Defence Industrialisation in Developing Countries: An Analysis of India

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Abstract

All nations strive to achieve self-sufficiency in the development and production of military hardware to attain strategic independence and enhance their standing within the community of nations. While India is experiencing economic growth and exercising considerable diplomatic influence, it remains the third-largest importer of military equipment, a factor that could hinder its aspirations to become a major global power. Despite numerous initiatives such as 'Make in India', self-reliance in defence production remains an elusive goal. This study examines the shortcomings in India's defence production and proposes a roadmap to achieve selfreliance in defence manufacturing by adopting industry best practices aligned with strategic concerns and desired defence policies. The article offers recommendations to assist developing countries, including India, in accelerating their efforts to achieve genuine self-sufficiency in defence production.

Introduction

The state is responsible for maintaining national security, and to achieve that, it needs a strong military, which can only be sustained if the state develops and manufactures the weapons and equipment it needs.¹ In addition to the security concerns, developing nations' pursuits for self-reliance are also motivated by

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power, wealth and prestige.² Power to exert control over other countries, wealth resulting from exports, helping technology spread to other industries, and prestige due to a confluence of circumstances, namely improving diplomatic and economic connections and technical advancements. A nation cannot be heavily reliant on foreign armament supplies if it hopes to be regarded as one of the great nations, as this not only reduces its military vulnerabilities also undermines its national power by curtailing its freedom of action.³

However, for the developing countries, the defence industry presents a formidable challenge; it requires higher than average technological competence and a steep learning curve,⁴ which often acts as a significant barrier to entry.⁵ Defence products are complex systems unlike mass-produced goods, requiring mastery of production capabilities, system design, project management, system engineering and integration.⁶ Regardless of the challenges faced, developing countries continue their efforts and build capabilities with support of foreign partners and indigenous breakthroughs.⁷

India's pursuit of achieving self-reliance in arms development and production has been a long-cherished dream since its independence. It invested heavily in the creation of a Defence Industrial Base (DIB) comprising a mix of Defence Public Sector Undertakings (DPSUs), Ordnance Factories and the Defence Research and Development Organisation.⁸ India continues to focus on developing its DIB by supporting a number of long-term weapons development programs⁹, irrespective of the fact that many such earlier attempts lacked the quality when compared to similar products available in international markets.¹⁰ To further self-reliance agenda, a slew of measures has been taken by the government, which include amongst many, increased participation of the Indian private sector, small and medium enterprises, and including tapping into the start-up ecosystem.

Even after continued focus, support and investment, the DPSUs and the private companies have not been able to successfully provide the arms needed by the Indian defence forces, severely impacting the self-reliance goals of the government.¹¹ Faced with this reality, India has been forced to follow a middle path by continuing direct imports of high-technology advanced weapons with simultaneous sourcing of low-technology and mass-

produced products via domestic production, supplemented by licensed production. The indigenous component is primarily focussed on the production of spares, upgrades and life extensions, while direct imports of main equipment and associated technologies are used to fill critical gaps, along with projects wherein indigenous programs have failed.¹² India remains the largest importer of major arms between 2018 and 2022, accounting for 11.0 per cent of the global market (Figure 1) with its arms exports share being less than 1.0 per cent (Figure 2).



Figure 1: Market share in the import of major arms between 2018 and 2022

Source: Statista, 2023

Indian Policy Domain

The official policy domain on the subject in India is strewn with committee papers, directives, annual reports, and answers to parliamentary questions. The degree of information contained in each varies depending on the context, reference and relevance. The Defence Procurement Procedures (DPP)/Defence Acquisition Procedures (DAP) lay out the guidelines for capital acquisitions for the armed forces. Figure 3 provides and overview of the major reports and policy documents along with the key recommendations from 1991 to 2023, which have influenced shaping of the Indian DIB.



Figure 2: Market share of the leading exporters of major weapons between 2018 and 2022

Source: Statista 2023

Industrial Policy 1991	Self-reliance goal Investment I R&D Licence for defence industries FDI allowed Technology and foreign consultant allowed Made a mention of private sector in defence sector for					
	better competition, but preserve the sector for DPSUs					
Group of Ministers Report 2000/01	• Defence management needs to be efficient, resilient and responsive					
	 Dysfunction amongst DPSU, DRDO and users 					
	No synergy between academic research and government					
	Government policy making happens in vacuum					
	 Recommended-level playing field to private sector, push for defence exports and technology assessments within the country 					
Kargil Committee Report 2005	 Encourage private sector in defence manufacturing Use defence offsets to get technology and investment in the sector 					
	• Synergy between DRDO, DPSUs and OFB for hi-tech capability					
	 Armed forces to form a 15-year acquisition plan to be shared with industry 					
	Private sector to be treated at par with DPSUs					
	• Participation of SMEs in defence manufacturing to be increased					
	• Defence R&D to be done by both DRDO and private industry					
	• Defence offsets to be utilised					

Sisodia Committee Report 2007	Domestic defence industry should be involved from the beginning to be able to map what capability industry has and what needs to Jbe acquired from abroad Cost-benefit analysis to be undertaken for all indigenous development projects				
	Industry should be involved in Requirement-Formulation				
	 Department of Defence production to also look after private defence companies in addition to DPSUs 				
	Defence industrialisation Policy to be formulated				
	Strategy for defence exports				
Defence Procurement Procedures	DPP 2002 DPP 2005 DPP 2006 DPP 2008 DPP 2011 DPP 2013 DPP 2016 DAP 2020 DAP 2020 (Update 2021, 2023, 2024)				
Miscellaneous Policies	 FDI limit 74 per cent under automatic route and 100 per cent with government approval Security Instruction for Licenced Defence Companies Defence Export promotion Policy – Munition list and dual use products Use of government test facilities by private defence companies allowed Innovation for defence excellence. Start-up challenge Policy for Indigenisation and Spares and Components used in defence platforms Positive lists for indigenisation 				

Figure 3

Innovation Ecosystem

For a better knowledge of any country's innovation processes and invention ecosystem, patent analysis has been widely employed.¹³ Data from patents shows funding for research and development and, most crucially, forecasts future technological advancement.¹⁴ In order to achieve this, the study looked at two patent databases: The World Intellectual Property Organisation (WIPO) and the Organisation for Economic Co-operation and Development (OECD). The former has been used to examine the patents filed in technology domain. To better visualise the statistics and compare India's situation with established and emerging nations, China and US's data have been presented alongside those of India (Figure 4a). India has the lowest number of patent files overall (Figure 4a) and in emerging technologies (Figure 4c), from 2000 to 2021.



Figure 4a: Total Number of Patents Filed by India, China and US



Figure 4b: Total Number of Patents Filed by China in Emerging Technologies from Year 2000 to 2019



Figure 4c: Total Number of Patents Filed by India in Emerging Technologies from 2000 to 2019

Source¹⁵

In the military domain, referring to the International Patent Classification, section F: Classifications F41 A to J and F42 B to D are for military products. The OECD database from 1999 to 2017 (Figure 5), shows total number of patents filed by India. The data is indicates that the total number of patents filed by Indians in military field remained quite low from 1999 to 2017.

Reference Date Patents office & Patents Families			es	Priority Date Patent Application Filed under PCT															
				Inventor (s)'s country (ies) of residence															
Country	Country				India														
Unit	Country				Number 2017														
Unit					Num	ber,	2017												
FEA	1.1	88	88		80		60	88		- 00	85		- 80	88	88	80	1	00	
145		80	88	00	80	88	88	60	88	68	80		80	88	88	60		60	82
FEC		88	- 88	88	80	85	00	60		- 68	85		80		88	00		00	
ref.		88	88	00	80	88		60	-	88	u	42	60	88	88	00		68	88
F#6		86	80	83	60	88	66	60	60	68	80	60	80	68	18	60		00	15
Feb		60	88	00	10	62	68	60	18	10	\$7	10	80	10	86	18	1	63	13
Feu		88	88	83	80	88	0.0	60	68	00	80		88	88	10	10		08	80
F43	00	60	80	88	00	00	65	60		00	62		60	87	87	00		10	88
FCC		88	80	88	80	88	88	60	88	40	80		80	00	83	10		00	80
FØ	80	88	80	88	80	88	00	80			83		80	83	88	00		28	88
41a FUNCTION ARMS OR 41b WEAPON OTHERWIS 41c SMALL AI 41f APPARATI ROCKETS 41g WEAPON 41h ARMOUR; 41j TARGETS; 42b EXPLOSIV 42c AMMUNITI 42d BLASTING	IAL FEATURE ORDNANCE FOR PROJEC SE PROVODE US FOR LAUN OR TORPED SIGHTS; AIMI ARMOUR TUP TARGET RAI E CHARGES ON FUZES	S OR [5] TING D FOF DLS O NCHIN DES; NG RETS NGES; eg FO	DETA MISSII R RIFI G PRC HARPC ; ARM BULE R BL/	ILS C LES V DJECT DON C IORED T CAT	OMMO VITHO ILES (GUNS O OR A FCHER G; FIR	N TO UT US DR MI ARMEC S EWOR	BOTH E OF SSILE D VEHI RKS; A	SMA EXPL S FRC CLES	IL AR OSIVE M BA MEA	MS AI	ND OF COMB S eg (IDNAN USTIB CANNO	ICE eq LE PF DNS (\$	3 CAN ROPEL SMALL	NONS LANT ARM	: MOU CHAF S F41	NTING RGE: V C0; L/	S FOI VEAPC AUNCE E IN C	R SMALL
Figure 5: Total Number of Patent Filed by India in																			

Figure 5: Total Number of Patent Filed by India in Weapons Category from 1999 to 2017

Source: Organisation for Economic Co-operation and Development

(Fractional counts applied for patents with multiple inventors/applicants: When a patent was invented by several inventors from different countries, the respective contributions of each country is taken into account. This is done in order to eliminate multiple counting of such patents)

Offsets

Offsets are a term used by the military to describe a kind of countertrade that involves commercial technological partnerships, involving licensed manufacture, knowledge transfer, skill development, training, and other forms of industry involvement, subcontracts, etc., that are connected to the procurement of a specific weapon.¹⁶ In India, direct offsets were first introduced as a policy in the DPP 2005 and were meant to act as a catalyst for India's attempt towards self-reliance in defence production. The policy compelled foreign arms manufacturers to source or invest 30.0 per cent of the value of purchased goods (in 'Buy' and 'Buy and Make' categorisations, where value of purchase exceeded INR 300 Cr, which was subsequently increased to INR 2,000 Cr) from Indian industries.

Even though they are a politically sensible strategy, offsets fall short of expectations. Data and economic theory both contradict the idea that offset agreements boost the economies of the importing nations.¹⁷ The benefits of offsets as a component of a developing country's acquisition and industrial policy have also been analysed by many researchers, wherein, more or less it has been generally concluded that, while raising the price of purchase, offsets have not been shown to be advantageous.¹⁸ The expense of the defence equipment supplier meeting its offset commitments will be passed on to the customer in the form of increased costs. On the other hand, the military industries of buying nations will become offset reliant and, if the contract expires, find themselves unable to handle new prospects and a competitive market.¹⁹ Due to the fact that offsets cannot, on their own, overcome structural shortcomings and human resource limitations of the receiving nation, they have failed producers in their attempts to rise to the level of system-wide self-sufficiency and have failed to build a single global military firm.20

Defence offset experience in India has not been positive. The Standing Committee on Defence of Parliament noted that, after reviewing offsets since 2005, 56 offset contracts totalling around USD 13.03 bn were signed between 2008 and 2027. However, only USD 88 mn of these had been authenticated as of 2017, but by 2021, that number had risen to USD 1,928 mn. Only USD 1,928 mn of the entire USD 3,569 mn in offsets that overseas suppliers claimed to have discharged have been approved by the audit. The early findings of the Controller and Auditors General of India's study on the 'Management of Defence Offsets' point to a terrible state of affairs in terms of offset conceptualisation and execution. It emphasises the policy's incapacity to obtain cuttingedge military technology or, at the very least, production capabilities. The research highlights the Ministry of Defence's inefficiencies, excessive red tape, and lack of qualified employees, while highlighting the fact that, there has been no technology transfer or investment in Research and Development (R&D).²¹

Foreign Direct Investment (FDI)

The term FDI refers to cross-border investments where a resident of one nation buys stock in a firm that is situated in a different country.²² In addition to supplying desperately needed finance, FDI also permits the transfer of beneficial technology and knowhow, which boosts the local economy.²³ FDI was not authorised in the defence industry until 2001, after which 26.0 per cent of it was granted via an automatic process.²⁴ The primary motivation for allowing FDI in the defence industry was that it would entice international suppliers to import technologies, enhancing domestic defence production.²⁵ The FDI ceiling has continuously increased since 2001 and is now 74.0 per cent via the automatic method and 100.0 per cent with government permission.²⁶

Increase of the FDI limit by India has not had the desired effect, as its inflow in defence sector remains almost negligible when compared to other sectors. Figure 6 provides the cumulative and year-wise FDI in the defence sector from year 2005 to 2020. Even after raising the cap to 74.0 per cent, the abysmally low FDI has contradicted the reasons offered by the Kelkar committee and even industry organisations, who anticipated fast improvement.²⁷

Year	Cumulative		FDI in the	
(December)	from year	\$ Millions	year	Remarks
2005	1991	0	0	FDI limit 26%
2006	1991	0.05	0.05	
2007	2000	0.05	0	
2008	2000	0.15	0.1	
2009	2000	0.15	0	
2010	2000	0.05	-0.1	
2011	2000	3.72	3.67	
2012	2000	4.12	0.4	
2013	2000	4.94	0.82	
2014	2000	4.94	0	
2015	2000	5.02	0.08	
2016	2000	5.12	0.1	FDI limit increased to 49%
2017	2000	5.12	0	
2018	2000	7.26	2.14	
2019	2000	8.82	1.56	
2020	2000	10.15	1.33	FDI limit increased to 74%
2021	2000	10.15	0	
Total			10.15	

Figure 6: FDI inflow Defence Sector

Source²⁸

Defence Industrial Policy

India does not have a Defence Industrial Policy (DIP), and the policy guidelines are interwoven in the defence acquisition procedures. Even after repeated recommendations by various committees including the Sisodia Committee²⁹, Government of India has not promulgated a separate DIP. While India strives to have a credible DIB, it must be built around a policy which considers a wide range of factors, including size, ownership, structure, and most significantly, a R&D foundation. Any defence industrial policy must be guided by industrial base capabilities, military requirements, and best value for taxpayers. The goal is to create a sustainable environment that consistently meets stated security objectives.³⁰ The defence industrial policy has to formulated in the context of strengthening military capabilities versus supporting international competitiveness in the face of liberalising markets.³¹

Figure 7a and 7b demonstrate how different DPPs have affected India's export and import of weapons as well as the overall number of military licences given to Indian firms. The analysis indicates that there has not been much of an impact on the ground from frequent modifications to the DPP and its related industrial policies. The defence exports have remained very low, defence imports have remained very high and the number of defence industrial licenses issued have not shown any significant increase. Furthermore, only 30.0 per cent of companies which have received license have commenced production. Also, measuring impact in terms of offsets, of the total of USD 13.03 bn offsets signed since 2008 onwards, only 14.7 per cent (USD 1.928 bn) have been verified.



Figure 7a: Defence Exports and Imports (in \$ millions) issued from 2001 to 2018.



Figure 7b: Total defence Industrial licenses

Source – Gol DPIIT website³²;

Total licenses issued till 2021 are 539 to 333 companies

(Source - Rajya Sabha un-starred question no. 669 answered on 26 Jul 2021)

Analysis

It is amply clear that India's quest to create a credible DIB by India has not had the desired result. The majority of India's efforts at indigenisation are driven by foreign acquisition. Additionally, a severely distorted, uneven playground has been created as a result of the acquisition policy's recurrent revisions (once every two years), which were implemented with practically no impact assessment studies. Considering procurement timelines of at least five years for any major procurement, this translates to a minimum of two DPPs per acquisition. Maintaining continuity of policy between inception to acquisition is important as it displays coherence of purpose, process and method³³, thereby, reducing uncertainty, costs and risks for both foreign Original Equipment Manufacturers (OEMs) and local industry.

Additionally, large high-ticket purchases are being made through Inter-Government Agreements, which bypasses the strict requirements of local involvement and indigenisation content in the DAP that any Indian business or its foreign partner must follow. The fact that most of these purchases, involving Government-to-Government contracts, are allocated to the DPSUs, further demoralises local businesses, like the recently concluded contract for local production of AK-203 rifles from Russia, being manufactured via the Ordnance Factory. As a result, the DPSUs continue to dominate the Indian defence manufacturing sector, making it difficult for any indigenous companies to compete. A healthy, impartial defence manufacturing ecosystem is a crucial part of the nation's DIB, 'For' the state and not 'Of' the state.³⁴

The acquisition policy outlines the steps for what to purchase, how to acquire it, and whom to buy it from, but it completely ignores the cost-benefit analysis of such choices. It is difficult to establish defence industrial autarky, especially when considering the financial burden it places on the country. An investment in defence results in a reduction of funds available for welfare, health, and education, each of which directly impacts voting behaviour, particularly within a democratic system. India's aspiration for defence manufacturing self-sufficiency is unique, as it disregards economic factors. The procurement categorisation decisions (Buy, Buy and Make or Make) are based on indigenous capability development rather than financial logic (short and long term). It is necessary to re-evaluate the defence industrialisation process with a more pragmatic and selective approach. All defence-related choices should be managed effectively, with a cost-benefit analysis taking into account both the short- and long-term effects, and through the lens of affordability.35

Although FDI is a crucial instrument for integrating the economies of different countries, it is driven by the need for profits for the investment company. Any company engaging in FDI would be in competition with local companies; thus, unless the investing company is given an edge over local competitors, it will not participate. Furthermore, in India's FDI policy, there is a difference in objectives between the government and foreign manufacturers regarding technology transfer and support for local industry. While technology acquisition is one of the key goals of India's FDI strategy, OEMs wish to preserve this area, as the result of costly R&D, technology grants the OEM exclusivity and control, which are lost, if it is sold or parted with.³⁶ Further, the 'Make in India' strategy and the new Defence Acquisition Procedures (DAP)³⁷ give priority to local acquisition. This further, discourages

international OEMs from investing in India as a result of this excessively proclaimed favouritism towards local industry, which raises the risks associated with their investment.

A nation's pursuit of achieving self-sufficiency in the defence manufacturing industry must be supported by a well-defined DIP. When examined in isolation, procurement decisions may seem advantageous for a specific acquisition; however, only when they are considered within the context of a larger DIP framework, can their implications and chances of success for the nation's goal of achieving autarky be evaluated, along with any justifications for deviating from the best course, if applicable.³⁸

India's attempt to employ offsets has failed; yet, they have continued to rule India's acquisition landscape since 2005. The refusal to recognise the issue and conduct an effect study of the policy has further denied users of an evidence-based solution that might have modified the policy in accordance with the changing dynamics and demands of the nation.³⁹ India's aspirations to become self-sufficient are being hampered by the MoD's unwillingness to conduct an offset audit and its continued practise of restricting data access to academics. India's offset policy undoubtedly requires reform, but without comprehensive data and rigorous analysis, achieving this will be challenging.

Conclusion

Developing nations aspiring to establish a reliable DIB must carefully balance their immediate demands with current industrial capabilities, future needs, and available funding, considering all these factors over the long term. Short-term, poorly conceived actions and policies, implemented without qualitative data and analysis, will not only result in financial losses but also extend the timeline for achieving genuine self-sufficiency in the defence manufacturing industry. It is essential for developing nations to formulate a coordinated strategy that integrates cross-domain capabilities with policy continuity. Achieving self-reliance in defence manufacturing carries an economic cost, making affordability and the efficient management of available resources critical. Any national strategy aimed at promoting defence indigenisation must be rooted in a robust policy framework that fosters close collaboration with the private sector to build an ecosystem of innovation and sustainability.

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