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Defence and Technology: India's Indigenization Drive for Self-Reliance

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'We will win future wars through indigenous weapons.'

– Late CDS, General Bipin Rawat

Abstract: In this paper, I will discuss science and technology innovation and its application in the Indian defence sector to achieve self-sufficiency and reduce defence imports. I plan to research India's indigenization and how it affects the defence forces' ability to manage the country's security.

Furthermore, this study will examine India's indigenization drive in the defence sector and assess how critical it is to become self-sufficient in this sector. What are the impediments to India's dream of defence self-reliance? My core point is that India's defence sector Indigenization strategy is the key to strategic stability. This would improve our internal and external security, but only if the right mix of critical technology, research, and development, the military-industrial complex, a vibrant and robust scientific community, particularly among military scientists, institutional reforms, and policy initiatives are in place.

Keywords: *Self-sufficiency, Innovation in the defence Sector, Indigenization, Make in India Plan, Integrated Guided Missile Development Programme (IGMDP)*

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Introduction:

The origins of the war are frequently found in human brains. However, military strategies are determined by strategic calculations and technological advancements. The advancement of science and technology has spawned new types of combat and transformed warfare modes. The first world war was dubbed the 'chemist war,' while the second world war, with the introduction of nuclear weapons, was dubbed the 'physicist war.' (Deshingksr,1983). Artificial intelligence and space technology are predicted to guide future wars. Long before China and other major powers, powerful countries such as America began developing a substantial military-industrial complex and technology. Industrial production has won previous global wars, but military research and technology are

expected to win the next one. As a result, the goal is to succeed in military technology to outsmart the competition. This sparked a never-ending weapons race, not against any specific adversary but the existing quo. For example, the new America 2022 Draft National Defence Strategy stresses research and development investments. By investing in artificial intelligence, hypersonic weapons, non-kinetic missiles, and other sophisticated capabilities, it hopes to prepare US soldiers for future wars against Russia and China. (Scowcroft Centre,2022)

India's superpower ambitions are a significant influence on her defence self-reliance. The increasing complexity of security problems in India's neighbourhood and the need to protect national interests necessitate India's robust defence capabilities development. However, the country's defense procurement was primarily reliant on imports in the past.

Indigenization: What is It?

Since 1947, India has followed a phased approach to indigenization: phase one was agriculture, phase two was automobiles, phase three was information and communication technology, phase four was healthcare and biotechnology, phase five was space, where India made significant progress, and phase six was a defence to ensure the state's security. Indigenization of technology is making things based on plans and materials supplied by a foreign producer while also adapting technological know-how to allow for future adjustments or redesigning. Defence production was entirely under public sector undertakings under India's mixed economy.

One of the first such projects was India's F-INSAS programme, which provided state-of-the-art equipment to its infantry in 2005. Similarly, the HAL *Tejas*, a light combat aircraft, was the first single-engine fighter plane made entirely in India. *Tejas* was the face of the government's "**Make in India**" initiative. These measures are being made to ensure that the military can stay up with the levels of other military forces; nonetheless, India's reliance on military imports will continue for some time, making complete indigenization impossible shortly.

The giant Chinese treachery in 1962 prompted India to beef up its defence capabilities. This resulted in an increase in defence spending to 2.3 percent of GDP. Other factors that aided India's indigenization were global political instability, the US embargo on arms imports during the 1965 Indo-Pak War, and the aftermath of the 1998 nuclear tests. As a result, India became dependent on Russia. However, India's dependence on defense equipment shifted its defense industrialization strategy towards indigenously developed production, especially after the United States imposed sanctions on Russia.

India spends about 4% of its GDP on defence. Increased import dependency increases the budget deficit. China, Pakistan, and the non- and unpredictable strategic environment in South Asia pose many dangers to India. India's indigenization plan in the 1980s was driven by a desire to acquire strategic autonomy, safeguard its porous borders, increase self-reliance, create jobs in the defence industry, export to other nations, and, above all, cut its fiscal deficit. The threat of US sanctions under Counter America's Adversaries Through Sanctions Act (CAATSA) weighs big over India's plan to purchase Russian Federation's S-400 Surface-to-Air Missiles (SAM). (ORF,2021). The United States and India had already inked an agreement to allow for the secure transfer of secret essential defence technology.

The 'Make in India' plan was introduced in 2014 to boost India's manufacturing prowess and create more job opportunities. The primary purpose of this programme was to encourage the indigenization of technologies such as electronics, information, and communication technology, defence, space, and transportation.

Through indigenization, the India's defence industry aims to:

- manufacturing of cutting-edge sensors
- systems of weapons,
- platforms and related equipment for the Indian military.

Indigenization in the Defence Sector: History

In 1983, the Integrated Guided Missile Development Program (IGMDP) was established to develop five missile systems.

The Agni series includes the Prithvi (surface-to-surface), Akash (surface-to-air), Trishul (naval version of Prithvi), Nag (anti-tank), and Agni ballistic missiles. In 1990, A.P.J. Abdul Kalam-led Self-Reliance Review Committee (SRRV) announced a ten-year plan in which the self-reliance index (SRI) (defined as the percentage share of indigenous content in total procurement spend) was to be increased from 30% in 1992-1993 to 70% by 2005. However, domestic initiatives were insufficient. As a result, co-development and co-production with overseas enterprises were conducted. In 1998, an intergovernmental agreement for developing and manufacturing the Brahmos supersonic cruise missile was inked with Russia. Later, India formed alliances with Israel, the United States, and France. India has collaborated on several such initiatives collaborating with Israel, France, Russia, and others.

Measures Taken by the Government Recently

The government has implemented several policy initiatives and reforms to boost defence industrial self-sufficiency. These policy measures aim to promote domestic design and research, innovation, and manufacturing of defence equipment in the country, minimizing long-term reliance on imports. Important policy measures and reforms are outlined in Raksha Rajya Mantri Shri Ajay Bhatt's Information delivered on February 4, 2022. (MoD,2022)

The Defence Acquisition Procedure 2020 reflects the spirit of the 'Aatmanirbharta,' which was declared as part of the 'Aatmanirbhar Bharat Abhiyan.' In September 2020, the Ministry of Defence issued the Defence Acquisition Procedure 2020 to streamline the procurement process and enhance indigenous armaments manufacturing. The new policy replaced the 2016 Defence Procurement Procedure.

Indigenously built, crafted, and manufactured category preferred indigenous designed defensive infrastructure, assembles, and weapons.

MoD issued a 'First Positive Indigenisation list' of 101 products on August 21, 2020. A second such 'Positive Indigenisation list' of 108 items was made on 31 May 2021, for which a ban on imports for the deadlines mentioned has been imposed. This is a significant step toward indigenization in the defence industry. The Indian defence sector will utilize its indigenous technology and building capabilities to cater to needs geared for Indian Armed Forces. The Second Indigenisation List for 108 products was published in June 2021.

What is the Third List, and What Does It Mean?

Light Weight Tanks, Mounted Arty Gun Systems, Next Generation Offshore Patrol Vessels (NGOPV), and other highly complicated systems, sensors, weapons, and ammunition are included in the third list.

From December 2022 through December 2027, these weapons and systems are expected to be indigenized in stages. According to the Defense Acquisition Procedure (DAP) 2020, these 101 goods will now be bought from local vendors.

On December 27, 2021, the government published a Positive Indigenization list of DPSU sub-systems, assemblies, sub-assemblies, and components. The list includes 2,500 goods that have already been indigenized and 351 items that would face an embargo on import beyond the dates specified.

The capital procurement 'Make' programme has been streamlined to develop private players to design, develop, and manufacture defence items, principally for import substitution. The government would subsidize 70% of development costs for indigenous businesses in the Make-I category. MSMEs would be promoted in the 'Make in India' scheme.

An 'Indian vendor,' according to DAP 2020, is what is managed and run by Indians and has less than 49 percent foreign direct investment (FDI). It encourages more indigenous content in military procurements of weaponry and equipment, including equipment made in India.DAP-2020 mandates a 10% increase in indigenization above DPP 2016 in most acquisition categories.

The import embargo products, including a hundred products, will be implemented until December 2025. An embargo is an order of the government which bans trade or the exchange of the listed things with foreign exporters.

Make-I (government-funded): Make-I is working on big-ticket platforms like light tanks and communication devices that adhere to Indian security regulations.

Make-II (Industry Funded): Projects in the 'Make-II' category will involve prototype development of equipment/ system/ platform or upgrades, or their subsystems/ sub-assembly/assemblies/ components, mainly for import substitution/innovative solutions, with no government assistance.

Make-III (Indigenously Made): This category includes military hardware that is neither designed nor developed in India but can be manufactured to reduce imports. Indian companies may work with foreign partners to manufacture these items.

Defence Industrial Corridors: A defence corridor is a road or path along which domestic defence equipment manufactured by the public sector, private sector, and MSMEs are lined up to improve the defence forces' operational capacity. The government has developed two Defence Industrial Corridors. The Tamil Nadu Defence Industrial Corridor was established in 2019.

Chennai, Tiruchirappalli, Coimbatore, Salem, and Hosur are included. It will build manufacturing units and encourage testing and certification facilities, export promotion, and technology transfer, among other things.

Aligarh, Agra, Kanpur, Chitrakoot, Jhansi, and Lucknow would be the six nodes of the Uttar Pradesh Defence Industrial Corridor. It seeks to establish the state as one of the world's largest and most advanced defence production hubs.

Ordnance Factory Boards Corporatization: As part of a significant defence sector reform, the Ordnance Factory Board (OFB) has created seven new defence businesses. The fundamental goal of these efforts is to increase the efficiency of the units' operations and the quality and competitiveness of the end products. The OFB, which reports directly to the Ministry of Defense, has been unable to generate revenues.

The Defence India Startup Challenge (DISC) aims to assist startups, SMEs, and innovators in developing prototypes and commercializing items in managing India's defence. The Ministry of Defence has launched it in collaboration with the Atal Innovation Mission.

MoD has come up with a draught Defence Production and Export Promotion Policy 2020 (DPEPP 2020) to achieve the target of one lakh seventy fie thousand crores by 2025, including exports worth thirty-five thousand crores in goods and services meant for the Aerospace and industry.

The mission of *Raksha Gyan Shakti* was established in 2018 to improve the indigenous defence industry's Intellectual Property Rights (IPR) culture.

'Make-II' category (industry-funded) was introduced in DPP 2016 and included several industry-friendly provisions such as relaxed eligibility criteria, minimal documentation, etc.

The Indian government has increased FDI in the defence sector to seventy-four percent through the Automatic Route for companies needing new defence industrial licences and to a hundred percent through the government mechanism when it is expected to result in access to current technologies. (Singh,2022)

In April 2018, the Defence Department created the Innovations for Defence Excellence (iDEX) ecosystem. iDEX aims to encourage defence and aerospace industries by engaging industries such as MSMEs, start-ups, individual innovators, R&D institutes, and academia and providing them with grants/funding and different kinds of support.

SRIJAN, an indigenization platform for DPSUs/Services with an industry interface, was launched in August 2020 to promote MSMEs, etc., for import substitution. So far, the portal has shown 18023 Defence products that were previously imported. Three thousand eight hundred twenty-six things have piqued the curiosity of the Indian industry. Three thousand one hundred ninety of them have already become indigenous.

The 'Offset portal' was established in 2019 to ensure a transparent and accountable system. DAP 2020 includes reforms to offset policy, focusing on investment and transferring technology for manufacturing. (Kaushik,2022)

In May 2017, the government announced the Strategic Partnership Model, which calls for durable collaborations with Indian entities by teaming up with the Original Equipment Manufacturers to establish a supply and manufacturing chain in India in the domestic defence sector.

In March 2019, a 'Plan of indigenization of components and spares used in Defence Platforms' was introduced to create an industry capable of indigenizing imported components.

Achievements:

The INS Vikrant, also known as Indigenous Aircraft Carrier 1 (IAC-1), is the Indian Navy's novel aircraft carrier.

India successfully tested indigenously designed and manufactured loitering munitions at 15,000 feet on April 11, 2022. (they are a combination of a surface-to-surface missile and a drone.) Ladakh's Nubravalley attacks radar stations, air defence systems, communication centres, and dynamic targets. (FP,2022) These munitions are among those on the "no-import list," They are 40% less expensive than foreign systems. In April 2022, HELINA, another Indian-developed anti-tank guided missile, successfully tested flight at a high altitude. After the HAL Marut, the Tejas is Hindustan Aeronautics Limited's second indigenously developed aircraft. In 2017, the Indian Navy launched Project-seventy five (India), the "mother of all underwater defence accords," to develop six modern stealth submarines. With other countries' help. Mazagon Dock Limited built Indian Naval ships wherein French company DCNS designed them. (IAS clear,2022)

However, it cannot deploy for an extended period and requires better development due to a lack of fuel. The integrated guided missile development program began in 1983; AGNI V granted India the recognition of ICBM owner nation years after that.

The AGNI V, Dhanush, Nirbhaya, Prithvi, and Akash missiles are products of indigenization of the defence industry. Armament Research Development Establishment created the Pinaka Multi Barrel Rocket Launcher (Pune). The contribution of India is a meagre 50.5 percent, and the share of Russia is 49.5 percent. Arjun Tank is a DRDO-developed 3rd generation main combat tank. To minimize weight, the DRDO is experimenting with composites. (VIF,2022) According to SIPRI (India News,2022), India's arms imports dropped 33% between 2011 and 2016-20 after the country took steps to reduce its reliance on imported military gear.

Policy on 5th Science, Technology, and Innovation (STIP)

In 2020, the Indian government posted the draught of the 5th National Science, Technology, and Innovation Policy for public comment:

Technology Indigenization for Atmanirbhar Bharat shall be implemented in tandem to achieve self-sufficiency in the economy. Technology development will be approached in two ways: (a) developing indigenous technologies and (b) adopting imported technologies.

Diffusion and Defence of Technology

Another argument for military technological advancement is that of technology dispersion. Military R&D has various effects on civil technological development: Military R&D money may be used to support organizations or researchers involved in activities that promote civilian innovation, such as universities. Spending on the acquisition by the military has the potential to raise demand for technologies.

Because the existing technology base is used to build innovations, it can produce knowledge and new technologies that influence overall growth. (Schmid,2017)

Indigenization also boosts the country's scientific and technology levels. When we gain technological dependence and autonomy, research and development accelerate, encouraging diverse institutes to take on additional initiatives in the name of innovation. This promotes both technological innovation and economic prosperity.

As stated in Article 51 A (h), one of our essential responsibilities is to foster a scientific mindset and spirit of inquiry throughout the country. Indigenization is a natural antecedent to the country's scientific and technological advancement.

Indigenization Roadblocks in India

Deficiency in defence planning is one of the numerous issues facing India's indigenization drive. Institutional ability is lacking. There is a shortage of infrastructure. Besides, there is a lack of a dispute resolution body to handle disputes. Also, there are restrictions on the purchase of land.

'India's powerful defence PSUs face numerous problems,' according to Dhruva Jaishankar; the armed services provide unachievable requirements, the Ministry of Defense lacks expertise, the Finance Ministry restricts spending, and the executive does not have the finesse to make appropriate decisions. To overcome these many issues, efforts should be made to ensure long-term predictability.' (Jaishankar,2019)

India has made some progress in creating its missiles. However, India's DRDO has yet to produce a single realistic SAM capability equal to the S-400 in the air defence realm. Despite the DRDO's claims, it may still be subject to additional testing before deployment in tackling enemies and weaning dependence on overseas suppliers. (0RF,2021)

Furthermore, the military's R & D is limited. In India, the army is still regarded as a strictly military organization. Armed forces in the twenty-first century can no longer play a supportive role as simply technology users; they must change into technology developers. (ORF,2022)

The absence of an overarching organization to channel the efforts of multiple agencies towards a pre-defined aim is the second reason. The Indigenisation Directorates of the Services, the DRDO, the OFB, and the Defence PSUs are currently involved in these initiatives, although they are mostly disconnected and lack coordination.

Initially, during the 1950s, India was able to promote indigenization through ToT (technology transfer), in which foreign supplier corporations transferred technology to enable the buyer to produce defence systems. Many trading practices are restricted under such agreements. Furthermore, several export limitations, such as those imposed by the unfair regimes like the Missile Technology Control Regime, the NSG (Nuclear Suppliers Group), and the NPT, obstruct technology transfers. Such technology transfer agreements also come with conditions that may jeopardize the country's strategic autonomy.

Some Indigenously Developed Systems

AGNI V

TEJAS

Prithvi Air Defence- India's Ballistic missile defence Shield.

India's Ballistic Missile Defence Shield is known as Prithvi Air Defence.

Source: Indian Defence News

Conclusion:

The defence forces have been allocated Rs 1,17,400 crore for the year 2022. At least 68 percent of the funds must purchase indigenous weapons. Different uniform spending targets have been established. The Indian Navy has been assigned to allocate 70% of its overall budget.

The Air Force will commit to spending 62 percent of its budget on domestic purchases (Samata, 2022). The Indian Army would be compelled to spend 75-76 percent of its allocated capital on indigenous purchases.

India's defence indigenization plan is a bold initiative that addresses a critical need for defence reform. India's reliance on defence imports cannot be reduced to zero overnight; it will take time. Indigenization does not necessarily equate to cost reductions, particularly in developing specific alloys and critical technologies that do not have economies of scale. Priority would be given to the indigenization of components, sub-assemblies, and assemblies that may be produced in India at a lower cost than importing the same product. Because such goods do not typically account for a significant part of the technologies used to create a high-tech product, the amount of indigenous content in various defence products remains modest. This is only one of many concerns that need to be addressed at the policy level.

At the very least, a broad network of efforts has begun. So, with proper policy implementation and the removal of impediments, we will achieve defence reliability over time. Repair and maintenance costs would be low for indigenously-built electronic equipment utilizing imported equipment. Apart from the strategic advantage of having immediate and direct access to a local manufacturer and his support network, it also has the advantage of being easily upgraded. Indigenization in defence will improve the country's scientific development and R & D, and vice versa. As a result, it is no longer a choice but a necessity. Only time will tell how many more decades are required. We will have to continue importing for our immediate defence needs because we cannot risk our security to achieve self-reliance. Because of the combustible nature of India's surroundings and sensitive security issues, we need self-reliance first. It is a far-fetched but not unattainable dream to be able to not only create self-sufficiency in managing our defence but also to export our indigenously produced defence equipment and weapon systems to other countries.

'We dream of a day when India is completely self-reliant in defence production & exports defence equipment worldwide.'

PM Narendra Modi

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