

MARXIST

Theoretical Quarterly of the Communist Party of India (Marxist)

XXXV, 2

April-June 2019

Editor's Note	3
PRABHAT PATNAIK Some Comments About Marx's Epistemology	7
RAGHU Defence Procurement Today: Threat to Self-Reliance and Strategic Autonomy	16
CC RESOLUTION (2010) On the Jammu & Kashmir Issue	57

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Printed by Sitaram Yechury at

Progressive Printers, A 21, Jhilmil Industrial Area, Shahdara, Delhi 110095,

and published by him on behalf of the Communist Party of India (Marxist) from

A.K.Gopalan Bhavan, 27-29 Bhai Veer Singh Marg, New Delhi 110001

RAGHU

Defence Procurement Today

Threat to Self-Reliance and

Strategic Autonomy

INTRODUCTION

India was the world's second largest importer of military hardware during 2014-18 accounting for 9.5 per cent of the total, having dropped from its first rank during 2009-13 and ceding top spot to Saudi Arabia which accounted for around 12.5 per cent of total imports during these last five years.¹ However, this was mainly due to delays in deliveries of earlier orders to India, and a sporadic spurt in Saudi imports. One can therefore broadly say that India has been the world's leading arms importer over the past decade. For a country that prides itself in being the world's fourth largest economy (now the 5th), with the fourth largest scientific and technological manpower, this is not a global ranking to be proud of.

Analysts point to several explanations for this high level of defence acquisitions in recent times. India's armed forces badly need modernization, especially in equipment that reflects the revolution in military affairs (RMA) witnessed towards the end of the previous millennium. The Indian military is saddled with

¹ Stockholm International Peace Research Institute (SIPRI) Report, March 2019.

legacy equipment, some going back almost to the Second World War. It is only since about two decades that India has had funds to finance major acquisitions. India is situated in a risky security environment and has faced repeated military conflicts or potential for serious clashes on both its Northern and Western borders, with worries about a two-front conflict. Finally, India's defence industry has failed to develop and deliver indigenous equipment so as to reduce the high quantum of imports.

Institutional structures and processes for planning of defence research and development (R&D), domestic manufacture and procurement are badly in need of overhaul. Defence acquisitions are mostly *ad hoc*, often under-funded and sub-optimal, and done with little strategic planning. User Services have a deficit of technological capability to play their expected role as explained later, generalist career bureaucrats have scanty domain knowledge and a tendency towards procedural intrigues, and the political class has not exercised the requisite leadership, together leading to an erosion of self-reliance and dependence on foreign manufacturers.

In this situation, a perspective has gained ground in government, and unfortunately also among a section of the armed forces, that an answer to these woes lies in a major shift in the defence industry, towards the private sector, assisted by foreign direct investment (FDI) and collaboration with foreign original equipment manufacturers (OEMs). Policies towards this end have been championed by the first Modi government and have received enthusiastic support from corporate lobbies. While the push for domestic manufacture under the flagship "Make in India" programme has achieved some success, albeit less so in high-end equipment, some ominous portents for the future have not received due attention. With no systematic measures being taken to revamp defence public sector undertakings (DPSUs) and R&D institutions, and a fledgling private sector leaning heavily on external agencies for both technology and funds, a serious threat to technological self-reliance looms, and foreign-OEMs are poised to

entrench themselves in the domestic defence industrial landscape.

In light of the above, this essay argues that the current policy framework for defence procurement, production and R&D needs to be completely overhauled, along with all its processes and institutional mechanisms. An explicit goal of maximizing technological self-reliance and indigenous development of defence hardware needs to be built in, with a strategically conceived long-term perspective and effective oversight mechanisms. In this, priority must be given to upgrading and revamping the existing massive infrastructure and R&D capability in the public sector, while planning the development of synergistically linked capabilities in competent private sector entities, so as to broaden the defence industry base.

DEFENCE PROCUREMENT: STATUS & TRENDS

There is broad consensus that equipment available with the armed forces in India are grossly inadequate even for current requirements, leave alone for modernization and future plans. In spite of faster economic growth in the past two decades, and jingoistic lionization of the armed forces by the ruling dispensation, the harsh reality is that all the three 'Services' suffer from severe shortages and a heavy burden of legacy equipment.

The Army has 68 per cent vintage, 24 per cent current and only 8 per cent state-of-the-art equipment. The accumulated deficit in weapons and ammunition is such that India would be strained to withstand 10 days of conflict, a weakness noted during the 1999 Kargil conflict and not changed much since. The Navy and Air Force are in worse condition, the problem compounded by high costs of equipment in these wings.²

India's expenditure on equipment started rising in the new millennium, and a substantial proportion of budgetary

² Parliamentary Standing Committee on Defence (2018-2019) Report (hereafter SCOD Report, 2018-19).

allocations were for capital acquisitions. Defence spending has hovered around 2.5 per cent of GDP, compared to the 2.8 per cent average earlier, but the amounts involved are obviously higher. In comparison, Pakistan's military budget has consistently been 3 to 4 per cent of its GDP. China's defence expenditure, just under 2 per cent of its much higher GDP, has seen hefty rise since the mid-1980s to now rank second only to the US. Notably, China has effected sizeable troop reductions and invested in high-tech equipment commensurate with RMA, aiming for a leaner, more modern military.

Neither India's total defence expenditure nor its spending on equipment tells the whole story though. Expenditure has often been 30-40 per cent below sanction due to reduced fund releases, and procurement has lagged far behind approvals due to payment liabilities from previous years.³ Modernization has therefore suffered seriously, as repeatedly observed by the Parliamentary Standing Committee on Defence and evidence of the 'Services' before it.⁴

Nevertheless, substantial procurement has taken place, but with continued heavy import dependence. In fiscal year (FY) 2018 till October, procurement of defence equipment from domestic sources stood at around Rs 73,918 crore, while procurement from foreign vendors stood at Rs 1,65,590 crore.⁵ Over the past two decades, this ratio of domestic procurement to imports has rarely crossed one-third. Other comparable countries, such as in Europe, and Japan, spend much more on defence procurement than India, but most of it from domestic sources, with China dramatically increasing its domestic production in recent times.⁶

³ "Indian Defence Resource Allocation Trends", *Defence Procurement & Acquisitions* (available at <http://www.defproac.com/?p=485>).

⁴ SCOD report, 2018-19.

⁵ PIB Press Release, January 2, 2019 (available at <http://pib.nic.in/newsite/printrelease.aspx?relid=187049>).

⁶ Shun Zhenhuan, "Reform of China's Defense Industry", Institute for National Strategic Studies (available at <https://fas.org/nuke/guide/china/>

Those in India who praise the virtues of a globally open market for defence procurement fail to notice, or evade, the fact that the world's leading capitalist power, the USA, has stringent laws and procedures that render defence imports a rarity, with barely 4 per cent of US defence purchases being from non-US entities.⁷ In India, by contrast, indigenization and self-reliance are sought to be delegitimized as “reinventing the wheel”.

The dominance of imports in recent acquisitions, revealing India's external dependence, may be seen in the brief status summary below, which also shows the capability and potential of the domestic defence industry and indigenous R&D.

ARMY

In recent times, the army has acquired new infantry gear, sensors and night-vision devices along with tanks, artillery systems, modern assault rifles and a variety of conventional battlefield anti-aircraft, anti-tank and missile-defence missiles.

Thanks to the Integrated Guided Missile Development Programme (IGMDP), later merged into the Defence Research and Development Organization (DRDO), several missile systems are indigenous and manufactured by DPSUs, Bharat Dynamics and Bharat Electronics Limited (BEL). The Indo-Russian Brahmos supersonic cruise missile made in India by the joint venture (JV) ‘Brahmos Aerospace’ continues to find applications in various land, air and sea-based platforms and the Dhanush anti-aircraft missile too is being procured, both with different types of launchers developed and made by Larsen and Toubro (L&T). However, in sheer numbers, particularly of conventional battlefield missiles, there is a trend of preference for missiles from foreign OEMs

doctrine/zhenhuan.htm).

⁷ Laxman Kumar Behera, “Examining the US Defence Acquisition Apparatus: What can India Learn?”, *Journal of Defence Studies*, vol. 11, no. 4, Oct-Dec 2017, pp. 82-3 and ff.

especially from France and Israel, with several US systems also under consideration, while Russian missiles are becoming rare, such as the recent acquisition of the quite unique S-400 missile defence system.

A tussle between the army and DRDO has been seen over man-portable, Anti-Tank Guided Missiles (ATGM), with the army being dissatisfied with DRDO's-ATGM and preferring to acquire Israeli Rafael Spike ATGMs using its discretionary funds despite problems with its field trials.⁸ Nevertheless, DRDO continues to offer serious competition, and has entered into co-development and domestic manufacture programmes with foreign OEMs such as for the Israeli Barak 8 anti-aircraft missile, made by BEL.

The army continues to rely on Russian tanks, the DRDO's Arjun Main Battle Tank (MBT) not meeting its standards of weight and power despite recent induction of small numbers of an upgraded MK1-A version, and has recently ordered another 400 T-90s to bolster the existing tank fleet of 2,000 each of T-72s and T-90s.⁹

Acquisitions of artillery gun systems has seen a spurt recently, notably all made in India by private sector players. These orders come after a long gap due to ban on many foreign OEMs, and hesitancy in the acquisitions system in the wake of the 1980s Bofors scandal, all resulting in a distinct disadvantage vis-à-vis Pakistan's US-made artillery.

⁸ See Pradip R. Sagar, "Indian Army's decision to buy 'failed' missiles raises eyebrows", *The Week*, April 12, 2019 (available at <https://www.theweek.in/news/india/2019/04/12/exclusive-indian-army-decision-to-buy-failed-missiles-raises-eyebrows.html>); see also Franz-Stefan Gady, "India to Conduct Validation Trials of Israeli Anti-Tank Guided Missile", *The Diplomat*, September 26, 2018 (<https://thediplomat.com/2018/09/india-to-conduct-validation-trials-of-israeli-anti-tank-guided-missile/>).

⁹ Franz-Stefan Gady, "Indian Army Accepts Arjun MK1-A Main Battle Tank for Service", *The Diplomat*, February 20, 2019 (available at <https://thediplomat.com/2019/02/indian-army-accepts-arjun-mk1-a-main-battle-tank-for-service/>).

145 US-made M-777 towed guns were acquired from BAE Systems through the US Foreign Military Sales (FMS) programme, 25 imported and the rest made in India by Mahindra with ToT (transfer of technology), with the cost almost doubling since acquisition began in 2010. Orders have also been placed for 100 K-9 'Vajra' self-propelled artillery guns modified from South Korea's Samsung-Hanhwa K-9 Thunder and made in India by Larsen and Toubro (L&T) with 50 per cent indigenous content, India's largest private sector defence contract hitherto.

Indigenously developed guns too were acquired. Recent orders include 114 'Dhanush' towed long-range howitzers made by Ordnance Factory Board (OFB) based on ToT from Bofors during that infamous purchase, with orders up to 400 likely. Another order approved is for 150 Advanced Towed Artillery Gun System (ATAGS) developed by DRDO, with prototype development and production divided between Tata Power and Kalyani Group.

The INSAS (Indian Small Arms System) rifle developed by DRDO in the 1990s which faced much criticism was finally retired, being replaced by the Russian Kalashnikov-203 to be manufactured in India by OFB under ToT, highlighting weaknesses in indigenous weapons development.

AIR FORCE

The IAF has been facing dire shortages of fighters in a fleet comprising a bewildering mix of aircraft types posing logistical nightmares, all due to a long history of poor planning, *ad hoc* acquisitions, procurement delays and failures of indigenous development.

The IAF is down to a dangerous 33 squadrons compared to the sanctioned strength of 42 with the threat of going even lower due to impending retirements especially of legacy MiG-21, 23 and 27s. Major mid-life upgrades by Hindustan Aeronautics Limited (HAL) of the MiG-21 Bison, Jaguar strike aircraft and Mirage-2000

multi-role fighters have at least prolonged their effective service.

Major recent acquisitions have sought to address the above problems, besides modernizing the fleet especially with aircraft for specialized functions.

The Medium Multi-Role Combat Aircraft (MMRCA) tender for 126 aircraft was floated in 2007 after deliberation since 2001, envisaging an IAF fleet comprising three main aircraft types, the Sukhoi-30MKI air superiority fighters, the MMRCA for which the French Dassault Rafale had been selected, and the indigenous Light Combat Aircraft (LCA) Tejas. Approval for acquiring 126 Rafales, with 108 to be made in India by HAL through ToT, was inexplicably cancelled by PM Modi in 2015 and a mere 36 Rafales bought outright. Shockingly, a fresh process for acquiring 114 MRCA has been issued thereafter, with the same 6 contenders responding, exposing the completely dysfunctional and non-transparent character of the Defence Procurement Procedures (DPP).

Meanwhile, the much-delayed indigenous 4th generation LCA developed by DRDO since the mid-1980s and manufactured by HAL is finally entering service. Eighty LCA of different configurations have been ordered, likely to go up to 200 or more, with an accelerated production by HAL of 16 aircraft annually.

Another badly felt gap has been filled by outright purchase of 75 Pilatus PC-7 turbo-prop basic Trainers from Switzerland in 2012, and 123 Hawk-132 advanced jet Trainers from British Aerospace in 2008 of which 100 are being made in India by HAL. The gaps were due to the failure of HAL in timely development and delivery of its HTT-40 basic Trainer and the Intermediate jet Trainer (IJT) to replace the long-serving but retiring HAL Kiran Mk-II jet Trainers.

After the signing of the Indo-US Defence Framework Agreement in 2005, which opened up the doors for US military equipment sales to India after decades of technology denial and sanctions, several major deals were struck by India with the US.

The first lot of acquisitions included eight Boeing P8-I maritime reconnaissance and anti-submarine aircraft, 12 Lockheed Martin C-130J Super Hercules transport aircraft, and 11 Boeing C-17 Globemaster III heavy lift transporters. Deliveries are underway for the more recent acquisition of 15 Boeing CH-47F Chinook heavy lift helicopters and 22 Boeing Apache AH-64D attack helicopters, with options for 7 and 11 more respectively. At a total \$12 billion, these purchases catapulted the US from zero to India's second largest military supplier.

India procured mid-air refuelling tankers from Russia, the Phalcon airborne early-warning (AEW) system from Israel mounted on an IL-76 Russian transporter, and another DRDO-developed indigenous AEW system mounted on a Brazilian Embraer aircraft to replace the original sole indigenous prototype (a poor decision indeed) on board an HS-748 aircraft that unfortunately crashed, killing all crew on board.

Acquisitions of different types of helicopters are ongoing due to the imminent retirement of the French Alouette-HAL Cheetahs and Chetak. The long-awaited order for 196 light utility helicopters was finally awarded to the Russian Kamov-228 to be made in India by a 51-49 HAL-Russia Helicopters JV. Further orders of the HAL Dhruv Advanced Light Helicopters (ALH) in various configurations were also placed by the three Services.

NAVY

A big thrust is being given to develop a blue water navy towards expanding its reach from the African coast in the West to the Malacca Straits and beyond in the East, along with the wider Indian Ocean region. India has also added nuclear-armed submarines to its strategic land and air-based capabilities so as to complete the nuclear deterrence triad.

Modernization and enlargement of the naval fleet has been proceeding at good speed, although with several hiccups in

decision-making and acquisitions. On the positive side, naval equipment has seen far greater development of self-reliant indigenous capability than in the other Services, largely due to the relatively less complex technologies involved.

The navy plans to increase its fleet strength from 150 ships and submarines and 250 aircraft to 200 vessels and 500 aircraft. The Indian Navy also looks to expand vessel types and capabilities with increased emphasis on enhanced operational range, advanced technologies especially in networking, and strategic capabilities. Importantly, the Navy seeks to achieve these goals mostly through indigenous efforts, seeking transition from a bought-out to a locally developed and manufactured fleet.

Five new vessels have recently been acquired and another 36 are at different stages of manufacture mostly at DPSU shipyards. These include 11 project 17 and 17A frigates, 7 Project 15 and 15A guided missile destroyers with stealth features, anti-submarine corvettes and coast guard cutters.

India acquired the used USS Trenton landing platform dock (LPD) from the US, renamed *INS Jalashwa*, and is planning to indigenously build another two such vessels with foreign design collaboration.

Like the IAF, the navy experienced serious attrition of its submarine fleet from 21 in 1996 down to 13. India had failed to replace retired submarines, and was holding on by upgrading its 20-30-year-old Russian Kilo-class and German HDW submarines, the latter getting mired in a corruption scandal putting the entire submarine programme in limbo for several years. A programme to build French Scorpene submarines in India also got into procedural tangles for over ten years.

Eventually, a programme to build 6 diesel-powered Scorpene subs with stealth features through ToT from the French state-sector naval group (formerly DCNS) is underway as part of Project 75 at DPSU Mazagon Docks (MDL) with four submarines having been inducted to date.

The parallel and at one time hush-hush Rs 50,000 crore Project 75I (for India) has been launched to build 6 larger advanced diesel-powered attack subs, with air-independent propulsion to enable subs to stay submerged for extended periods and armed with Brahmos cruise missiles. Quotations have been invited from 6 foreign OEMs for design and manufacture in India under the “strategic partnership” programme.

Two diesel-powered Akula-class nuclear-capable submarines have been leased from Russia so as to operationalize this strategic capability and train future crews while the indigenous programme gathers momentum. The indigenously developed and built nuclear-powered and nuclear-capable ballistic missile submarine *Arihant* was inducted in 2016, while the second of the class *Arighat* is being outfitted. Two more subs are to be commissioned by 2024 and maybe another two after that under the Rs 90,000 crore Advanced Technology Vessel (ATV) programme at the navy shipbuilding yard in Vishakhapatnam with significant design contributions by L&T.

Enlargement of the aircraft carrier fleet, down to a single ageing carrier, is underway. India bought the retired Admiral Gorshkov from the Russian Navy in 2004 and inducted it in 2014 as the *INS Vikramaditya* after prolonged negotiations and extensive refurbishing at considerable expense.

India’s first indigenous carrier IAC-1, under a programme started in 1999, was launched in 2013, expecting to be inducted in 2021. Building of IAC-2 is ongoing.

ROLE OF FOREIGN OEMs

There were, and continue to be, several strands of efforts to redress the huge imbalance noted above between defence imports and indigenously developed defence equipment and technologies. Support to various R&D efforts by DRDO and DPSUs continues on a selective basis and, although India designed

and manufactured hardware have been placed top in the order of priority for procurement, there is no systematic plan to identify priority equipment or technologies for self-reliance. As a response, going back almost a decade to the DPP, but with a special thrust since DPP 2013, and later the flagship “Make in India” programme of the Modi government, there has been a vigorous push for domestic assembly or manufacture, but with a sharp and explicit preference for the private sector. The ostensible rationale for these DPP provisions is to “promote growth of the domestic defence industry” and that “self-reliance is a major corner-stone on which the military capability of any nation must rest. There is also immense potential to leverage the manpower and engineering capability within the country for attaining self-reliance in design, development and manufacturing in defence sector”.¹⁰ However, given the sector’s low level of experience and capability in defence manufacturing, a major role for foreign OEMs is seen as vital.

Complimenting this, a preference among sections of the Services and the bureaucracy for off-the-shelf equipment from foreign OEMs, especially from the West and Israel, has also been noticeable and cannot be wished away,¹¹ with manufacture in India by a private sector junior partner seen as the next best thing.

Various policy incentives have therefore been offered to foreign OEMs and collaborating private sector entities starting with loosening the state monopoly in defence, promoting FDI in defence including by foreign defence majors, and promoting “strategic partnerships” between foreign OEMs and Indian private players including JVs with the former. Offset obligations have also been steadily relaxed in favour of foreign OEMs. These measures have been incorporated into the DPP which have been suitably modified many times over the years. As a result, the entire policy frame encourages a dominant role for foreign OEMs, and

¹⁰ DPP 2016.

¹¹ See various blogs at *Security Wise* (<https://bharatkarnad.com/>) by Bharat Karnad.

increases dependence of the Indian defence industry on them; the very opposite of the goal of self-reliance. The problem is that much of this stems from a fundamental misunderstanding of what technological self-reliance means, and what measures are required to achieve it, and also flies in the face of ground realities.

FDI IN DEFENCE

In DPP 2001, a cap of 26 per cent FDI had been imposed for the defence sector. This was raised to 49 per cent under the automatic route under DPP 2006, with even up to 100 per cent permitted on case-by-case basis if “state-of-art” technologies are involved. Till that time, the only case of more than 26 per cent foreign participation, with special approval of the Cabinet Committee on Security (CCS), was the JV for the Brahmos supersonic cruise missile involving state-owned enterprises from both Russia and India with the former holding 49.5 per cent. The policy was further amended in July 2018 removing the condition of “state-of-art” technologies, and completely opening up FDI in defence under the approval route.¹²

The rationale advanced is that, if foreign OEMs are permitted larger stakes, they would be more comfortable bringing in advanced technologies, thus boosting indigenous capabilities. Supporters of the policy argue that, if India can import military hardware from foreign OEMs, there is no harm in allowing the same companies to set up even a fully-owned entity in India which, besides enabling domestic manufacture, also open up lucrative export prospects. This idea is succinctly summed up in an industrial policy document: “Defence industry is highly technology driven and capital intensive. Since it may take some time for domestic

¹² *Economic Times*, July 11, 2018 (available at <https://economictimes.indiatimes.com/news/defence/no-change-in-defence-fdi-limits-but-state-of-art-technology-not-needed-for-investments-over-49/articleshow/52843171.cms>).

companies to acquire a technical edge, it is important to consider . . . accessing the technology through the modality of allowing foreign companies to set up production bases/facilities within the country itself. Manufacturing within the country, through foreign capital, [supposedly] *with full transfer of state-of-the-art technology* will be a better option than importing the equipment from abroad (emphasis added).¹³

Both these ideas, namely that financial incentives will encourage foreign OEMs with advanced technologies to set up manufacturing bases in India, and that this will in turn facilitate absorption of such technologies into the domestic manufacturing industry,¹⁴ are completely erroneous.

The total control exercised by international corporations over proprietary advanced technologies, especially in defence, is well known. Foreign defence majors zealously protect their technologies and rarely set up manufacturing bases outside their home countries unless it is completely out of their control. Further, foreign, especially Western OEMs are already well positioned in the lucrative Indian military procurement market, and a domestic production base, which will necessarily have to be product-specific, may not provide much additional leverage. Exporting from a new production base in India is also not particularly advantageous compared to exporting from, say, USA or Europe, where home governments could provide additional leverage such as government-to-government deals, tie-ups through military alliances or foreign aid, etc. Manufacturing costs in India are not significantly lower, given poor infrastructure, lack of component and raw material supply chains, and an absence of high-technology industrial ecosystems. The big danger of course is that if foreign defence majors do indeed make major investments in India, they

¹³ Discussion Paper on FDI in Defence Sector, Department of Industrial Production & Policy (https://dipp.gov.in/sites/default/files/DiscussionPapers_17May2010%20%204.pdf).

¹⁴ Ibid.

will expect good, consistent and long-term returns and, therefore, press the government to keep placing fresh orders, and thus build a more-or-less permanent base in India.

In any case, as things stand today, the utter failure of the FDI policy is testified by the fact that total FDI in the Indian defence sector till now has been a meagre Rs 4,000 crore!¹⁵

OFFSETS

As per current DPP provisions, foreign OEMs are obliged to offset 30 per cent of the value of contracts worth more than Rs 2,000 crore by undertaking manufacturing or Services sub-contracts in India through Indian Offset Partners (IOP). In special cases, an even higher offset proportion of 50 per cent was imposed in the earlier DPP 2013, operative in the Rafale deal but now scaled back to 30 per cent in DPP 2016.

Contrary to the numerous objections to offsets provisions that these act as disincentives to foreign OEMs, such provisions are common around the world.¹⁶ In the Indian policy, “the key objective . . . is to leverage the capital acquisitions to develop Indian defence industry” by fostering competitive enterprises, enhancing defence R&D capacity, and helping “development of synergistic sectors like civil aerospace and internal security”.¹⁷

The complementary, but secondary, aim is to retain within India a significant portion of the contract amount that would otherwise entirely go abroad. However, the numerous modifications of the offset’s provisions since DPP 2005 raise questions about the

¹⁵ Secretary, Defence Production, Shri Ajay Kumar, quoted in an interview to *Economic Times* on January 10, 2019 (available at <https://economictimes.indiatimes.com/news/defence/indias-defence-exports-may-cross-rs-10000-crore-by-end-of-fy19-secretary-of-defence-production/articleshow/67591075.cms>).

¹⁶ See *Wikipedia* page for ‘Offset agreement’ (https://en.wikipedia.org/wiki/Offset_agreement).

¹⁷ DPP 2016, Defence Offsets Guidelines, Appendix-D to Chapter 2.

government's understanding of the main goal and what it entails, and have led to the secondary commercial goal becoming primary, which is completely neglected. This suits foreign OEMs who would rather part with some money than give away sensitive technologies.

From the outset, the offsets scheme has been under intense pressure from foreign OEMs and business lobbies to dilute its provisions, arguing that "onerous" offsets clauses are making it difficult for OEMs, leading to delays or even reluctance to bid by the best firms. Bowing to this pressure, each successive modification has further eased the offset obligations and rendered their technology acquisition goals more difficult to achieve.

The contract value threshold at which offsets kick in have been raised several times. While initially the offset activity was related to the product being acquired, thus promoting absorption of defence technologies, foreign OEMs were subsequently permitted to take up any activity towards even unrelated products or Services. In special cases, this may be justified and even useful, such as in the small-sized orders for specialized aircraft from Boeing in which offsets through part-manufacture in India makes little sense. Here Boeing is allowed to offset a part of the contract value by collaborating with an IOP to make aerostructure parts for the Boeing passenger aircraft. However, this provision has now come to be widely misused by foreign OEMs to evade transfer of technologies or related activities involving military technologies, instead undertaking innocuous activities having some commercial value but little or no technological significance. In the notorious Rafale deal, Dassault is to offset 50 per cent of the contract value, and its major IOP is the entirely inexperienced Reliance Aerostructure, headed by Anil Ambani, which is only going to make a few parts of Dassault's Falcon 2000 executive jet. Further, Dassault CEO, Éric Trappier, later changed the offsets arrangement, converting the Reliance Aero unit into a 49-51 JV with Dassault, asserting that Dassault would exercise full control over the technology there as

part of its own manufacturing ecosystem!¹⁸ So the entire logic of using offsets to leverage acquisition of technologies by India was simply tossed aside. To add insult to injury, the Indian government had no say in the matter, since DPP 2016 now allows the offsets contract to be signed and communicated to the government even up to 2 years *after completion of the contract*,¹⁹ and states that the OEM “will be free to select the IOP for implementing the offset obligation,”²⁰ in effect giving up any say as to how effective the offset will be for enabling technology absorption into the domestic defence industry. This exposes the utter futility to which the offsets scheme has been reduced.

Offsets have thus become yet another way in which foreign, especially Western, OEMs will soon create deep roots for themselves in the Indian defence industry, with little potential for absorption of technologies by Indian entities, thus perpetuating India’s dependence on these OEMs for vital defence hardware and technologies.

PROMOTING THE PRIVATE SECTOR

As noted earlier, a cornerstone of the present defence procurement policy is the prominence sought to be given to the private sector in India, especially in collaboration with foreign OEMs. The rationale, articulated in several policy documents, is that despite India having a large state-sector manufacturing and R&D infrastructure, India remains a major importer of defence equipment. It is argued that the private sector, with supposedly better efficiency and competitive impulse, can do better.²¹

¹⁸ See D. Raghunandan, “L’affaire Rafale”, *Frontline*, February 15, 2019 (available at <https://frontline.thehindu.com/the-nation/article26119691.ece>). Also see *Wikipedia* page for ‘Offset Agreement’.

¹⁹ “Period of discharge”, DPP 2016, Defence Offsets Guidelines, Para 5.2, p. 65.

²⁰ “Indian Offset Partner”, DPP 2016, Defence Offsets Guidelines, Para 4.3, p. 64.

²¹ See for instance Defence Production Policy 2018 (available at <https://>

The following paragraph in the preamble to the Strategic Partnership (SP) scheme of DPP 2016 perhaps best articulates this argument:

As with the liberalization of the Indian economy in the 1990s, active involvement of the private sector in the manufacturing of major defence equipment will have a transformational impact. It will serve to enhance competition, increase efficiencies, facilitate faster and more significant absorption of technology, create a tiered industrial ecosystem, ensure development of a wider skill base, trigger innovation, promote participation in global value chains as well as exports. From a strategic perspective, this will help reduce current dependence on imports and gradually ensure greater self-reliance and dependability of supplies essential to meet national security objectives.²²

All these arguments, stated as if they are proven facts, are actually a set of blanket assumptions, with no basis in ground reality in India. They also betray an utter lack of understanding of how the defence industry works, anywhere in the world, in the public or private sectors, and of the role of the State.

Since liberalization, the private sector in India has witnessed ever deeper involvement in the defence sector. Yet most private entities make relatively minor or technologically non-challenging products, or, where more advanced technologies are involved, undertake sub-contract work or make components or sub-assemblies for larger system integrators. At present, around 6,000 medium, small and micro enterprises (MSMEs) are today part

ddpmod.gov.in/sites/default/files/Draft%20Defence%20Production%20Policy%202018%20-%20for%20website.pdf).

²² “Revitalizing defence industrial ecosystem through strategic partnerships”, Para 2, Ministry of Defence document (available at <https://mod.gov.in/sites/default/files/Chapterdppn.pdf>).

of the defence industry supply chain, 800 being engaged with DRDO²³ and around 2,000 with HAL.²⁴ Many others supply stores and consumables such as clothing and gear to the Services.

Several MSMEs are emerging as important players in the defence sector, particularly in avionics, electronics, instruments and some speciality components. Even if they do not graduate to become system integrators or develop new products, they could still play important roles in the defence industry ecosystem.

The SP model, however, proposes to promote a select few large private sector entities, including JVs with foreign OEMs, to emerge as autonomous defence majors of scale and commensurate capability.

STRATEGIC PARTNERSHIP (SP) MODEL

The SP model in DPP 2016 has a specific and, earlier, exclusive focus on the private sector. However, under immense pressure from DPSUs and sections of the bureaucracy, the government has now grudgingly allowed DPSUs to also apply for SP projects. HAL, for instance, has applied for the Naval Utility Helicopters tender. But such moves are being strongly resisted by private sector lobbies who argue that this will thwart a level playing field and prevent emergence of strong private sector entities.²⁵

The SP model identifies four key military platforms to be

²³ Amit Cowshish, "Cabinet Decides to Redefine MSMEs", post at *IDSA Comment*, citing government data, March 13, 2018 (available at https://idsa.in/idsacomments/cabinet-decides-to-redefine-msmes-defence-sector-to-benefit_acowshish_130318).

²⁴ "To ensure Rs. 3000 crore orders, HAL plans to rope in more vendors", *Hindu Business Line*, updated January 20, 2018 (available at <https://www.thehindubusinessline.com/news/national/to-ensure-3000cr-projects-take-off-hal-plans-to-rope-in-more-vendors/article8402410.ece>).

²⁵ Laxman K. Behera, "An Assessment of the Strategic Partnership Model in Defence Industry", post at *IDSA Comment*, June 2, 2017 (available at https://idsa.in/idsacomments/strategic-partnership-model-in-defence-industry_lkbehera_020617).

taken up under it, namely fighter aircraft, helicopters, submarines, and armoured fighting vehicles including main battle tanks. For each, including sub-segments if required, one foreign OEM and only one domestic SP will be identified by the government so as to facilitate scale and expertise in that product or technology. The scheme clarifies that partners identified for a particular contract are not permanent, and may not be selected for the next contract in that segment.

However, creation of private sector monopolies is likely. The policy itself, as well as the tendency of serious players, will drive companies towards platform specialization and industry consolidation which in turn would tend to stifle competition, a major rationale for private sector participation. The US too has experienced the same, with accompanying drop in efficiency and rising costs, as in the 'joint strike fighter programme' involving Boeing and Lockheed Martin, which have created an aviation duopoly after each taking over many other companies. In an era of cronyism, there is also a good chance that preference for one or other local partner may influence selection of a particular OEM. For instance, Sweden's Saab Gripen may get selected for the 114 fighters tender because the government favours the Adani group, which has tied up with Saab. The scenario is ripe for new scams!

The more systemic danger is that big private sector entities will mount pressure on decision makers to place fresh orders after completion of earlier ones, arguing that their substantial investments would otherwise go waste, thus casting undue influence on acquisitions, choice of weapons platforms and, beyond that, on defence and foreign policy. This is what late US President Eisenhower once famously called the military-industrial complex and warned against! Given the long-term tie-ups being encouraged between private players and foreign OEMs, there is the added danger of foreign pressure groups becoming domestically entrenched, perpetuating external dependence and undermining strategic autonomy.

Finally, it is unclear how domestic private sector players would absorb technologies obtained through foreign OEM collaborations and thereby develop their own technological capabilities. The disappointment with DPSUs has precisely been their failure to develop such capabilities despite several decades of licensed production and ToT. Why or how will the Indian private sector be different, especially when the entire history of the private sector in India across industrial segments, from automobiles to white goods to electronics and cell phones, has been one of serial foreign collaborations and weak or non-existent development of Indian products and technologies?

Clearly, the answer cannot lie simply in transitioning from public to private sector, or just by promoting domestic manufacture of foreign OEM products, but must be sought in the more complex task of systematic planning for technology absorption and development of autonomous R&D capabilities, i.e. true self-reliance.

A brief look at major private sector players in defence would be useful.

MAJOR PRIVATE SECTOR PLAYERS

Tata Advanced Systems Limited (TASL), building on its engineering experience and capabilities, focuses on aviation and has collaborations or JVs with multiple foreign OEMs. TASL partners with Lockheed Martin to make cabins for Sikorsky S-92 helicopters, sub-assemblies for C-130 Hercules transporters, and wings for F-16 fighters, hoping also to bag the contract for the F-16/F-21 under the new 114 fighters tender. It also makes components for missiles and UAVs for Israeli Aerospace Industries (IAI) and aerostructures for Switzerland's Pilatus PC-12NG small passenger-cum-transport aircraft. TASL partners with Airbus for C-295 light transport aircraft, bagging the recent IAF order for

56 planes, 16 imported and 40 assembled in India. It is also into avionics and radar components.

Mahindra Group is into diverse dual use platforms, building on its strengths in heavy vehicles and engineering. Mahindra Defence has linked up with BAE Systems for land-based armaments. Mahindra Aerospace began by acquiring majority stakes in several Australian aviation firms such as Gippsland making GA200, GA8 Airvan and GA10 Airvan light aircraft, Aerostaff Australia making precision components for aviation OEMs, and Boeing Australia making various components. Mahindra is partnering with the National Aeronautical Laboratory (NAL), CSIR, to jointly develop the NM5, a 5-seater aircraft based on NAL's Hansa. Diversifying even further, it has tied up with a subsidiary of Italy's Finmeccanica (of Agusta Westland fame) for underwater naval systems.

Infrastructure and engineering giant Larsen and Toubro's, L&T Heavy Engineering has, over 30 years, acquired substantial product development and manufacturing capabilities in land, naval and airborne systems, missiles, submarines and military communications systems. L&T has made major contributions to design and construction of India's first nuclear powered submarine, the *Arihant*, and other naval platforms. It has developed its own anti-submarine weapons launcher system, has joined with DRDO to develop launchers for all Dhanush missile versions, and similarly made launchers for different applications of the Brahmos cruise missile. In India's largest private sector defence contract hitherto, L&T manufactures the Vajra self-propelled artillery guns based on the South Korean, Samsung-Hanhwa K-9 Thunder howitzer with 50 per cent indigenous content. L&T's towed artillery gun co-developed with France's Nexter is currently undergoing field trials with the army. While the critical firing systems of both guns have been developed and made by the OEMs, L&T has engineered the mobility systems. L&T has other collaborations with global OEMs, but prefers project-based arrangements to multiple JVs.

Kalyani Strategic Systems Limited (KSSL), a subsidiary of Bharat Forge, is another strong engineering firm foraying into defence, albeit with a different business model. KSSL builds on the group's core competence in forgings and heavy engineering, and prefers to build up from components and sub-contracts to system integration and products, with credentials of over 30 years as a component supplier. It has made ammunition, shells, rocket tubes, various vehicle wheels, transmission and body components for 'main battle tanks', etc. At a higher level, KSSL is collaborating with IAI (Israelis) for manufacture and maintenance of air defence systems and precision ammunition. With DRDO, it has co-developed Advanced Towed Artillery Guns along with Tata Power SED and is now awaiting manufacturing orders. It is also looking to manufacture gas turbine engines for helicopters and drones, while staying away from aerostructures and aerospace as being far from its core strengths.

Other wannabe major players in the defence sector are Anil Ambani's Reliance Defence, and Adani Defence, both known for their proximity to the Modi government. Both, however, highlight the perils of crony capitalism and non-transparent decision making in defence procurement. These are major worries surrounding private sector participation in defence production where manipulation, lobbying and influence over supposedly independent institutions are deep rooted, as exposed in the Rafale deal.

Adani Aero Defence Systems and Technologies (hereafter AAD) was set up with an eye on prospects in the burgeoning defence sector. Recognizing it had limited experience and infrastructure in advanced manufacturing, especially defence, a pre-condition for selection under the SP model, AAD sought to acquire these through strategic acquisitions and tie-ups. AAD bought Alpha Design Systems, Bengaluru, with niche capabilities in avionics and defence electronics. It set up a 51:49 JV with Israel's Elbit Systems to manufacture Hermes 900 medium altitude long endurance

(MALE) UAVs, and later the Hermes 450, becoming the first such facility outside Israel and the first private UAV manufacturer in India, aiming at both the global and Indian markets. A JV with US giant Rave Gears for making high-end gear trains for rotary aircraft including HAL helicopters has also been set up. AAD has an MoU with Saab of Sweden to make its Gripen fighter in India if it wins the new tender.

Anil Dhirubhai Ambani Group's (ADAG) Reliance Defence, inexplicably landed a major offsets contract in the Rafale deal with no prior experience or infrastructure in aviation or manufacturing. Reliance Defence made its entry in 2015 by acquiring the troubled Pipavav Shipyards with debts of over Rs 6,000 crore and serious delivery slippages. However, due to Pipavav's excellent infrastructure and Anil Ambani's clout, Reliance Defence continued getting major deals such as the prestigious US Navy contract for maintenance and repair of its Seventh Fleet vessels after India signed the LEMOA Indo-US logistics-sharing agreement. However, true to form, the company soon ran up more debts nearing Rs 9,000 crore prompting auditors to question its survivability. Pipavav ran afoul of the Indian Navy in 2017 for non-delivery of even one out of five Naval Off-Shore Patrol Vessels; ONGC cancelled orders for five long overdue off-shore support vessels, and was taken to the National Company Law Tribunal in 2018 for insolvency proceedings by its main lender IDBI Bank leading 23 lenders.²⁶ The navy and MoD were left with

²⁶ See Ajai Shukla, "Will defence ministry okay Anil Ambani's Reliance Naval?", *rediff.com*, September 2018 (available at <https://inwww.rediff.com/news/report/will-defence-ministry-okay-anil-ambanis-reliance-naval/20180928.htm>); Sagar, "Vendors unpaid at Reliance Shipyard", *Caravan*, November 17, 2018 (<https://caravanmagazine.in/business/reliance-shipyard-rajula-non-payment-vendors>); Maulik Vyas, Gopika Gopakumar, "IDBI Bank moves NCLT against Reliance Naval's Rs. 1,250 crore loan default", *Livemint*, September 6, 2018 (<https://www.livemint.com/Companies/5HFFIUIRoNhxdYu9g6dHM/IDBI-Bank-moves-NCLT-against-Reliance-Navals-1250-crore-1.html>); for detailed reporting of all

a mess, stuck on orders for 42 vessels of different types, unable to decide whether or not to drop the renamed Reliance Naval from consideration. Given the earlier bankruptcy of ABG Shipyards, several subsequent orders shifted back to public-sector shipyards.

Salient aspects of the private sector in defence production may now be summarized.

At the outset, the private sector *has* been involved in defence production for a long time, including in collaboration with DPSUs and DRDO. However, only a few serious entities have played creditable roles, and some have had a patchy record. The serious players have core competencies in some disciplines of engineering and manufacturing, with specializations relevant to defence platforms. However, some wannabes only looking to make quick profits and relying on political connections, have doubtful staying power and ability to deliver. Common to almost all private players is their dependence on foreign OEMs for technology. At the same time, given the expanding needs of the armed forces, and given capacity limitations of DPSUs and OFBs, competent private sector players can play a useful synergistic role in independent manufacture of some less complex equipment categories, or of components or sub-assemblies for system integration by DPSU/OFBs. Whether the private sector will have the stamina to sustain in the face of uncertain demand and develop autonomous system integration and product development capabilities may be assessed later.

THE STATE SECTOR

To recall, a major rationale for the big policy push the active promotion of the private sector in defence manufacturing has been the supposed failure of the state-sector, paving the way for import dependence. The previous section has shown that the idea,

these developments.

that the private sector, in collaboration with foreign OEMs, can better achieve the goal of self-reliance is completely mistaken. At the same time, this essay must squarely address the criticism of state-sector defence establishments, because if one does not acknowledge a problem one cannot tackle it.

DPSUs

India has nine large Defence PSUs, including four shipyards, all functioning under the Department of Defence Production (DoDP) of the MoD, and 41 ordnance factories (OF) under the OF Board (OFB) directly under the MoD. Besides these production facilities, with a little R&D done mainly by a few DPSUs, the DRDO functioning under the Department of Defence Research & Development (DoDRD) of the MoD has an extensive network of 50 laboratories covering different disciplines, and works with DPSUs, OFs and private sector industries for prototype development and manufacture.

The DPSUs were set up with the explicit aim of indigenous technology development and manufacture of high-end defence equipment, while the OFBs were to meet the requirements primarily of the army for tanks and armoured vehicles, hand-held weapons, other low-end equipment, ammunition and stores. DRDO was set up in 1958 specifically for R&D.

Those were the heydays of self-reliance, especially in the frontier areas of science and technology and core industries, which were retained in the state sector and seen as key to maintaining strategic autonomy. This policy perspective is often ascribed to so-called “Nehruvian socialism”, even though it was supported by major private industrial and commercial leaders in the so-called Bombay Plan of 1948, arguing that the private sector did not possess either capital or technological capability at that time. While atomic energy and space were accorded pride of place with full political backing, autonomy and their own institutions

for capacity building, the same strategy was unfortunately not followed in defence.

Nevertheless, self-reliant technology development in defence equipment was given considerable support in the 1950s and '60s. Many advanced weapons platforms were indeed developed and manufactured, providing a sound foundation for the future. The Services responded enthusiastically and used these indigenous equipments extensively, including in combat. There was considerable technology denial by Western powers, although some collaboration was extended by France and the UK among a few others through licensed production. The then Soviet Union extended far greater cooperation in military hardware, including in indigenization, and the Services and DPSUs naturally came to rely rather heavily on it. Whereas manufacturing capabilities improved steadily, if slowly, technology development did not take off as it should have.

A brief look at HAL, with perhaps the most advanced and diversified technological capabilities of the DPSUs, would help understand their strengths and weaknesses.

HAL took up licensed production of Britain's Folland Gnat fighter in the 1950s and '60s, and later made an upgraded version named Ajeet. More than 200 Gnats/Ajeets served the IAF creditably including in the 1965 and 1971 wars. HAL designed and manufactured the HT-2 basic Trainer and 190 of the highly successful HJT-16 "Kiran" Stage-II Jet Trainer which continued in service till the 1990s with upgrades. A major achievement was the design and manufacture of the HF-24 "Marut" fighter by HAL under a team led by the famous German Second World War designer Kurt Tank. Unfortunately, the HF-24 never achieved its supersonic or other capabilities due to its low powered British engine for which a substitute was never obtained probably due to Western technology denial. Nevertheless, 147 HF-24 were made and also saw action although in limited ground-attack roles.

HAL has manufactured more than 2,000 aircraft but, with the

exception of the above, most have been produced under license from foreign OEMs such as the Anglo-French Jaguar, the Mirage 2000 from France's Dassault, which also underwent a major upgrade at HAL, several versions of Alouette Helicopters from Aerospatiale of France (renamed Chetak and Cheetah), besides various MiG models such as the IAF's workhorse MiG-21 and the upgraded MiG-21 Bison, MiG 23, 27 and 29, and more than 200 Sukhoi 30MKI air superiority fighters, the mainstay of the IAF today, which is made by HAL from the raw material stage. Other manufacturing ongoing are of Hawk-132 Advanced Jet Trainers (AJT) under license from British Aerospace, Kamov-228 light utility helicopters through a HAL-Russian Helicopters JV, and DRDO's indigenous Light Combat Aircraft (LCA) "Tejas". Even if some private sector firms undertook some projects through ToT, it would take them years to acquire the capabilities of HAL in aviation.

It should be noted, however, that DPSUs and OFs have had low productivity throughout, said to be only a quarter that of their Western counterparts.²⁷ This has resulted in consistently higher costs and delivery times than imported hardware which decision makers, and user Services, earlier grudgingly accepted for the sake of indigenization but increasingly protest against. For instance, HAL had stipulated their requirement for 2.7 times the manpower used by Dassault for making the Rafale.²⁸ Part of the problem is that machinery and infrastructure in DPSUs and OFs require modernization, for which at least the 41 factories of the OFB were

²⁷ Laxman K. Behera, "Indian Defence Industry: A Reform Agenda", in *Defence Reforms: A National Imperative*, edited by Gurmeet Kanwal and Neha Kohli, New Delhi: IDSA/Pentagon Press, 2018, p. 182 (also available at <https://www.brookings.edu/wp-content/uploads/2018/04/book-defence-reform-3.pdf>).

²⁸ "Performance Audit Report of Comptroller & Auditor General on Capital Acquisitions in Indian Air Force", Union Government (Defence Services), Air Force, Report No. 3, 2019 (hereafter CAG Rafale Report), p. 125.

sanctioned Rs 15,000 crores for the 12th plan period.²⁹ DPSUs would be well advised to reinvest some of their profits in updating their machinery. A long-standing problem of work culture also needs looking into.

However, after that initial creative period, Services have seen little technology absorption and further advances of in-house design capability, despite impressive licensed production. Today, this has become a serious problem for HAL and indeed for most DPSUs.

This is starkly revealed in Trainers. When the HT-2 basic Trainers and Kiran jet Trainers retired, HAL had not developed successors in time. HAL's HPT-32 first flew in early 1977 and production commenced in 1984 through the early 1990s, with around 120 aircraft delivered to the IAF and the navy. But the plane had serious flaws. Seventeen aircraft crashed over the years killing 19 pilots. Many pilots were being trained directly on the few Kirans still in service and quickly moved to the challenging MiG 21, leading to many MiG crashes and further loss of precious young lives. In 2009, all HPT-32s were grounded. With the next successor nowhere in sight, the IAF procured 75 Pilatus PC-7 Mk II Trainers from Switzerland. HAL's new basic Trainer, the turbo-prop HTT-40, has now finally made progress after many hiccups and the IAF is said to have placed orders for 106 Trainers, although it is likely to also procure additional Pilatus Trainers, reportedly at half the price!

HAL's development of an Intermediate Jet Trainer (IJT) HPT-36 as successor to the now retired HJT-16 Kiran Mk II Trainer has also been way behind schedule. Design work began in 1997 and prototype development in 1999. Flight tests in 2003-04 showed the aircraft to be underpowered and HAL replaced the

²⁹ Ajai Shukla, "MoD's massive Rs 15,000-cr upgrade for ordnance factories", *Business Standard*, April 8, 2013 (available at https://www.business-standard.com/article/companies/mod-s-massive-rs-15-000-cr-upgrade-for-ordnance-factories-113040800018_1.html).

Turbomeca engine with the Russian NPO Saturn AL-55/I engine. After further delays and crashes of the prototypes, flight tests resumed in 2009, but the aircraft continued to experience serious problems with stability and in vital spin characteristics. After several modifications based on international consultancy inputs, the aircraft flew satisfactorily in April 2019. Orders from the IAF may be expected after obtaining full operational clearance (FOC) which may still take many months.

Due to these inordinate delays, the IAF's entire Trainer fleet today is regrettably of foreign origin.

R&D capability has been problematic in all DPSUs. The combined R&D spending by the nine DPSUs in 2014-15 was only five per cent of their turnover, with most of this in HAL and BEL, with all others spending less than one per cent. The OFs performed even worse with R&D at around 0.5 per cent,³⁰ although more should not be expected given their production orientation. The French electronics company, Thales, spends around 20 per cent of its turnover on R&D, compared with the best Indian R&D performer, BEL, spending only 8.3 per cent of its turnover on R&D a few years ago,³¹ but still the highest among the DPSUs. Consequently, BEL generates 54 per cent of total turnover from its own indigenously developed products, again highest among DPSUs, with 81 per cent coming from other indigenously developed products from DRDO and other state-sector labs.³²

HAL has performed better in R&D with helicopters. HAL developed the Dhruv Advanced Light Helicopter (ALH) with design assistance from German firm MBB and has made over 200 with many variants for the army, navy and civilian agencies. An attack helicopter with high-altitude capability, the Light

³⁰ Behera, "Indian Defence Industry".

³¹ Laxman K. Behera, "Defence Innovation in India: The Fault Lines", IDSA Occasional Papers No. 32, pp. 31-2 (available at https://idsa.in/system/files/OP_DefenceInnovationInIndia.pdf).

³² *Ibid.*, p. 29.

Combat Helicopter (LCH), has been developed as per the army's requirement and more than 114 have been delivered to the army and 65 to the IAF. The engine too, named Ardiden in France and Shakti in India, has been co-developed with France's Turbomeca by adapting its earlier engine. All this capability and experience has enabled HAL to establish a strong autonomous presence in the helicopter segment.

DRDO

DRDO labs cover multiple disciplines such as aeronautics, armaments, electronics, land combat engineering, life sciences, materials, missiles, and naval systems. Tasked specifically with R&D, they have no production facilities or responsibilities, which are left to DPSUs, OFs and some private entities. Yet, the success rate of DRDO in their mandated task of product development has been indifferent, despite numerous R&D projects taken up. There are many contributing factors and mitigating circumstances, but they do not alter this broad assessment.

The most notable successes of DRDO have been from the Integrated Guided Missile Development Programme (IGMDP) started in 1983 for development of long, medium and short-range missiles, and which was incorporated into the DRDO family later. Strategic weapons systems are approached by DRDO, the government and the armed forces very differently from other defence projects, we shall not discuss them further in this article. However, it should be noted that, apart from the Brahmos supersonic cruise missile co-developed with Russia, DRDO has not had the same success with tactical missile systems such as air-to-air, ship or land-based air defence, missile defence and other missile systems, most of which are today being sourced from Israel, France or Russia in multi-billion dollar imports or collaborative domestic manufacture deals. Some recent successes have been achieved with Israeli co-development of Long-Range Surface to

Air Missiles (LR-SAM or Barak 8) and the man-portable Anti-Tank Guided Missile (ATGM) systems although the army has preferred to import Israel's Spike ATGM, despite its failure in desert summer conditions.

Other major weapons systems from the DRDO stable include the Main Battle Tank sanctioned in 1974, the Tejas LCA fighter started in 1983, the INSAS rifle, the indigenous Airborne Early Warning (AEW) System, and a host of radar, communications and Electronic Warfare (EW) systems contributed independently, or along with BEL or HAL. All these programmes have come under often quite severe criticism, for huge cost- and time-overruns and quality issues, much of which is at least partly justified as evidenced by continued imports in such systems.

Development of the INSAS rifle to replace Second World War vintage arms started in the mid-1980s and was completed in 1990, but mass production commenced only in 1997, and ammunition still had to be acquired from Israel. Its deployment during the Kargil conflict revealed many problems leading to a Parliamentary Committee commenting on its poor quality.³³ It was finally retired in 2018, but an upgraded version is still awaited and a successor has not yet been developed. It is now being replaced by the Swiss Sig Sauer and the Russian AK-203 to be manufactured under license by OFs.

The Arjun MBT has also had a chequered history since its inception in the early 1980s. It has been rated by the army as too heavy and under-powered. Despite many modifications by DRDO and the Avadi Heavy Vehicles Factory, the tanks showed multiple problems in transmission and targeting but nevertheless received orders for 124 tanks. An improved Arjun Mk1-A was belatedly accepted by the army in February 2019 and 118 tanks ordered. A

³³ For a detailed account of problems with the INSAS Rifle adapted from the AK-47, see Amit Bhardwaj, "INSAS, the desi Kalashnikov that wasn't", *Newslandry*, October 4, 2016 (available at <https://www.newslandry.com/2016/10/04/insas-the-desi-kalashnikov-that-wasnt>).

further improved Mk2 version is also expected soon. Meanwhile, the mainstay remains the T-90 series of tanks from Russia and the Ukraine of which several thousand are in service.³⁴

These clear weaknesses of DRDO in R&D and failure to develop new products has severely hampered self-reliance in defence and led to dependence on foreign OEMs. The situation is extremely serious and urgently calls for remedial action.

OTHER WEAKNESSES

Self-reliance has been hampered in other significant ways too. A high-level committee headed by the then scientific advisor to MoD, A.P.J. Abdul Kalam, recommended in 2005 that an indigenous content of 70 per cent should be maintained in procurement and production of defence equipment. A study by the Institute of Defence & Strategic Analysis (IDSA) in 2013 estimated that indigenous content of only 40 per cent had been achieved in the period 2006-07 to 2010-11.³⁵ Since that period, the quantum of bought-out items from foreign OEMs has shot up dramatically, with indigenous content dropping even further.

Even when equipment is developed and made in India, there are massive “indirect arms imports”³⁶ in the form of imported raw materials, parts and components which are not available domestically, again indicating serious gaps in the domestic defence industry, whether private or public sector, and the absence of efforts to fill these gaps. It is estimated that in 2011-15, a huge amount of over Rs 60,000 crore was spent in foreign exchange by

³⁴ Franz-Stefan Gady, “Indian Army Accepts Arjun MK1-A Main Battle Tank for Service”.

³⁵ See Laxman K. Behera, “Indian Defence Industry: Issues of Self-reliance”, IDSA Monograph Series No. 21, July 2013 (available at <https://idsa.in/system/files/monograph21.pdf>); Behera, “Indian Defence Industry”, p. 181 and ff.

³⁶ Behera, “Indian Defence Industry”, pp. 181-2.

the DPSUs showing continuing heavy import dependency.³⁷

There are numerous factors influencing these weaknesses in the DPSUs, OFs and DRDO with respect to both R&D and manufacturing. Several major committees have gone into at least some of these factors and have made important suggestions to improve self-reliance in defence equipment. Most of these, alas, have been ignored or shelved, leaving the state-sector defence R&D and manufacturing apparatus to their own *ad hoc* measures, with no concerted effort to address its structural problems.

Clearly, a complete restructuring of institutions and processes is required to give a new fillip and orientation to indigenous defence R&D and linked manufacturing. Based on current and foreseeable capabilities, it may be presumed that the state sector would continue to play a major role in R&D and future planning, while a few private sector engineering companies with relevant core competencies may also play important roles in co-development, especially of sub-systems and speciality items. When indigenous design-development of major weapons systems accelerates, private sector entities will have extensive and increasingly complex roles to play in the manufacturing ecosystem, since the state-sector DPSUs including shipyards and OFs will alone be unable to cope with the demand.

TOWARDS A SELF-RELIANT DEFENCE INDUSTRY

We may now draw together the discussions so far, and also briefly take into account other major uncovered aspects, so as to draw some major conclusions and pointers for future action.

WEAKNESSES IN R&D

It is evident that both DRDO and DPSUs have weaknesses in R&D

³⁷ Ibid.

which urgently need rectification so as to reduce dependence on imports, but in a structured manner to bring about a fundamental change in R&D culture and outcomes – a massive and long-term task. Some elements may be delineated.

Synergies need to be built between DPSUs, DRDO and other national laboratories and institutions, especially through collaborative R&D programmes, with oversight by expert bodies under the Department of Defence Production (DoDP) including full participation of the user Service(s).

This could also help overcome the artificial separation of R&D from production in India, a strange departure from international practice, which accentuates the tendency of research institutions in India to function in silos, and has been a major problem with the LCA, MBT and Scorpene submarine projects. The lack of experience of the OFs and some DPSUs in technology development, which some describe as “not speaking in R&D language”,³⁸ make the transition from prototypes to production difficult. DRDO projects too have suffered from the absence of in-house production experience, a problem dating back to the very creation of DRDO in 1958.³⁹

R&D capabilities can also be enhanced by obtaining specialized inputs through consultancies from external agencies, as seen above, but earlier in the technology development cycle rather than as a fire-fighting method.

Self-initiated in-house R&D projects by DPSUs without necessarily waiting for a fully government approved and funded R&D programme are important, including for dual-use equipment, which could generate commercially viable products. For example, HAL has missed out on several opportunities, such as the basic Trainers, successors to the Avro 748 transporters, and the medium transport aircraft (MTA) project with Russian collaboration which was unwisely dropped, all of which have potentially significant

³⁸ Ibid.

³⁹ Ibid.; see pp. 187-8 for a historical analysis of this problem.

domestic and export markets. Brazil's Embraer and Canada's Bombardier have demonstrated this strategy successfully with several niche products. DPSUs could well draw on their own profits for such R&D projects, with government helping by not demanding high dividends.

PLANNING R&D AND EQUIPMENT NEEDS

A huge stumbling block for indigenous technology development has been the absence of an institutional mechanism to decide on R&D programmes with a militarily and technologically strategic outlook. DPSUs being mainly production oriented, develop platforms based on specific near-term demands from the Services. DRDO being R&D oriented has taken on longer-term projects but, with lack of proper planning, has an unfortunate history of taking on and abandoning many R&D projects, as critically observed by CAG and parliamentary committees.⁴⁰

Current attempts at delineating R&D projects are simply too *ad hoc*. Long-Term Perspective Plans (LTPP), and their short- and medium-term derivatives, drawn up by the respective Service Headquarters (SHQ) are not informed by a rigorous appreciation of technological trends and research needs. Identified projects under the "Make" category of DPP 2016⁴¹ are too few, and a random mix of short-term needs and futuristic platforms. The Defence Production Policy 2018, is a long wish list covering almost all categories of weapons systems from battleships to fighter aircraft to small arms, with a wildly over-optimistic goal of indigenous design, development and production by 2025!⁴² For these reasons, these ideas have not been discussed in detail

⁴⁰ Behera, "Defence Innovation in India", p. 26.

⁴¹ "Potential 'Make' Projects", Department of Defence Production, Ministry of Defence, Government of India, updated March 30, 2017.

⁴² See Raghu, "New Defence Production Policy: Alice in Wonderland", *Peoples Democracy*, June 5, 2018.

in this essay, but interested readers may delve into them further at references provided.

Instead, planned missions for military platforms and filling critical technology gaps are necessary, conceptualized with a long-term vision through institutionalized multi-stakeholder mechanisms. Institutional frameworks in the US, UK and France may serve as exemplars and for best practices. The historical disconnect in India between hardware procurement and the goal of self-reliance can also be overcome in this manner and must be built into such a mechanism.

ROLE OF THE SERVICES

The role of the Services in procurement and drawing up specifications for the same, the all-important General Staff Quality Requirements (GSQR) of respective Services, has come in for much criticism from different quarters over the years.⁴³ Several experts have noted that although DRDO and other specialist agencies are expected to vet and add value to GSQRs, these leave much to be desired in terms of how effectively they guide procurement choices or technology development, and the extent to which they reflect current and foreseeable technological trends.⁴⁴ SQRs have often been modified mid-way through procurement, and are often wishful in nature or far too specific, adding to the confusion and customary delays in India's acquisitions, as also recently observed by CAG in the MMRCA acquisition process.⁴⁵ There is clearly a problem regarding domain knowledge and technical proficiency of Services personnel and institutions regarding defence hardware,

⁴³ Mahendra Prasad, "GSQRs: Need to Address Gaps in Formulation", post at *IDS Comment*, December 19, 2011 (available at https://idsa.in/idsacomments/GeneralStaffQualitativeRequirementsGSQRs_mprasad_191211).

⁴⁴ *Ibid.*

⁴⁵ CAG Rafale Report.

and also importance in formulating R&D programmes.⁴⁶

There are also disturbing indications of bias against indigenous products among sections of the Services, also seen in the use of SQRs as a means to underplay their merits vis-à-vis imported products.⁴⁷ Examples cited by experts include SQRs for OFB's ill-fated Ishapore Rifles which apparently no gun in the world could match, or SQRs for the Arjun MBT which had eight stringent parameters while those for Russian T-90s gave far more leeway, and delays caused by many IAF complaints and extraneous suggestions regarding the LCA leading to further delays as pointed out by CAG.⁴⁸ Some of this may be a reaction to poor quality and delivery delays by DPSUs, OFs or DRDO, but it may also simply reflect blind preference for foreign hardware, the "west in best" syndrome, as often lamented by these agencies, or even occasionally due to unsavoury reasons as alleged by others.

On the other hand, there is also a very unfortunate ambivalence in the civilian bureaucracy, the political class, and among technocrats in the DPSUs and DRDO regarding the role of the Services in defence procurement and indigenous R&D. Whereas there is acknowledgement of their vital stake and knowledge in current military hardware, there is also a perception that the Services would push their subjective preferences and are impatient with procedures. Various stratagems are therefore adopted to reduce the importance of the Services in relevant decision making. This meshes with a tendency in the body politic to deny the Services their due place in national security strategy and planning, contrary to the practice in comparable countries, in the name of civilian control of the military. Grievances of the Services about their "second class" status even in defence matters, has reached unhealthy levels.

The Services need to be fully integrated into planning and

⁴⁶ Ibid.

⁴⁷ Behera, "Indian Defence Industry", p. 187.

⁴⁸ Ibid.

decision-making structures and processes for acquisition and indigenous development of defence equipment. These should be fully multi-stakeholder mechanisms with a clearly articulated goal of suitably equipping and modernizing the armed forces while maximizing self-reliance in indigenous technology and manufacturing capability.

INSTITUTIONAL STRUCTURES & PROCESSES

Finally, institutional arrangements and processes need to be evolved to achieve the goals spelled out above.

There is currently no structured process or institutional mechanism for planning and identifying indigenous R&D projects or developing long-term plans for technology acquisition. Classification of acquisitions into various categories such as through outright purchase, collaboration with domestic production and technology transfer, or indigenous development are done by a 'categorization committee', under the DPP in a rather *ad hoc* and exigent manner. In fact, the Rafale fiasco reveals the dysfunctional and opaque character of the DPP process when its earlier well-considered decision of over 14 years regarding numbers of fighters, and need for manufacture in India with ToT, were abruptly and arbitrarily changed by executive fiat, and the latter's decision subsequently rubber-stamped retroactively. (This essay has not discussed the DPP at any length because it seems not to be worth the paper it is written on.)

Besides the separation of R&D from production noted earlier, the separation of the procurement process from indigenous production and R&D too has caused enormous harm. It has impaired the integrity of the procurement system and especially the cause of self-reliance and an autonomous domestic manufacturing ecosystem. Several committees and experts have pointed to this fundamental flaw and have even suggested remedial actions

which, however, have not seen the light of day.⁴⁹

Some have rightly pointed out that, in the Indian system, “procurement” has come to mean “import” as the default option.⁵⁰ DPP 2013 tried to address this by prioritizing the manufacture of at least a part of the order in India through ToT, and DPP 2016 went a step further by introducing the “Buy and Make Indian Designed, Developed and Manufactured” or “Buy & Make (IDDM)” as a new category with the highest priority.

But such measures will mean little unless the system conceptualizes and plans indigenous R&D, domestic production and other procurement in an integrated and technologically strategic manner. Most advanced countries in fact have just such systems. France, for example, has a powerful and horizontally integrated Direction générale de l’armement (roughly translated as Directorate General of Armaments) under the defence ministry with responsibility for major indigenous R&D and weapons development, external procurement, as well as testing. The DGA brings together civilian and military technological, industrial and financial experts, the military experts being mostly graduates of state-run military engineering colleges and drawn from the specialized military engineering service. The DGA also oversees major weapons development programmes and coordinates with domestic industry, including many state-sector production units, as well as with export customers. France today has one of Europe’s most successful and technologically advanced military technology ecosystems with a proud history of indigenously developed weapons systems.⁵¹

In India, however, efforts to move towards such an integrated structure have been stymied. Even in its early days, the then chief

⁴⁹ Behera, “Indian Defence Industry”, pp. 187-8.

⁵⁰ *Ibid.*, p. 187.

⁵¹ *Ibid.*, p. 188; and *Wikipedia* page for ‘Direction générale de l’armement’ (https://en.wikipedia.org/wiki/Direction_g%C3%A9n%C3%A9rale_de_l%27armement).

controller of DRDO had recommended a merger with DPSUs, initially accepted by government, but strongly resisted by the DRDO and the then new scientific advisor to MoD, seeking to protect its high technocratic status unsullied by shop-floor grime.⁵² The painstaking 2005 Kelkar Committee Report on Defence Acquisition, drew a detailed programme for indigenous R&D involving DRDO, DPSUs, OFs and private sector players, but the report only gathered dust.⁵³ One expert notes that “although a mere brick wall separates the offices of the director general (acquisition) and secretary (defence production), the two are yet to find common ground . . . [and] it is primarily because of the inherent conflicts of interest between these two high offices that the domestic industry has not received the necessary attention it deserves”.⁵⁴

It is high time, India moves in the right direction, and, for the long-term good of the nation and its armed forces, takes concerted steps to restore self-reliance to its rightful centrality in the defence procurement system.

⁵² Behera, “Indian Defence Industry”, p. 187 and ff.

⁵³ Kelkar Committee Report on Defence Acquisitions, 2005 (available at <https://xaam.org/kelkar-committee-report-on-defence/?print=pdf>); see also Behera, “Indian Defence Industry”, pp. 187-8.

⁵⁴ Behera, “Indian Defence Industry”, p. 187.