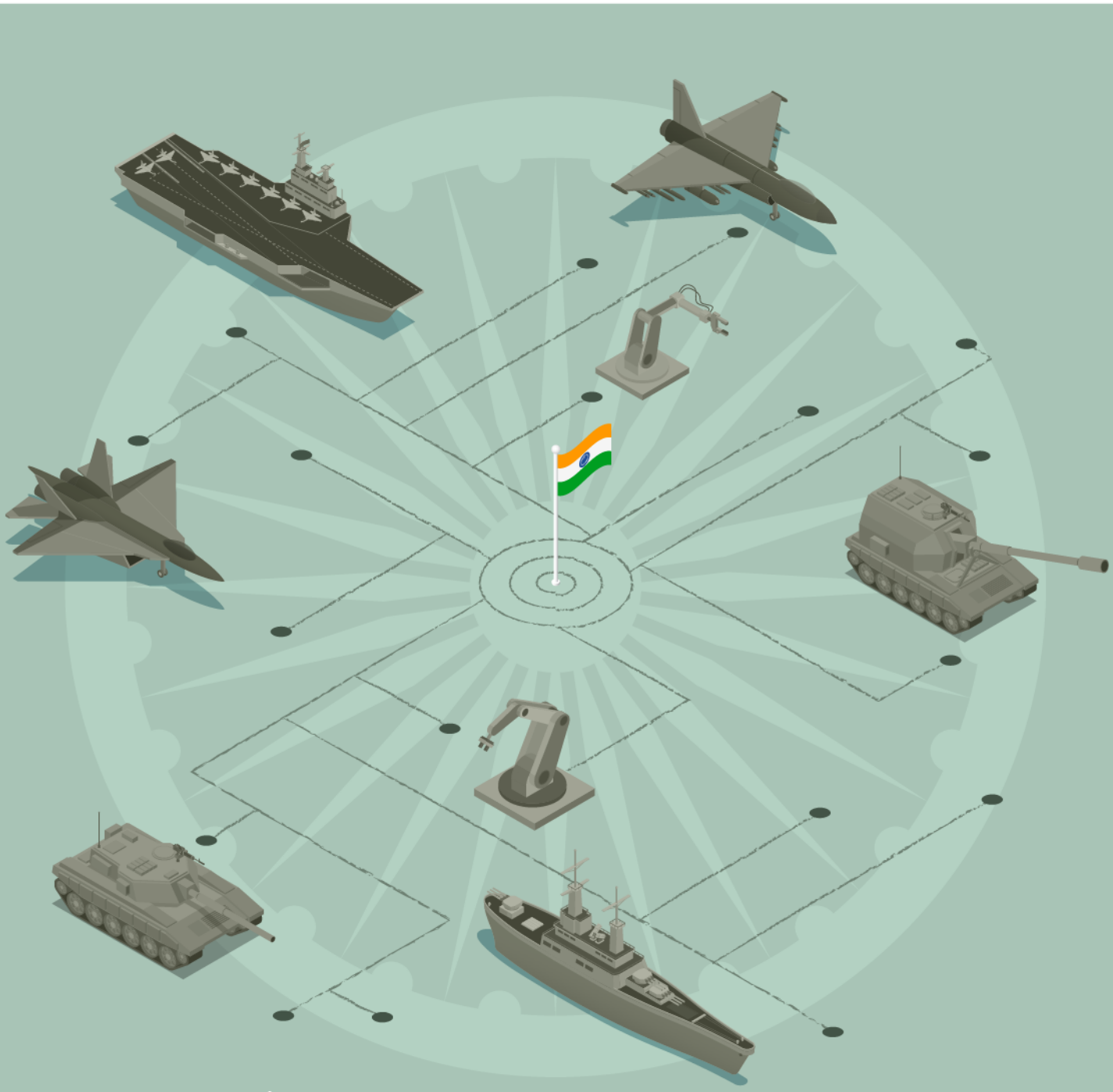
GATEWAY HOUSE
INDIAN COUNCIL ON GLOBAL RELATIONS

A Defence Industrial Agenda for India

by **Sameer Patil,** Fellow, International Security Studies Programme



PAPER NO. 24 | JULY 2020

A DEFENCE INDUSTRIAL AGENDA FOR INDIA

Sameer Patil, Fellow, International Security Studies Programme

Paper No. 24 | July 2020

GATEWAY HOUSE
INDIAN COUNCIL ON GLOBAL RELATIONS
भारतीय वैश्विक संबंध परिषद्

GATEWAY HOUSE
INDIAN COUNCIL ON GLOBAL RELATIONS

Executive

Executive Director: Manjeet Kripalani
Director: Neelam Deo

Publication

Editor: Manjeet Kripalani
Copy Editor: Nandini Bhaskaran
Research assistance: Nikhil Dasari, Amrita Menon and Jyotsna Mehra
Website and Publications Associate: Sukhmani Sharma
Designer: Debarpan Das

Gateway House: Indian Council on Global Relations

@GatewayHouseIND

@GatewayHouse.in

For more information on how to participate in Gateway House's outreach initiatives, please email outreach@gatewayhouse.in

Printed in India by Airolite Printers

About the Author

Sameer Patil is Fellow, International Security Studies Programme, Gateway House. Prior to this, he was Assistant Director at the National Security Council Secretariat in the Prime Minister's Office, New Delhi, where he handled the counter-terrorism and regional security desks. Sameer has written extensively on various aspects of national security, including counter-terrorism, cybersecurity, the Kashmir issue, India-Pakistan and India-China relations.

TABLE OF CONTENTS

Executive Summary

India has upgraded its military capabilities over the past two decades, mostly through imports as domestic manufacturing of advanced equipment has consistently fallen short of satisfying the requirements of the armed forces. Defence manufacturing in India remains restricted and burdened by excess regulation. Efforts to promote private sector participation have yielded limited results, mainly due to the opposition from defence public sector units, which have enjoyed a monopoly in a monopsony market.

Since 2014, the government has made a concerted effort to enlist the private sector and start-ups to boost country's defence-industrial capabilities. The mechanisms for their participation are the Strategic Partnership model and the Innovations for Defence Excellence programme. Progress has been slow because the private sector has been waiting for a major weapons contract, without which it would be difficult for them to sustain investments in the requisite infrastructure. Still, private companies have been tying up with U.S. and European aerospace companies for the manufacture and export of sub-systems, giving them an active position in the global supply chain.

To create a robust defence-industrial base, the government will have to step up the pace of de-regulation and pragmatic planning for the immediate, medium and long term.

Immediate

- The Strategic Partnership model has to be re-oriented to encourage and enable partnerships between the DPSU and the Indian private sector. Such partnerships ought to be prioritised in defence procurement, or, as an initial experiment, be awarded contracts for manufacturing equipment from the already marked categories under the Strategic Partnership model.

Medium

- The Strategic Partnership model has to be re-oriented to encourage and enable partnerships between the DPSU and the Indian private sector. Such partnerships ought to be prioritised in defence procurement, or, as an initial experiment, be awarded contracts for manufacturing equipment from the already marked categories under the Strategic Partnership model.
- India can initiate flagship domestic programmes based on existing competencies in information and digital technologies. This will help to integrate the commercial and manufacturing dimensions of production with R&D efforts and expedite the commercialisation of these technologies. It also offers opportunities for Indian IT majors, which have so far played a limited role in military modernisation.

Long-term

- The Indian Navy is the most indigenised of the three services, yet the capacity for shipbuilding is primarily concentrated in the DPSU shipyards, rather than the private sector. This is not encouraging for the private sector companies, which are hoping to get a larger share of defence contracts. To provide capacity and resources, the government can explore creating the global model of a Common User Facility, which can potentially have facilities such as fabrication, assembly, commissioning, maintenance, and repair activities.
- India has initiated some technology co-development and co-production projects with the U.S., Israel and Japan. This cooperation needs to evolve to include additive manufacturing. The scope this technology offers for customisation can be advantageous for the Indian defence industry in capacity-building.

1. Introduction

In 2019, the Indian military made significant additions to its capabilities. This included the Apache attack and Chinook heavy lift helicopters, along with the long-pending Dassault Rafale fighter jet for the Indian Air Force (IAF), K9 Vajra howitzer guns for the Indian Army, and commissioning of the INS Khanderi Kalvari-class submarine for the Indian Navy. Upgrading military capabilities has become an imperative for India, especially as its security remains fraught – border disputes with China and Pakistan, cross-border terrorism, and armed insurgency in the Kashmir Valley, the growing influence of China in the neighbourhood, in the Indo-Pacific and Beijing's superior offensive cyber capabilities.

India is modernising its military, but much of it is by arms imports. Domestic defence manufacturing of advanced military hardware remains limited and unable to fulfil the military's requirements.

Since 2014, under the flagship Make in India programme,[1] the government has sought to expand the country's defence-industrial base, with participation by the private sector. Progress has been slow since then, with no major weapons contracts being awarded to the private sector; inadequate budgetary allocations; a protracted acquisitions process; and controversies over arms purchases, as seen in the Rafale aircraft case, where allegations of irregularities related to price escalations and favouritism were levelled against the government.

India's inability to create a vibrant defence-industrial base is in stark contrast to countries such as South Korea, Turkey, and Brazil, which have used various models to achieve a strong local defence-industrial base. In the process, these countries have emerged as defence exporters by developing niche capabilities. Similar is the example of China, which was one of the largest arms importers until two decades ago. A sustained focus on R&D, coupled with 'reverse engineering' of Russian and Western hardware, has now enabled China to achieve not just self-reliance but also emerge as the world's fifth-largest arms exporter.[2] This has implications for India: Beijing has assiduously exploited its role as a defence supplier to entrench itself in the countries in India's neighbourhood.[3]

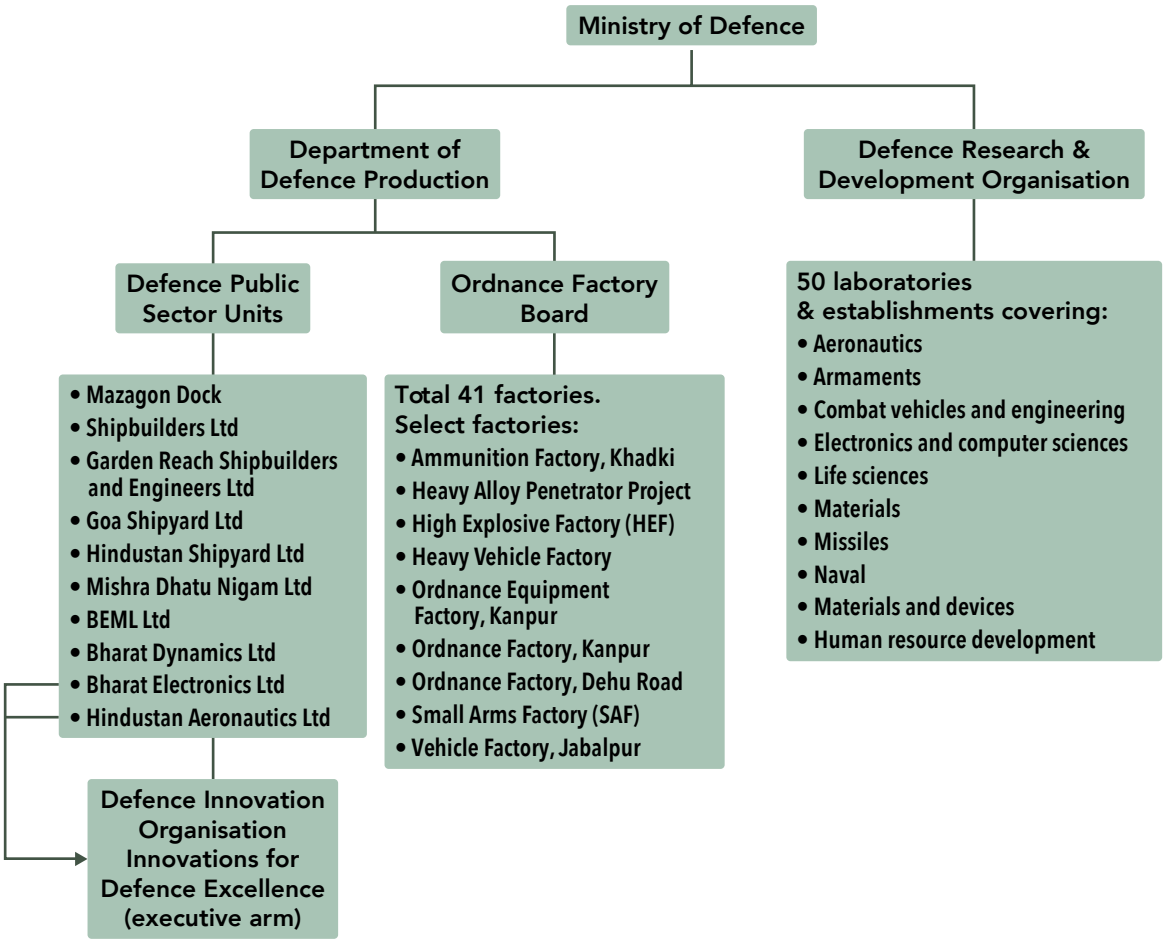
Defence-industrialisation, therefore, is a critical requirement for India as it is linked to national security as also its greater role in the region, which is evident from China's expanded influence. This paper reviews India's quest for defence-industrialisation by examining the performance of domestic players and mapping current defence-industrial capabilities. It then identifies opportunities to develop a robust defence-industrial agenda for India.

2. Pursuit of domestic defence-industrialisation

India's efforts to set up a defence-industrial base began quite early, immediately after Independence in 1947. Under the Industrial Policy Resolution of 1956, manufacturing of "Arms and ammunition and allied items of defence equipment" was made an exclusive responsibility of the state – primarily because of the capital-intensive nature of the sector.[4] This policy gave rise to a state-owned defence-industrial base (Figure 1), comprising nine defence public sector units (DPSUs), along with the 41 factories of the Ordnance Factory Board (OFB), which manufactured basic military equipment and carried out licensed production of imported platforms. For instance, Hindustan Aeronautics Limited (HAL) collaborated with foreign defence companies, primarily from France, the UK, and Germany, in the late 1950s and early 1960s, to license-produce Gnat jet fighters for the IAF) and Aloutte helicopters (for the IAF and Indian Navy). The OFB, meanwhile, also exported low-tech items, such as small arms and weapons spares to other developing countries, including Nepal, Sri Lanka, Bangladesh, Kenya, Nigeria, Botswana, and Chile.

A component of this base was the defence research ecosystem, led by the Defence Research and Development Organisation's (DRDO) 50 establishments, focused on research on various technologies related to aeronautics, robotics, navigation, and propulsion among others.

Figure 1: India's state-owned defence-industrial base



This base achieved a monopoly in a monopsony market under state patronage and guaranteed orders. But this monopoly didn't benefit the military as missed deadlines and spiralling costs became the hallmark of state-owned enterprises. The unwillingness of Soviet defence companies (which became India's main defence supplier after the India-Pakistan War of 1971) to transfer design and technology[5] and the DPSUs' lack of long-term focus on R&D-oriented planning resulted in a failure to absorb the relevant technology.[6] As a result, they faced challenges in designing and developing indigenous platforms. Flagship projects, such as the Tejas fighter jet and Arjun Main Battle Tank, which were to replace the imported equipment, took more than three decades to develop and are still not best-in-class.

The Arjun tank is a case in point. The DRDO began the Arjun development project in 1974 at the sanctioned cost of Rs 15.50 crores. There were many in the government and military who argued at that time that the DRDO had bitten off more than it could chew. Their arguments were not off the mark. Two decades later, in 1995, DRDO concluded the project by submitting a few prototypes, based on a near-obsolete design, at a total cost of Rs. 305.60 crores.[7] The tank was heavy, lacked armour protection, and gunfire accuracy.[8] Naturally, the Indian Army was much against the Arjun's induction. Yet overruling the Army's misgivings, the tank was inducted in 2004-2005. For a platform which was touted as indigenous, 69% of its components were imported.[9] Till today, the tank is plagued with problems.[10] To bridge the shortfall caused by the delay in its development, the Army had to import T-90 tanks from Russia.

As expected, frustration is felt deeply in the military, which has repeatedly accused the DPSUs and the DRDO of following a 'foot in the door' policy[11] – over-committing beyond their existing capabilities, binding the military to sub-standard and under-powered equipment, and ultimately missing deadlines. This problem is not restricted to advanced platforms, but also relatively smaller pieces of equipment like bullet-proof jackets, webbing harness, and light-weight ballistic helmets, which did not meet the armed forces' requirements.[12]

Against this background, imports thrived and created a lobby of vested interests in the form of "middlemen", who coveted the kickbacks which foreign contracts enabled. Naturally, they actively worked against defence indigenisation. This has gradually made India one of the biggest arms importers in the world.

Indigenisation was also hampered by the lack of raw material availability and the relevant domestic metallurgy processing industrial capacity. In the absence of raw material, India's attempts at indigenisation would still have come to nought due to dependency on imports. This is especially applicable to heavy engineering goods. The Chinese realised this early on and proceeded to purchase mines in various countries to bridge the gap in demand for metals such as copper, aluminium and nickel, which are important in defence manufacturing.

In 2001, in an effort to boost domestic capabilities, the government opened up the defence sector, including manufacturing, to private participation by changing the investment norms, to allow domestic private companies to invest 100%, and foreign private companies up to 26%, in the business.[13] This was fiercely opposed by the DPSUs, which feared the end of their monopoly in defence manufacturing. Their resistance worked, and till now private companies have been unable to land a major weapons manufacturing contract, despite the government's sustained push.

However, not all submitted to public sector pressure, and the Indian Navy has been a limited beneficiary of these changed investment norms. In most other cases, private companies have mostly contributed by producing sub-systems which form part of the larger equipment. (See Table 1 in Appendix for a detailed breakup).

Shipbuilding and naval systems

During the development of the Arihant-class nuclear-powered ballistic missile submarine programme in the 1990s and 2000s, the Navy Shipbuilding Centre in Visakhapatnam had enlisted the help of private companies in developing critical components of the vessel. For instance, Larsen & Toubro (L&T) constructed the submarine's hull,[14] Walchandnagar Industries designed the propulsion and vertical missile launch systems,[15] and the Tata Power Strategic Engineering Division (SED) built the control systems.[16]

This involvement enabled the private sector to secure smaller contracts early on, when defence manufacturing was opened to the private sector. L&T and Bharati Shipyard built interceptor boats for the Indian Coast Guard; L&T offshore patrol constructed vessels for the Indian Navy. Likewise, the Pipavav Shipyard (now Reliance Naval and Engineering Limited) made offshore patrol vessels while ABG Shipyard built cadet training ships for the Indian Navy. In addition, the private sector continued to provide sub-systems like weapons launching systems, sensors, and combat management systems to the Indian Navy's ships.[17] [18]

These contracts created the expectation of bigger shipbuilding orders from the government: some of these shipyards had even invested in additional capacity and forged tie-ups with foreign manufacturers. But the orders never materialised, partly due to the long-drawn-out procurement process. As a result, in the last five years, shipyards like ABG and Bharati have gone out of business,[19] while Reliance Naval and Engineering Limited has mounting debts.

Therefore, today, while the Indian Navy is the most indigenised of the three services, the capacity for shipbuilding is primarily located in DPSU shipyards, like Mazagon Dock, rather than the private sector shipyards. This is not encouraging for other private sector companies, hoping to obtain a larger share of government contracts.

The current state of private shipyards flags a major issue: the private sector needs certainty and a defined time frame for defence contracts. Only then will it be able to sustain its investment in creating additional capacities.

Aerospace-related systems

For the Indian Air Force, India has relied on a combination of imports and license production by HAL. To utilise imports for building domestic defence-industrial capabilities, including in the aerospace sector, India introduced offset obligations in the Defence Procurement Procedure (DPP)-2005.[20] The policy mandated that foreign companies executing contracts worth Rs. 300 crores or more had to invest 30% of the total contract value in India's defence industry. While overall the performance of the offsets has been disappointing, it allowed foreign companies to forge partnerships with Indian ones, mainly in the aerospace sector.

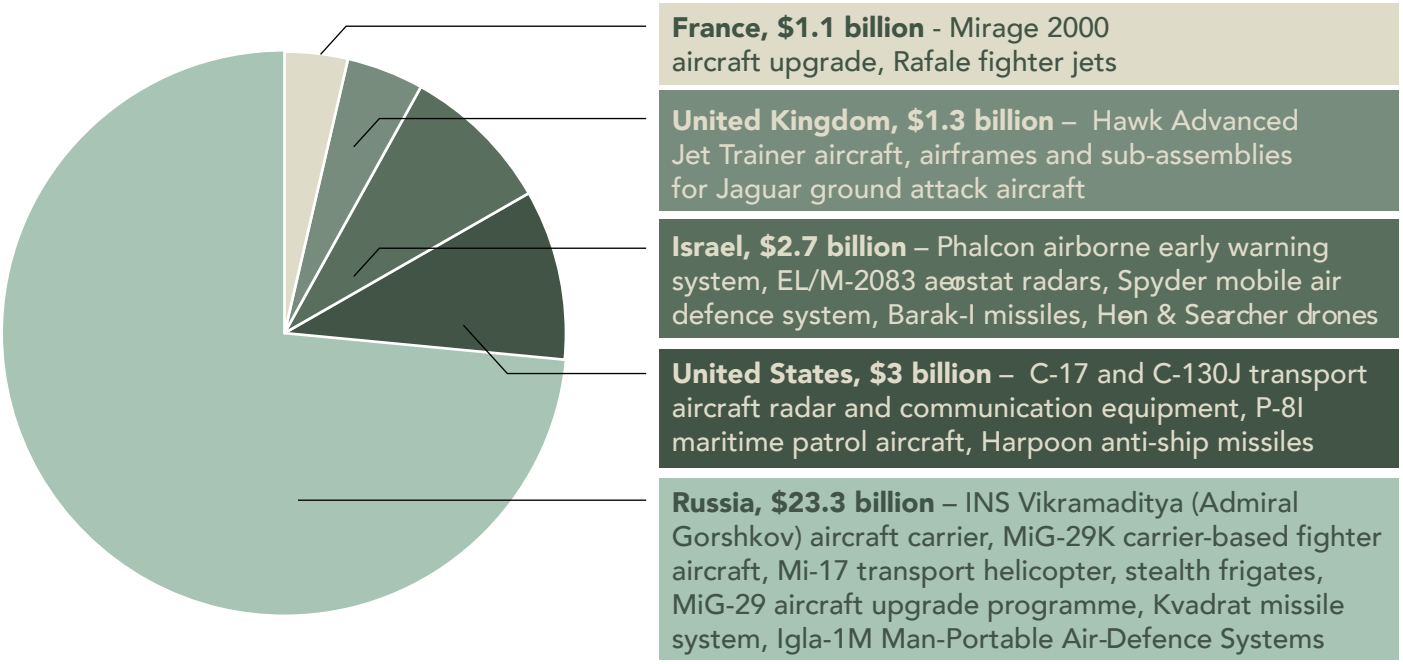
These partnerships have now matured into full-fledged joint ventures, enabling Indian companies such as the Tatas, Bharat Forge, and Mahindra Aerostructures, to manufacture and export sub-systems as an active participant of the global supply chain for European and American companies. For instance, the Tatas' joint venture with Boeing, the Tata Boeing Aerospace Limited, has emerged as the sole producer of fuselages for the AH-64 Apache helicopters globally, including the ones supplied to the IAF.[21] These partnerships also extend to civil aviation. For instance, Bharat Forge has produced titanium flap-track forgings for the Boeing 737 and 777 aircraft,[22] while Mahindra Aerostructures has supplied the airframe parts of Airbus helicopters.[23]

According to Boeing, there are more than 160 vendors in India which supply aero-structures, avionics mission systems, ground support equipment, and other parts for its civilian and military aircraft, which are sold globally.[24] Based on these partnerships, Boeing, Airbus, and Lockheed Martin have pitched for India's upcoming defence contracts, including the multi-medium role combat jet and transport aircraft for the IAF.

3. Mapping current defence-industrial capabilities

India's ongoing military modernisation shows that many of the immediate operational requirements for advanced equipment are being exclusively fulfilled through imports. In the last decade, India imported defence equipment totalling $33.8 billion. The top five suppliers are Russia, the U.S., Israel, France, and the UK,[25] in that order.

Figure 2: India's arms imports (2008-2018)



Source: Gateway House research, SIPRI Arms Transfers Database and United Nations Register of Conventional Arms

Major imports are still from Russia, at $23.3 billion. (See Figure 2.) These include the Admiral Gorshkov aircraft carrier (commissioned as INS Vikramaditya) along with the MiG-29K fighter aircraft for the Indian Navy and Mi-17 transport helicopters for the IAF. Major purchases from the U.S. include the C-17 and C-130J transport aircraft for the IAF. Most of these purchases have been G2G, under the United States' Foreign Military Sales programme – the major exception being the P-8I maritime patrol aircraft, which India purchased from Boeing under a commercial contract in 2009. In fact, India was the first export customer of this aircraft. U.S. President Donald Trump, during his recent India visit, announced that India will purchase additional equipment worth $3 billion, including helicopters.[26]

Israel has provided a variety of radar and missile defence systems along with Searcher and Heron drones. These drones have amplified India's surveillance capabilities, particularly in the border and coastal areas. The IAF also used the Israeli equipment in its raid on the Balakot terrorist training camp in Pakistan on 26 February 2019. This included the SPICE 2000 and Popeye precision-guided munitions, Heron drones and the Phalcon airborne early warning and control system.

The domestic production that is taking place is mostly for the Indian Navy, with the state-run Cochin Shipyard building aircraft carriers, Mazagon Dock building the Kalavari-class submarines with transfer of technology from France's Naval Group, and Kolkata's Garden Reach shipyard building Kamorta-class corvettes. Yet, India lacks indigenous technological capability in naval weapons systems, gas turbine jet engines, and aviation platforms such as maritime patrol aircraft, drones, carrier-based fighter jets, naval utility helicopters – critical modules and components to be truly indigenised.

Future platforms, which will be domestically produced, include: Project 75I-class diesel-electric submarines, Project 17A-class frigates and Visakhapatnam-class destroyers and Tejas fighter aircraft – naval version for the Indian Navy, HJT-36 Sitara intermediate trainer aircraft and light utility helicopter for the IAF. Table 1 in the Appendix provides a detailed breakup of the Indian military's current, future and potential acquisitions.

4. Make in India and defence manufacturing

Since 2014, the government has launched an ambitious programme to expand domestic defence production with a larger role for the private sector. As part of this, the government's focus has been on promoting private and foreign investments in the defence sector, prioritising development of indigenous equipment, encouraging defence research, undertaking defence technology collaboration with other countries and advancing defence exports. (See Table 2 in the Appendix for more details).These steps are aimed at encouraging domestic defence production, with an expanded role for the private sector, and the development of indigenous equipment.

To encourage the private sector, the government has brought in the Strategic Partnership (SP) model. Under this, tie-ups will be forged between Indian and foreign defence companies to produce fighter jets, submarines, medium lift and utility helicopters, warships etc. The Rs. 45,000-crore contract for the P75I diesel-electric submarines, which will replace the ageing submarine fleet of the Indian Navy, is the first to be activated under the SP model. The Defence Acquisition Council, headed by the Raksha Mantri, on 21 January 2020, shortlisted Mazagon Dock and L&T as its Indian strategic partners for this contract.[27]

The SP model is applicable for Tier 1 manufacturers. To encourage Micro, Small and Medium Enterprises from Tier 2 and 3 regions, procurement projects not exceeding the development cost of Rs. 10 crores (government-funded) and Rs. 3 crores (industry-funded) will be reserved for them.[28] This will enable the creation of an ecosystem across industry. Another step forward in creating this ecosystem is the stimulus being given to start-ups through the Defence Innovation Fund, established in 2017.[29] Under its auspices, HAL and Bharat Electronics Ltd funded the setting up of the Defence Innovation Organisation (DIO). The DIO promotes innovation through the Innovations for Defence Excellence (iDEX) programme.[30] The first two rounds of iDEX have so far identified technologies which augment the operational capabilities of the Indian military in combat. These include solutions for individual protection systems, secure hardware encryption devices, GPS anti-jam devices, unmanned surface and underwater vehicles, and 4G/LTE tactical local area network, among others.[31]

If implemented properly, this innovation ecosystem can unlock the huge homeland security market, not just in India but also abroad.

To encourage indigenisation, India has also initiated a number of projects with other countries to co-develop and co-produce defence technologies, required by the Indian and partner country's militaries. Some of these predated Make in India. Important projects include: development and operationalisation of the Barak 8 missile system with Israel and the Brahmos missile systems with Russia. There is cooperation on emerging technologies with the U.S. and Japan. With the U.S., it includes research on lightweight small arms technology (assault rifles and machine guns) and air-launched drones.[32] With Japan, the research focuses on visual simultaneous localisation and mapping-based global navigation satellite system augmentation technology for unmanned ground vehicles and robotics.[33]

5. Role of cyber and other emerging digital technologies

Technological advancements have not just transformed the physical battlefield, but also created a virtual battlefield. Utilising their existing defence-industrial capabilities, the U.S., Russia and China have taken a lead, while India is incrementally expanding its capabilities. A review of the literature[34] suggests that technologies which can be the mainstay of future militaries are cyber-defence, blockchain, quantum computing, Artificial Intelligence (AI) and Machine Learning (ML), swarming drones and additive manufacturing. Advancements in Information Technology (IT) are an important dimension to consider given its implications for the threat landscape – deep fakes, Internet-of-Things (IoT)-based threat vectors, social engineering attacks etc. can play a great role in the weaponisation of information. These technologies represent a fundamental shift towards information-based operations, not just for causing the 'fog of war', but to attain complete primacy in the battle.

The salience of information technology in this warfare can only be grasped through the government-military-industry collaboration. This offers opportunities for Indian IT companies such as Tech Mahindra, Tata Consultancy Services (TCS), Wipro and HCL Technologies, which have so far played a restricted role in the Indian military's technological modernisation. These companies can help the military better identify global technological trends. They can identify critical technologies, especially those that may be denied to India as part of the international Strategic Export Controls regime.

Given the rapid obsolescence of current and emerging technologies, India cannot afford to take years to achieve the desired competency. Therefore, a joint public-private effort is needed to reorient the defence technology ecosystem suitably. The private sector has already established a certain degree of competency in cyber and has the necessary foreign tie-ups. For instance, Tech Mahindra has partnered with Israel's Elta Systems to offer cybersecurity-based products, thereby leveraging an established competency. These need to be appropriately utilised.

6. From Make in India to Made for India

Acquiring defence-industrial self-reliance is an imperative for India. Numerous government committees, including the Kargil Review Committee (1999), Vijay Kelkar Committee (2004), Sisodia Committee (2007) and the Dhirendra Singh Committee (2015), have examined this issue in detail and suggested measures to accelerate domestic defence-industrialisation. Additionally, this paper makes the following recommendations:

Immediate

1. **Reorient the strategic partnership model to form partnerships between the DPSU and the Indian private sector.** The DPSU's strengths are its decades of experience and its infrastructure, whereas the private sector has management and financial expertise. The fear that DPSUs have of losing their monopoly and being shown up for their weaknesses can be overcome by the formation of a consortium between them and private players. This will leverage the best of both sectors. Such consortia ought to be prioritised in defence procurement, or, as an initial experiment, be awarded contracts for manufacturing equipment from the already marked 12 categories of equipment and platforms for the SP model, such as fighter jets, warships, submarines and medium lift and utility helicopters, warships etc.

Medium

1. **Commit a greater share of budgetary resources to the Indian Navy.** In recent years, India's naval capabilities have undergone a significant expansion. However, in key platforms, the Navy lags behind – the ageing submarine fleet is one example. The Navy is not just an instrument of war, but also of economic diplomacy. It is also a key enabler in enhancing India's profile in the Indo-Pacific. Yet, on average, the Navy gets between 13%-15% of the annual defence budget, lower than the Air Force (22%-23%) and far less than the Army (56%).[35] Given that the Navy will be an increasingly important player, it needs more robust budgetary support. A larger share for the Navy in the defence budget, closer to the Air Force's share, will give India the necessary strategic capacity.

2. **Initiate domestic flagship defence technology development programmes catering to future defence acquisitions.** Just like the joint defence technology development programmes with foreign governments, India needs to initiate such programmes domestically. Ideally, these flagship programmes should be based on existing competencies, such as information and digital technologies, which will help in integrating commercial and manufacturing dimensions with research and development (R&D) efforts and expedite the commercialisation of these technologies.

3. **Encourage the OFB to initiate collaborative industry research to identify global trends in emerging technologies and their implications for the Indian defence industry.** This can be the first step towards building those capabilities for India. This R&D needs to be done independent of the DRDO.

Long-term

1. **Explore the creation of the global model of a Common User Facility for the Indian shipbuilding industry, which can potentially have facilities such as fabrication, assembly, commissioning, maintenance, and repair activities.** Currently, Mazagon Dock offers some of its space to private shipbuilding companies, engaged in sub-contracting to work on the projects. This is not enough. Given the current precarious condition of many private sector shipyards, the Common User Facility (CUF) can provide some relief for those that don't have the capacity or resources to invest in infrastructure. A model worth emulating is the Australian Marine Complex's CUF in Henderson, Western Australia.[36] This facility enables private shipyards to bid for government shipbuilding contracts, without replicating existing and available infrastructure.[37] The CUF need not be restricted to defence shipbuilding, it can also be made available to build merchant navy ships.

2. **Include additive manufacturing (3D printing) in the scope of defence technology cooperation with the U.S., Japan and Australia.** Additive manufacturing technology is already proliferating in the manufacturing of aerospace and naval systems components in civil and military domains. The scope this technology offers for customisation can be advantageous for the Indian defence industry in capacity-building. It will also elevate the Quadrilateral Security Initiative by injecting technology and economics into it.

3. **Expand the private sector's participation in the Defence Innovation Organisation.** This organisation, funded by the two DPSUs, HAL and Bharat Electronics Limited, needs to be expanded to include the private sector. This will help identify emerging technological trends and the commercialisation of innovation.

7. Conclusion

In the last few years, the political will to reduce import dependence by creating a domestic defence-industrial base is evident. The creation of a vibrant base requires amplification and readjustment of existing policies. Bringing certainty to the defence procurement process, monitoring emerging technologies, and joining hands with like-minded countries, will go a long way in aiding this process. Rapidly-obsolescing military hardware has made the defence-industrialisation push vital for India.

8. Appendix

Table 1 – Indian military's current, future and potential acquisitions

Source: Gateway House Research

CATEGORY	INDIAN NAVY	INDIAN AIR FORCE	INDIAN ARMY	MIXED USERS
Indigenously developed and produced	INS Vikrant aircraft carrier and INS Vishal (design phase) • Cochin Shipyard • Millennium Aero Dynamics Arihant class nuclear submarines • Navy Shipbuilding Centre • L&T Shipbuilding • Walchandnagar Industries • Tata Power Strategic Engineering Division Kamorta-class corvettes • Garden Reach Shipbuilders and Engineers Vikram-class offshore patrol vessels (Coast Guard) • L&T Shipbuilding Samarth-class offshore patrol vessels (Coast Guard) • Goa Shipyard Sangraha electronic warfare System • DRDO	Tejas fighter aircraft • Hindustan Aeronautics Limited • Taneja Aerospace and Aviation Limited	Arjun main battle tank- Mk I and Mk II versions • DRDO • Heavy Vehicles Factory, Avadi Swathi weapon locating radar • Defence Research and Development Organisation • Bharat Electronics Limited Pinaka multi-barrel rocket launcher • Defence Research and Development Organisation • Ordnance Factory Board • Tata Power Strategic Engineering Division • Larsen & Toubro Heavy Engineering • Premier Explosives Limited • Solar Group	Dhruv multirole helicopters • Hindustan Aeronautics Limited • Taneja Aerospace and Aviation Limited Rudra armed helicopters • Hindustan Aeronautics Limited Light Combat Helicopter • Hindustan Aeronautics Limited • Taneja Aerospace and Aviation Limited Akash surface-to-air missile • Defence Research and Development Organisation • Ordnance Factory Board • Bharat Dynamics • Bharat Electronics

CATEGORY	INDIAN NAVY	INDIAN AIR FORCE	INDIAN ARMY	MIXED USERS
Domestically produced (with technology transfer or under license)* *** Initial deliveries may involve imports**	Kalvari class diesel-electric submarines • Mazagon Dock Shipbuilders Limited • Naval Group (DCNS), France • Millennium Aero Dynamics Chetak Aérospatiale Alouette III light utility helicopter • Hindustan Aeronautics Limited • Sud Aviation, France • Aérospatiale, France	Sukhoi 30 MKI fighter aircraft • Hindustan Aeronautics Limited • Sukhoi Design Bureau, Russia • Taneja Aerospace and Aviation Limited Hawk Advanced Jet Trainer • Hindustan Aeronautics Limited • BAE Systems, UK	K9 Vajra T howitzer • Larsen and Toubro Heavy Engineering • Hanwha Land Systems, South Korea M777 howitzer guns • Mahindra Defence • BAE Systems, UK WZT-3 armoured recovery vehicles BEML Limited • Bumar-Labedy, Poland • Autonomous Towed Howitzer Ordnance System • Elbit Systems, Israel • Bharat Forge	
Co-developed and co-produced with other countries				BrahMos supersonic cruise missile • BrahMos Aerospace (Defence Research and Development Organisation and NPO Mashinostroyeniya, Russia) Barak 8 surface-to-air missile • Israel Aerospace Industries • Defence Research and Development Organisation • Rafael Advanced Defense Systems, Israel • Bharat Electronics Limited

CATEGORY	INDIAN NAVY	INDIAN AIR FORCE	INDIAN ARMY	MIXED USERS
Imported	MH-60 Seahawk maritime helicopters • Sikorsky Aircraft, U.S. Admiral Grigorovich (Project 11356M)-class stealth frigates • Yantar Shipyard, Russia	Rafale fighter aircraft • Dassault Aviation, France • Reliance Defence PC-7 light trainer aircraft • Pilatus Aircraft, Switzerland AH-64E Apache attack helicopter • Boeing, United States • CH-47F Chinook heavy-lift helicopters • Boeing, United States	SIG716 7.62×51 mm assault rifle • SIG Sauer, Germany T-90MS main battle tank • Uralvagonzavod, Russia • Heavy Vehicles Factory, Avadi (proposed assembly facility) Heron unmanned aerial vehicle • Israel Aerospace Industries	S-400 Triumf missile defence system • Almaz-Antey • Fakel Machine-Building Design Bureau, Russia Pipistrel Virus Garud ultralight utility aircraft • Pipistrel, Slovenia

CATEGORY	INDIAN NAVY	INDIAN AIR FORCE	INDIAN ARMY	MIXED USERS
FUTURE AND POTENTIAL ACQUISITIONS				
Indigenously developed	Project 17A-class frigates • Garden Reach Shipbuilders & Engineers • Mazagon Dock Shipbuilders Limited Visakhapatnam-class destroyers • Mazagon Dock Shipbuilders Limited	Tejas fighter aircraft – naval version • Hindustan Aeronautics Limited HJT-36 Sitara intermediate trainer aircraft (under development) • Hindustan Aeronautics Limited Light utility helicopter • Hindustan Aeronautics Limited	Nag anti-tank missile • Defence Research and Development Organisation Advanced Towed Artillery Gun System • Defence Research and Development Organisation • Ordnance Factory Board • Kalyani Group • Tata Power Strategic Engineering Division	Ballistic missile defence system (under development) • Defence Research and Development Organisation K missile family (under development) • Defence Research and Development Organisation Agni-VI intercontinental ballistic missile (under development) • Defence Research and Development Organisation • Walchandnagar Industries (launchers) Prahaar ballistic missile (under development) • Defence Research and Development Organisation • Bharat Dynamics Limited Nirbhay subsonic cruise missile (under development) • Defence Research and Development Organisation Nishant unmanned aerial vehicle • Defence Research and Development Organisation

CATEGORY	INDIAN NAVY	INDIAN AIR FORCE	INDIAN ARMY	MIXED USERS
To be produced domestically (with technology transfer or under license)* * Initial deliveries may involve imports	Project 75I-class diesel-electric submarines Admiral Grigorovich (Project 11356M)-class stealth frigates • Yantar Shipyard, Russia • Goa Shipyard Limited	C295 transport aircraft • Tata Advanced Systems Limited • Airbus Medium Multi-Role Combat Aircraft	Spyder mobile air defence system • Rafale Advanced Systems, Israel • Israel Aerospace Industries	Ka-226T light utility helicon+pters • Kamov, Russia • Rosoboronexport, Russia
Co-developed and co-produced with other countries				Lightweight small arms (under development) • Textron Systems, United States • Defence Research and Development Organisation Air launched drones (under development) • Air Force Research Laboratory, United States • Defence Research and Development Organisation
Imported	Akula-class nuclear submarine (proposed to be leased) • Amur Shipbuilding Plant, Russia P-8I Poseidon maritime patrol aircraft (additional order) • Boeing MQ-9 Sea Guardian unmanned combat aerial vehicle • General Atomics Aeronautical Systems US-2 amphibious aircraft • ShinMaywa	A330 multirole tanker transport • Airbus		National Advanced Surface to Air Missile System-II • Kongsberg Defence & Aerospace • Raytheon

Table 1 – Indian military's current, future and potential acquisitions

DOMAIN	POLICY MEASURES
Investments	1. Foreign Direct Investment allowed via automatic route up to 49% and beyond 49% through government route (wherever it is likely to result in access to modern technology). 2. Creation of a Defence Investor Cell in the Department of Defence Production to act as a repository of information related to investment opportunities, procedures and regulatory requirements.
Procurement	1. Creation of a new category, 'Indigenously Designed, Developed and Manufactured' (IDDM), to prioritise purchase of locally designed and developed defence equipment in the Defence Procurement Procedure (DPP-2016). 2. Provision made in the DPP-2016 for funding 90% of development cost by the government to the Indian industry and reserving projects not exceeding development cost of Rs. 10 crores (government-funded) and Rs. 3 crores (industry-funded) for the Micro, Small and Medium Enterprises (MSMEs). 3. Inclusion of provision in the Buy & Make (Indian) category for procuring equipment from an Indian vendor with a tie-up with a foreign defence company, if it involves transfer of critical technologies.
Manufacturing	1. Introduction of Strategic Partnership (SP) model to forge tie-ups between Indian and foreign defence companies, with an aim for transfer of technology. Twelve categories of defence equipment identified for (SP) model. 2. Rationalisation and revision of the Defence Products List (used for issuing industrial licenses), removing the need to have licenses for many components, parts, sub-systems, testing equipment and equipment used in defence production. 3. Introduction of policy for indigenisation of components and spares used in defence platforms to create an ecosystem. 4. Increase in the validity of an industrial license from three to 15 years, with provision for a three-ear extension on a case-to-case basis. 5. Circulation of draft Defence Production Policy 2018, focusing on the creation of a globally competitive defence industry across public and private sectors and MSMEs. 6. Launch of two defence industrial production corridors, in Uttar Pradesh (connecting Lucknow, Kanpur, Agra, Aligarh, Chitrakoot and Jhansi) and Tamil Nadu (connecting Chennai, Coimbatore, Hosur, Salem and Tiruchirappalli). 7. Proposal under consideration for converting the OFB factories and associated establishments to corporate entities

DOMAIN	POLICY MEASURES
R&D and innovation	1. Creation of the Defence Innovation Fund to encourage R&D institutes, academia, industry, start-ups and individual innovators to innovate and devise technologies with potential for commercialisation. 2. Setting up of the Technology Development Fund under the DRDO to provide grants to the public and private sectors and MSMEs for developing technologies or product prototypes. 3. Initiation of a new framework called, Mission Raksha Gyan Shakti, for promoting intellectual property and innovation.
Exports	1. Expeditious permissions granted to defence export proposals. 2. Proposed 'Open General Export License' scheme which seeks to liberalise defence exports
Imports and offsets	1. Scrapping of basic customs duty on imported defence equipment. 2. Modification of offset guidelines done to allow change of Indian Offset Partners and offset components, even in already concluded contracts. Additionally, foreign vendors are no more required to provide details of Indian partners and products at the time of signing contracts. 3. Higher weightage (multiplier up to 3) permitted in discharge of offset obligations for technology acquisition by the DRDO.

Source: Source: Gateway House research based on the collated data from the Ministry of Defence, Ministry of Commerce & Industry, Rajya Sabha and Lok Sabha questions

References

1. Prime Minister's Office, Government of India, Major Initiatives: Make In India, <https://www.pmindia.gov.in/en/major_initiatives/make-in-india/>
2. Wezeman, Pieter D., Aude Fleurant, Alexandra Kuimova, Nan Tian and Siemon T. Wezeman, 'Trends in International Arms Transfers, 2018', SIPRI Fact Sheet, March 2019, <https://www.sipri.org/sites/default/files/2019-03/fs_1903_at_2018.pdf>
3. Bhandari, Amit and Chandni Jindal, 'Chinese Investments in India's Neighbourhood', Gateway House, Maps No. 4-9, February 2018, <https://www.gatewayhouse.in/chinese-investments-in-indias-neighbourhood/>
4. Department of Industrial Development, Ministry of Industry, Government of India, Industrial Policy Resolution, 30 April 1956, <https://dipp.gov.in/sites/default/files/chap001_0_0.pdf>
5. Pardesi, Manjeet and Ron Matthews, "India's Tortuous Road to Defence-Industrial Self-Reliance", Defense & Security Analysis, Vol. 23, No. 4, December 2007, p. 433.
6. Subrahmanyam, K., "Self-reliant defence and Indian industry, Strategic Analysis, Vol. XXIV, No. 7, 2000, p. 1233.
7. Ministry of Defence, Government of India, Fate of DRDO Developed Arjun Tank, 4 August 2015, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=124303>
8. Iype, George, "DRDO took up Arjun before it learnt to make tanks", Rediff, March 2000, <https://www.rediff.com/news/2000/mar/15drdo.htm>
9. Comptroller and Auditor General of India, "Report of the Comptroller and Auditor General of India on Working of Army Base Workshops for the year ended March 2016", Report No. 36 of 2016, <https://cag.gov.in/sites/default/files/audit_report_files/Report_36_of_2016_Union_Government_Defence_PA.pdf>
10. "Fresh snags delay roll out of indigenous Arjun MBTs", Outlook, 31 July 2005, <https://www.outlookindia.com/newswire/story/fresh-snags-delay-roll-out-of-indigenous-arjun-mbts/313933>
11. Kumar, KP Sanjeev, "Navy to HAL– We Dare, You Survive", 30 July 2019, <https://kaypius.com/2019/07/30/navy-to-hal-we-dare-you-survive/>
12. Routray, Bibhu Prasad, "Armed Forces versus Technologists in India's Military Modernisation", Defence Studies, Vol. 13, No. 1, 2013, p. 40.
13. Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, Press Note No. 4 (2001 Series), 21 May 2001, < https://dipp.gov.in/sites/default/files/press4_01.pdf>
14. L&T Defence, Submarines & Underwater Platforms, <http://www.larsentoubro.com/heavy-engineering/products-services/defence-aerospace/underwater-platforms/>
15. Walchandnagar Industries Ltd., Defence Business Group- An Overview, 27 November 2017, <https://walchand.com/wp-content/uploads/2017/11/WIL-Defence-Business-Group-27th-Nov-17.pdf>
16. See note no. 56 in Richard Bitzinger, Arming Asia: Technonationalism and its Impact on Local Defense Industries, Taylor & Francis, 2017, p. 84.
17. L&T Shipbuilding, New Construction - Defence Shipbuilding, <https://www.lntshipbuilding.com/products-services/new-construction-defence-shipbuilding/>

18. Ministry of Defence, Government of India, Raksha Mantri Addresses Naval Commanders at New Delhi, 8 May 2018, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=179178>

19. National Company Law Tribunal, Bharati Defence and Infrastructure Ltd.MA 170 of 2018 in CP 292 of 2017, 14 January 2019, <https://nclt.gov.in/sites/default/files/Interim-order-pdf/Bharati%20Defence%20and%20Infrastructure%20Ltd.MA%20170%20OF2018%20IN%20CP%20292%20OF%202017%20NCLT%20ON%2014.01.2019%20FINAL.pdf>

20. Ministry of Defence, Government of India, Clarification on Offset Policy, 22 September 2018, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=183625>

21. Boeing, Tata Boeing Aerospace delivers first AH-64 Apache combat helicopter fuselage, 1 June 2018, <https://www.boeing.co.in/news-and-media-room/news-releases/2018/june/tata-delivers-first-ah-64-apache-combat-helicopter-fuselage.page?>

22. Boeing, Boeing awards 777X titanium forging contract to Bharat Forge, 26 April 2016, <http://www.boeing.co.in/news-and-media-room/news-releases/2016/april/boeing-awards-777x-titanium-forging-contract-to-bharat-forge.page>

23. Airbus, Make in India' boost: Mahindra to make parts for Airbus Helicopters AS565 MBe Panther rotorcraft, 11 July 2016, <https://www.airbus.com/newsroom/press-releases/en/2016/07/make-in-india-boost-mahindra-to-make-parts-for-airbus-helicopters-as565-mbe-panther-rotorcraft.html>

24. Boeing, Boeing to accelerate growth in India's defence sector, 21 February 2019, <https://www.boeing.co.in/news-and-media-room/news-releases/2019/february/boeing-to-accelerate-growth-in-indias-defence-sector.page?>

25. Trend Indicator Value of arms exports to India, 2008-2018 – data generated from SIPRI Arms Transfers Database, < http://armstrade.sipri.org/armstrade/page/values.php>

26. Trump, Donald, Remarks by President Trump at a Namaste Trump Rally, 24 February 2020, <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-namaste-trump-rally/>

27. Kaushik, Krishn, "Rs 45k-crore submarine project: Mazagon Dock, L&T in, Adani out", The Indian Express, 22 January 2020, < https://indianexpress.com/article/india/rs-45k-crore-submarine-project-mazagon-dock-lt-in-adani-out-6228865/>

28. Ministry of Defence, Government of India, Defence Procurement Procedure-2016 Capital Procurement, <https://mod.gov.in/sites/default/files/dppm.pdf_0.pdf>

29. Ministry of Defence, Government of India, Defence Innovation Organisation, 21 July 2017, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=168797>

30. Department of Defence Production, Ministry of Defence, Government of India, Innovations For Defence Excellence (iDEX), <https://makeinindiadefence.gov.in/pages/innovations-for-defence-excellence-idex->

31. Ibid.

32. Mehta, Aaron, "US, India collaborating on air-launched drone", Defense News, 18 March 2019, <https://www.defensenews.com/global/asia-pacific/2019/03/18/us-india-collaborating-on-air-launched-drone/>

33. Embassy of Japan in India, Japan & India initiate a cooperative research on Unmanned Ground Vehicles /Robotics, 1 August 2018, <https://www.in.emb-japan.go.jp/itpr_en/00_000647.html>

34. Please see, Klare, Michael T., "The Challenges of Emerging Technologies", Arms Control Today, December 2018, < https://www.armscontrol.org/act/2018-12/features/challenges-emerging-technologies>, Philip Breedlove and Margaret E. Kosal, "Emerging Technologies and National Security: Russia, NATO, & the European Theater", 25 February 2019, https://www.hoover.org/research/emerging-technologies-and-national-security-russia-nato-european-theater and "Defense Primer: Emerging Technologies", Congressional Research Service , 19 December 2019, <https://crsreports.congress.gov/product/pdf/IF/IF11105>
35. Behera, Laxman Kumar, "India's Defence Budget 2019-20", Manohar Parrikar Institute for Defence Studies and Analyses, 8 July 2019, <https://idsa.in/issuebrief/indias-defence-budget-2019-20-lkbehera-080719>
36. Australian Marine Complex, "What is the Common User Facility (CUF)?", <https://australianmarinecomplex.com.au/common-user-facility>
37. Briefing given to the author at the Common User Facility, Henderson, Perth, 27 May 2019, https://www.australianmarinecomplex.com.au/common-user-facility

Bibliography

1. Adrianwalla, Xerxes, "Revitalising India's ailing arms industry", Gateway House, 4 July 2012, <https://www.gatewayhouse.in/revitalising-indias-ailing-arms-industry/>
2. Behera, Laxman Kumar, "Defence Agenda for Modi Government 2.0", Manohar Parrikar Institute for Defence Studies and Analyses, 6 June 2019, <https://idsa.in/policybrief/defence-agenda-modi-government-2.0-lkbehera-060619>
3. Hellyer, Marcus, "The government must create a single Australian submarine enterprise", Australian Strategic Policy Institute, 5 September 2019, <https://www.aspistrategist.org.au/the-government-must-create-a-single-australian-submarine-enterprise/>
4. Ministry of Defence, Government of India, "Self Reliance in Defence Production", Press Information Bureau, 7 February 2018, <https://pib.gov.in/newsite/PrintRelease.aspx?relid=176303>
5. Pande, Amitabha, "Defence, Make in India and the Illusive Goal of Self Reliance", The Hindu Centre for Politics and Public Policy, 26 March 2019, <https://www.thehinducentre.com/the-arena/current-issues/article26641241.ece>
6. Jaishankar, Dhruva, "The Indigenisation of India's Defence Industry", Brookings India, August 2019, < https://www.brookings.edu/research/the-indigenisation-of-indias-defence-industry/>
7. Louth, John and Trevor Taylor, "A Defence Industrial Strategy for the UK", Royal United Services Institute for Defence and Security Studies Occasional Paper, April 2018, <https://rusi.org/sites/default/files/defence_industrial_strategyv19.pdf>