2021, the Ministry of Defence signed a contract with the US Government, under Foreign Military Sale (FMS), for procurement of MK 54 torpedo and expendables (chaff and flares) for the Indian Navy, at a cost of Rs. 423 crore (US\$ 56.53 million).
- In October 2021, at the Industrial Security Agreement (ISA) summit between India and the US, both sides agreed in-principle to establish the Indo-US Industrial Security Joint Working Group. This group will meet intermittently to align policies and procedures expeditiously that will let the defence industries work together on cutting-edge defence technologies.
- The 11th Defence Technology and Trade Initiative (DTTI) Group meeting between India and the United States (US) was held virtually on November 09, 2021. The aim of the DTTI Group is to focus on a bilateral defence trade relationship and create opportunities for co-production and development of defence equipment.
- **India-Israel Cooperation –** In November 2021, to demonstrate the growing India-Israeli technological cooperation, the Defence Research and Development Organisation (DRDO), India and Directorate of Defence Research and Development (DDR&D), Ministry of Defence, Israel, entered a Bilateral Innovation Agreement (BIA) to promote innovation and R&D in start-ups and MSMEs of both countries for development of dual use technologies.

Notes:., R&D - Research and Development

Source: Press Information Bureau, Government of India

Developments in defence manufacturing industry...(4/7)

11

Defence Testing Infrastructure Scheme (DTIS)

- In August 2021, Defence Minister, Mr. Rajnath Singh, approved the launch of Defence Testing Infrastructure Scheme (DTIS) with an outlay of Rs. 400 crore (US\$ 54 million) to create state of the art testing infrastructure and boost domestic defence & aerospace manufacturing.
- The five-year scheme is predicted to set up 6-8 new test facilities in partnership with private industries and facilitate indigenous defence production. This will reduce imports of military equipment and make the country self-reliant.
- The projects under the scheme will be given up to 75% government funding in the form of 'Grant-in-Aid'. The remaining 25% of the project cost will be borne by a Special Purpose Vehicle (SPV) comprising members from Indian private entities and state governments

12

Advanced Towed Artillery Gun System (ATAGS)

- ATAGS development is being done by the Defence Research Development Organisation's (DRDO) Armament Research Development Establishment (ARDE) Pune, Defence Electronics Application Laboratory, Dehradun, and Centre for Artificial Intelligence and Robotics, Bengaluru, along with major corporates such as Bharat Forge, TATA Power SED, Ashok Leyland and Cummins.
- This 155-mm, 52-caliber artillery gun reportedly is undergoing the last stages of the trial and could soon be inducted into the Indian Army.
- ATAGS is one the key successes of the 'Made In India' story in defence manufacturing.

Notes: R&D - Research and Development

Source: Press Information Bureau, Government of India

Developments in defence manufacturing industry...(5/7)

13

Advanced Biodigester Mk-II Technology

- On January 05, 2021, Defence Research and Development Organisation (DRDO) signed an MoU with Maharashtra Metro Rail Corporation (MAHA –METRO) to implement the 'Biodigester Mk-II' technology in metro rail network.

14

Procurement of 83 Light Combat Aircrafts (LCA) 'Tejas'

- On January 13, 2020, Prime Minister Mr. Narendra Modi approved procurement of 73 LCA Tejas Mk-1A fighter aircraft and 10 LCA Tejas Mk-1 trainer aircraft at Rs. 45,696 Crore (US\$ 6.24 billion), along with design and development of infrastructure sanctions worth Rs.1,202 Crore (US\$ 164.29 million).

15

Web Based Project Monitoring Portal

- In October 2021, Defence Minister, Mr. Rajnath Singh, launched a Web Based Project Monitoring Portal (WBPMP) for Military Engineer Services (MES). The portal was conceptualised for the Union Government's Digital India Mission and developed by the Bhaskaracharya National Institute for Space Applications and Geo-informatics (BISAG-G).

16

Advanced Chaff Technology

- In April 2021, Defence Research and Development Organisation (DRDO) developed an advanced chaff technology to safeguard the naval ships against a missile attack. Defence Laboratory Jodhpur (DLJ), a DRDO laboratory, has indigenously developed three variants of this critical technology, namely short-range chaff rocket (SRCR), medium-range chaff rocket (MRCR) and long-range chaff rocket (LRCR) that meet Indian Navy's qualitative requirements. This successful development of advanced chaff technology by DLJ is another step towards 'Atmanirbhar Bharat'.

Notes:; R&D - Research and Development

Source: Press Information Bureau

Developments in defence manufacturing industry...(6/7)

17

Development and Production of Composite Raw Materials

- In February 2021, at Aero India 2021 in Bengaluru, Hindustan Aeronautics Limited (HAL) and Mishra Dhatu Nigam Limited (MIDHANI) signed a memorandum of understanding (MoU) for development and production of composite raw materials.

18

Advanced Light Helicopters

- In February 2021, Hindustan Aeronautics Limited (HAL) handed over three Advanced Light Helicopters (ALH) Mk III to the Indian Navy and two ALHs to the Indian Coast Guard as part of its 16 ALHs contract, during the ongoing Aero India 2021, at Air Force Station Yehalanka, Bengaluru.

19

Collaboration With Institutes/University

- In November 2021, the Indian Army inked an MoU with Rashtriya Raksha University (RRU) to synergise innovations, research, technology incubation, joint projects, publication & patents, training, higher learning and distance education in the Army.
- In November 2021, the Indian Army signed an MoU with the Bhaskaracharya National Institute for Space Applications and Geo-Informatics (BISAG-N), Gandhinagar, Gujarat. This MoU will facilitate exchange of knowledge and collaboration for development of GIS and IT-based enterprise resource planning software, train content, telecast audio-visual content, research and knowledge partnerships, technical support and upgradation for resources.

20

Joint Advanced Technology Program (JATP)

- In February 2021, Defence Research and Development Organisation (DRDO) signed a memorandum of understanding (MoU) with the Indian Institute of Science (IISc) Bengaluru to build JATP–Center of Excellence (JATP–CoE) in premises of IISc to expand the scope and objective of existing joint advanced technology programme.

Source: Press Information Bureau

Developments in defence manufacturing industry...(7/7)

21

Manufacturing French-Origin Anti-tank Guided Missile

- In March 2021, the Defence Ministry signed a Rs. 1,188 crore (US\$ 161.2 million) contract with Bharat Dynamics Ltd. (BDL) and defence public sector enterprise (DPSE) for manufacturing and supplying the French-origin MILAN-2T Anti-Tank Guided Missiles.

22

Light Specialist Vehicles

- In March 2021, the Defence Ministry signed a Rs.1,056 crore (US\$ 143.3 million) contract with Mahindra Defence Systems (MDSL) for supply of 1,300 light specialist vehicles to the Indian Army.

23

Domestic Procurement

- In February 2021, the Defence Ministry was allocated Rs. 70,000 crore (US\$ 9.50 billion) for domestic procurement in 2021-22.
- In October 2021, India signed contracts and cleared projects worth ~Rs. 54,000 crore (US\$ 7.21 billion), in less than a month, to enhance military capability with locally produce weapons and systems, including transport planes, tanks, helicopters, airborne early warning systems and counter-drone weapons.

24

Lightweight Bullet Proof Jacket

- In April 2021, Defence Research and Development Organisation (DRDO) Defence Materials and Stores Research lab and Development Establishment (DMSRDE), Kanpur, developed a lightweight bullet proof jacket (BPJ), which weighs 9.0 kilogrammes and meets qualitative requirements of the Indian Army.

Source: Press Information Bureau

Opportunities



OPPORTUNITIES

Opportunities in the defence manufacturing

1. Make in India Initiative

Government's emphasis on 'Make in India' initiative in the Defence sector provides huge opportunities for domestic players to enhance their indigenisation efforts.

The government is also inviting foreign players to invest in India and capitalise on the 'Make in India' opportunity. In June 2021, Defence Minister, Mr. Rajnath Singh, invited Swedish companies to invest in defence corridors in Uttar Pradesh and Tamil Nadu.

In July 2021, the Ministry of Defence announced that the Tamil Nadu and UP governments have acquired land (>450 hectares) to establish two defence industrial corridors.

2. Government Policy Support

Indian government policies to promote self-reliance in defence manufacturing under the Aatmanirbhar Bharat Scheme E.g., 74% FDI in defence manufacturing, 'Import embargo' on 101 military items and Defence Production and Export Promotion Policy 2020.



5. Self-reliance Target

The Defence Ministry has set a target of 70% self-reliance in weaponry by 2027, creating huge prospects for industry players.

4. Start-up India

- Indian government push for start-ups in India and collaborations to develop innovative solutions gives potential growth opportunity for the defence production in terms of operational capabilities. 25% of the defense R&D budget is set out for private sector and startups.
- The Startup Incubation and Innovation Centre, IIT-Kanpur (SIIC IIT-Kanpur) recently signed an MoU with Defence Innovation Organisation (DIO) to nurture and support start ups and SMEs in the defence sector through its flagship programme iDEX Prime.

3. Technological Modernisation via Public Private Partnership

Indian military's technological modernisation via public private partnership with the Indian IT companies such as Tech Mahindra, Tata Consultancy Services (TCS), Wipro and HCL for intelligence analysis and enhancing military readiness.

Source: CEAMA, India Retail Report, Business Line, IMAP India, News Sources

Government's effort on technological modernisation of defence manufacturing

2. INDIGENOUS HELICOPTER DEVELOPMENT PROGRAM

- In April 2021, Defence Research and Development Organisation (DRDO) developed single crystal blades technology and supplied 60 of these blades to Hindustan Aeronautics Limited (HAL), as part of their indigenous helicopter development programme, for helicopter engine application.

1. UNDER UPGRADATION OF FACILITIES

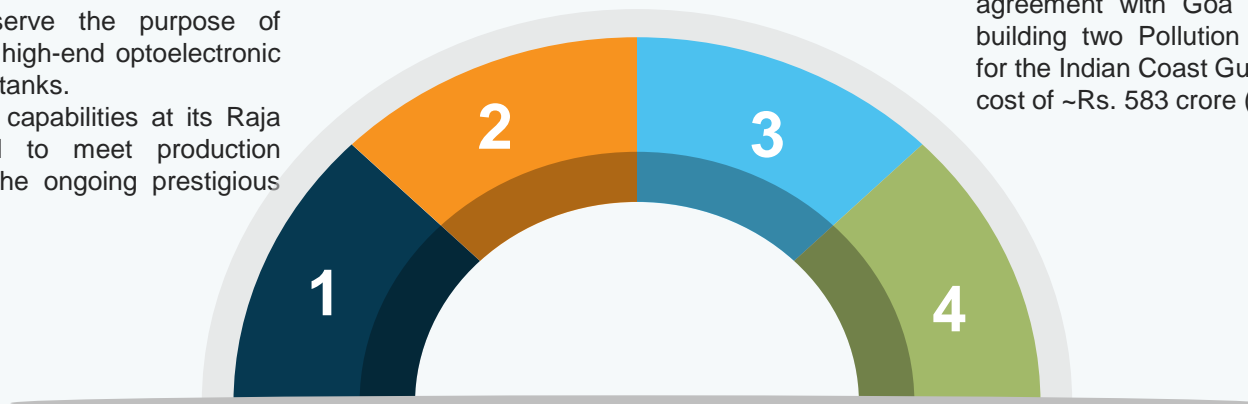
- Pinaka Rocket Complex at Ordnance Factory Chanda began upgrading facilities to meet enhanced requirements of Pinaka and other rockets.
- Modernisation of facilities at OLF Dehradun will serve the purpose of manufacturing of high-end optoelectronic products for T-90 tanks.
- GRSE enhanced capabilities at its Raja Bagan Dockyard to meet production requirement for the ongoing prestigious P17A project.

3. INDUSTRIAL DESIGN CENTRE

- BEML established an 'Industrial Design Centre' at Bengaluru as a part of its new infrastructure creation, focusing on industrial designs and human factors as a part of developmental strategies. It is proposed to develop this facility as a national facility and would be offered to the industry in the next stage.

4. NEW INFRASTRUCTURE AND TECHNOLOGY

- There are plans to establish new infrastructure including a defence park in Kerala to manufacture defence equipment for forces. The project is aimed at promoting MSMEs and boosting 'Make in India' initiative in defence manufacturing.
- In June 2021, the Ministry of Defense signed an agreement with Goa Shipyard Ltd. (GSL) for building two Pollution Control Vessels (PCVs) for the Indian Coast Guard (ICG) at an estimated cost of ~Rs. 583 crore (US\$ 78.11 million).







Notes:, R&D - Research and Development, DEBEL - Defence Bioengineering and Electromedical Laboratory

Source: Press Information Bureau, Government of India

Key Industry Contacts






Key players - value of production

| Key Player | | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 |
|-------------------------------------|--|--|--|--|--|--|--|
| Hindustan Aeronautics Limited (HAL) |  | Rs. 17,152 Crore (US\$ 2.6 billion) | Rs. 17,103 Crore (US\$ 2.6 billion) | Rs. 17,553 Crore (US\$ 2.5 billion) | Rs. 18,100 Crore (US\$ 2.6 billion) | Rs. 20,579 Crore (US\$ 2.7 billion) | Rs. 22,700 Crore (US\$ 3.0 billion) |
| Bharat Electronics (BEL) |  | Rs. 7,775 Crore (US\$ 1.2 billion) | Rs. 9,244 Crore (US\$ 1.4 billion) | Rs. 9,706 Crore (US\$ 1.4 billion) | Rs. 11,900 Crore (US\$ 1.7 billion) | Rs. 12,348 Crore (US\$ 1.7 billion) | Rs. 13,947 Crore (US\$ 1.9 billion) |
| Bharat Earth Movers Limited (BEML) |  | Rs. 2,740 Crore (US\$ 0.4 billion) | Rs. 2,624 Crore (US\$ 0.4 billion) | Rs. 3,227 Crore (US\$ 0.5 billion) | Rs. 3,450 Crore (US\$ 0.5 billion) | Rs. 3,320 Crore (US\$ 0.5 billion) | Rs. 3,556 Crore (US\$ 0.5 billion) |
| Bharat Dynamics Ltd. (BDL) |  | Rs. 4,297 Crore (US\$ 0.6 billion) | Rs. 5,011 Crore (US\$ 0.8 billion) | Rs. 4,641 Crore (US\$ 0.7 billion) | Rs. 3,235 Crore (US\$ 0.5 billion) | Rs. 2,591 Crore (US\$ 0.4 billion) | Rs. 2,043 Crore (US\$ 0.3 billion) |

In 2019-20, HAL and Bel registered an increase in the value of production on YoY basis (HAL: 14%; BEL: 4%), whereas BEML and BDL registered a decrease in the value of production (BEML: -4%; BDL: -20%).




Source: Ministry of Defence, Government of India, Company Annual report

Key players in defence manufacturing (1/2)

| | Key Products/Projects | Revenue (2020-21) | Research and Development Activities |
|--|---|---|---|
|  | <ul style="list-style-type: none"> • Su-30 MKI Aircraft • LCA Tejas Aircraft • Dhruv - Advance Light Helicopter (ALH) | <p>Rs. 22,700 Crore (US\$ 3.0 billion)</p> | <ul style="list-style-type: none"> • Hindustan Aeronautics Limited (HAL) and Bharat Electronics Limited (BEL) signed a contract for the co-development and co-production of the Long Range Dual Band Infra-Red Search and Track System (IRST) for the Su-30 MKI under the MAKE-II procedure of Defence Acquisition Procedure (DAP) 2020 as a part of the Make in India initiative. The key success has been in Advanced Light Helicopter (both utility and weaponised versions). • The company designed and developed a real-time operating system with the highest design assurance level to support both safety critical and mission critical systems (RTOS is in use at the Indira Gandhi 32 Atomic Research Centre, Kalpakum on their hardware platform). • More than 150 military Do-228 planes have been built and delivered to a variety of customers. HAL has also constructed two civilian Do-228 aircraft. |
|  | <ul style="list-style-type: none"> • Radars • Communication & C4I systems • Electro-Optic | <p>Rs. 13,947 Crore (US\$ 1.9 billion)</p> | <ul style="list-style-type: none"> • Company made a 3-year R&D plan identifying future programmes & various technologies, knowledge management portal, etc. On an average 10 new products are introduced annually. BEL spends ~9% annual turnover on R&D. • Two production grade systems manufactured by BEL have been installed and trial evaluated on-board INS Gomati and INS Ganga. The Indian Navy has awarded BEL a contract for Maareech systems. |
|  | <ul style="list-style-type: none"> • Armored Recovery and Repair Vehicle • Heavy, Medium and Light Recovery Vehicles • Aircraft Towing Tractor • Military Rail Coaches and Military Wagons • Aircraft Weapon Loading Trolley | <p>Rs. 3,556.64 crore (US\$ 478.17 million)</p> | <ul style="list-style-type: none"> • In July 2020, the company received a contract from the Ministry of Defence (MoD) to supply 1,512 Track Width Mine Plough (TWMP) for T-90 S/SK Tanks; this boosts the 'Make in India' initiatives. • In 2018-19, the company designed and developed high technology products/aggregates and upgraded existing products such as 155mm Mounted Gun System, 180T Hydraulic Excavator, 860 HP Bulldozer, Arjun Armored Repair & Recovery Vehicle. |

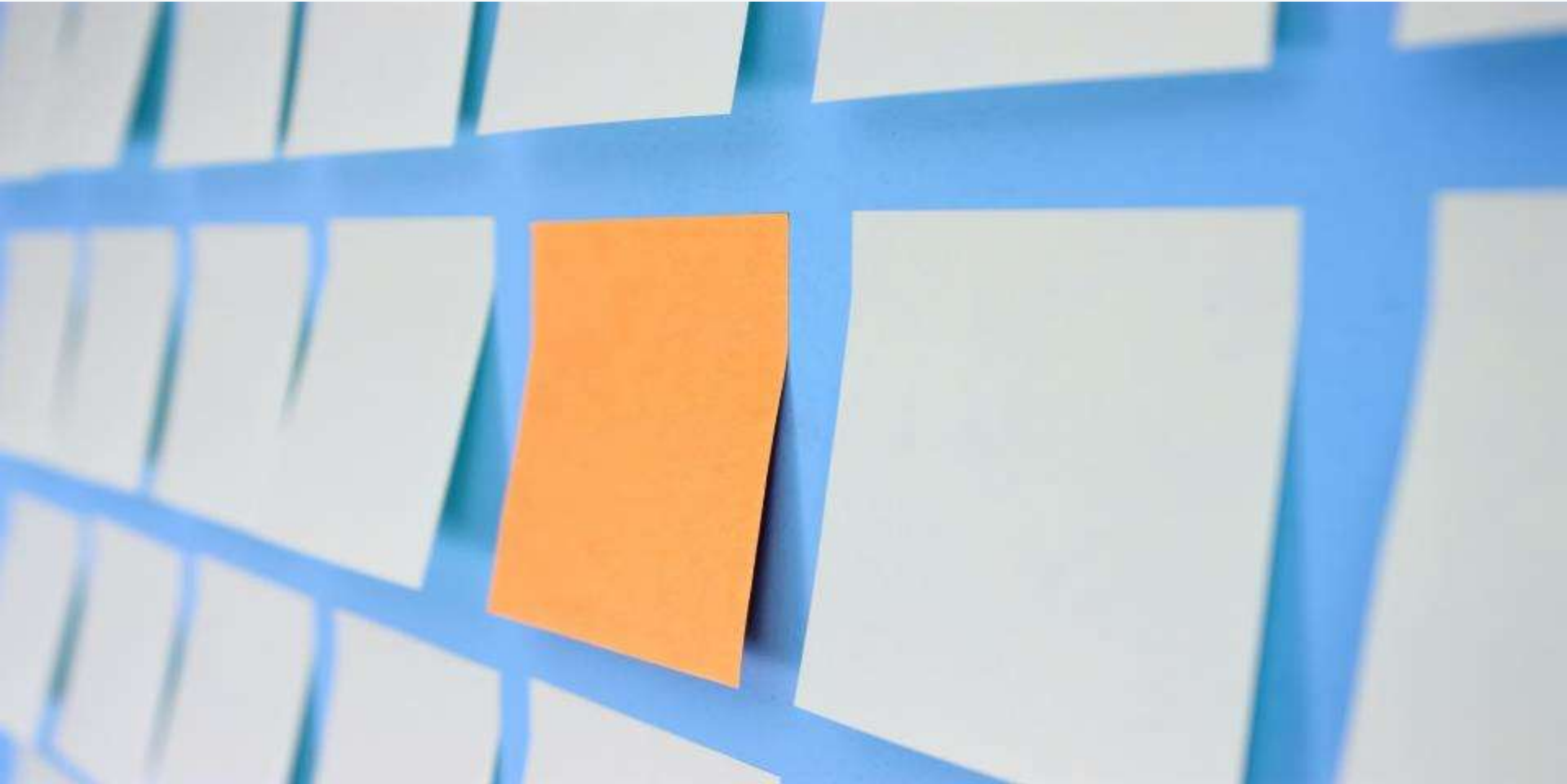
Notes: R&D - Research and Development
Source: Company Website, Annual Report

Key players in defence manufacturing (2/2)

| | Key Products/Projects | Revenue (2020-21) | Research and Development Activities |
|--|--|--|---|
|  | <ul style="list-style-type: none"> Four missile destroyers under Project P15B Four stealth frigates under Project P17A Six Scorpene submarines under Project P75 | Rs. 4,049.69 crore (US\$ 544.45 million) | <ul style="list-style-type: none"> The company has a dedicated indigenisation department and 'Make in India' webpage linked to MoD's website. Many items of Ships & Scorpene Submarine are taken up for indigenisation to achieve self-reliance. |
|  | <ul style="list-style-type: none"> The company has an order book for construction of 15 warships of the Indian navy, pertaining to 03 Projects, Stealth Frigates (P17A), Survey Vessel (Large) and ASW Shallow Watercraft (ASW-SWC) over the next 6-7 years (2027-2028) | Rs. 1,140.83 crore (US\$ 153.38 million) | <ul style="list-style-type: none"> The company introduced state-of-the-art 'Virtual Reality Lab' that added to its design capabilities. It has achieved the capacity of building 20 warships concurrently, post phase II modernisation of facilities at its main unit. |
|  | <ul style="list-style-type: none"> The company received Akash SAM order for supply of Akash Missiles, along with associated spares and first Heavy Weight Torpedo (Varunastra), from the production order of Indian Navy during 'Bandhan' Programme in Feb. 20 | Rs. 2,043 Crore (US\$ 0.3 billion) | <ul style="list-style-type: none"> The company identified various products to meet requirements of the Indian Armed Forces and currently its research and development is focussing on the following missions: Amogha-III: Prototypes of all the sub-assemblies of the missile are being developed as per in-house designs. CMD5 Mk-II with AI feature to provide self-protection to the aircraft against previously known missile threat at designated way points. Dispenser for AN-32 aircraft for dispensing flares and chaffs. |

Notes: R&D - Research and Development

Source: Company Website, Annual Report



Glossary

- CAGR: Compound Annual Growth Rate
- Capex: Capital Expenditure
- DRDO: Defence Research and Development Organization
- GOI: Government of India
- EPCG: Export Promotion Capital Goods Scheme
- FDI: Foreign Direct Investment
- FY: Indian Financial Year (April to March); So, FY10 implies April 2009 to March 2010
- R&D: Research and Development
- US\$: US Dollar
- Wherever applicable, numbers have been rounded off to the nearest whole number

Exchange rates

Exchange Rates (Fiscal Year)

| Year | Rs. Equivalent of one US\$ |
|---------|----------------------------|
| 2004-05 | 44.95 |
| 2005-06 | 44.28 |
| 2006-07 | 45.29 |
| 2007-08 | 40.24 |
| 2008-09 | 45.91 |
| 2009-10 | 47.42 |
| 2010-11 | 45.58 |
| 2011-12 | 47.95 |
| 2012-13 | 54.45 |
| 2013-14 | 60.50 |
| 2014-15 | 61.15 |
| 2015-16 | 65.46 |
| 2016-17 | 67.09 |
| 2017-18 | 64.45 |
| 2018-19 | 69.89 |
| 2019-20 | 70.49 |
| 2020-21 | 73.20 |
| 2021-22 | 74.42 |

Exchange Rates (Calendar Year)

| Year | Rs. Equivalent of one US\$ |
|-------|----------------------------|
| 2005 | 44.11 |
| 2006 | 45.33 |
| 2007 | 41.29 |
| 2008 | 43.42 |
| 2009 | 48.35 |
| 2010 | 45.74 |
| 2011 | 46.67 |
| 2012 | 53.49 |
| 2013 | 58.63 |
| 2014 | 61.03 |
| 2015 | 64.15 |
| 2016 | 67.21 |
| 2017 | 65.12 |
| 2018 | 68.36 |
| 2019 | 69.89 |
| 2020 | 74.18 |
| 2021 | 73.93 |
| 2022* | 76.73 |

*Note: *- As on August 2022*

Source: Foreign Exchange Dealers' Association of India

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