

# Dynamics of Indian Defence Technology: Indianisation, Indigenisation, Industrialisation, Integration

Venkat Bharathan and Arun Sahgal \*

*The philosophy of approach toward military technology is based on purpose, vision, relevance, efficiency and performance. Being Indian in content is what needs to be added to the above! Sixty four years down the line, four battle engagements later, our defence technology story is one of unexpected miracles and unacceptable failures. It is in above context that a holistic understanding of the foundation on which the edifice of the defence industrial base of India needs to be progressively pillared becomes imperative?*

### Curtain Call

Indian defence technology development is at a crossroads. There are four roads for us to take:

- The Import Highway
- The Indigenous Route
- The Private Path
- The Nowhere Road

But Indian defence technology omnibus is driven by five drivers which are:

- The Indian Military
- The Defence Research and Development Organisation (DRDO)/Defence Public Sector Undertakings (DPSUs)
- The Private Sector
- The Political Leadership
- The People of India

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**The key to increased private industry participation is joint and assured investment in R&D as well as in production. Most importantly the capital investment required and the already matured DPSUs need to be factored in.**

Each of the first three, want to take a different road. Each one is correct and each one is wrong. There is no consensus of approach. The military wants the latest operational equipment that is only available abroad. The DRDO/DPSU combine wants the armed forces to accept what they produce. The private sector feels left out. The fourth one lacks the understanding of the issues. The fifth is passive and perhaps indifferent as well. Since no consensus is obtaining the omnibus has driven itself mostly along the fourth road i.e. 'the nowhere road.'

The most important aspect of this impasse is that the import highway offers advanced technology hardware much to the relief and delight of the military. Concerned about dwindling operational

preparedness and hard pressed operationally the armed forces naturally want to induct what they perceive would serve them optimally in terms of operational efficiency? What is needed is a balanced objective approach that enables import and promotes indigenisation and thus complements each other. This is true of even advanced countries.

The Indian (indigenous) route is slowly gaining significance and repute. It is progressively finding its niche thanks to the persistence of the government that has sensed the wisdom of allowing both the import highway and Indian route to coexist as an interim solution.

The private path has just begun to be paved but remains dependent upon both the military and DRDO/DPSUs. Increased participation with greater access is essential for 'Indianisation'. The key to increased private industry participation is joint and assured investment in R&D as well as in production. Most importantly the capital investment required and the already matured DPSUs need to be factored in. Outsourcing from the private sector will help the DPSU optimise and at the same time familiarise the former with defence technology would be a good starting point. Tie ups between the private sector and foreign defence companies would go a long way in helping us realise our offset objectives. Government owned private sector managed combines would be a step in the right and futuristic direction. The development of the future infantry combat vehicle is the first green field project where industry is being asked to develop a new vehicle with 80 per cent funding

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from the government and the freedom to choose its own vendors in terms of development and production.

The “nowhere road” is an illusion. It might look good at close quarters hand but is actually a shimmering mirage. Our country had no choice but to be on this road. Post independence India chose to remain non-aligned. Consequently, the West shunned us and ensured that even Britain did not pass on any military technology. If we missed the industrial revolution in the distant past, we missed the technological revolution of the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. The West led by USA with the experience of two world wars emerged as a superior military technology power in comparison to the Soviet Union and the communist bloc. Yet both possessed the mass destruction capability. The Cold War era left India stone cold in terms of military technology. Compounding this was the ironic reality of the Indian political leadership’s policy of separating foreign policy from security. Consequently, defence technology remained below the radar - and perhaps still is of the politico-bureaucratic-military mind.

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The bad news was that defence technology was a focus never even began in the minds of the leadership. Perhaps the challenge of managing a pluralistic democracy kept the polity pre-occupied. The idealism of India’s leaders too was a contributing factor. The 1962 Sino-India border war changed all that. The conflict and the defeat of the venerated Indian military came as rude shocks. One expected the establishment to respond. It barely reacted. The military was swallowing its pride and licking its wounds. The blame game was only served to distract. Within the three services and the bureaucracy the culture of compartmentalisation, took deep roots. Our non-aligned posture did nothing to alleviate the military hollowness. In the late 1960s the Soviet Union stepped in to unconditionally support India. That democracy and communism could co-exist as close bed fellows surprised the West. At the same time, the US hardened its stand and continued its military technology denial policy. The Soviet military machine and leadership rapidly supplied and trained the three services on relatively modern equipment. To their credit the Indian armed forces adopted, adapted and professionally absorbed the Soviet machinery with aplomb. “The Indian military a British clone, mostly using Russian equipment, with Western doctrines in Indian terrain, speaking Hinglish (combination of Hindi and English)” was an enigma to itself and the world.

However, expedient and advantageous this arrangement was, the principal issue of defence technology was again given the go by!

## **Defence Research Development Organisation (DRDO)**

In 1958, the country set up the DRDO; a visionary move, considering the circumstances and the environs. However, there was a fundamental in its operating philosophy and its stand alone structure merely as a technology developer and demonstrator with little or no production co-relation. Ever since its inception, there has been a stand off between the military R&D set up, the MOD and the services because of exaggerated expectations and gross misperceptions. The armed forces wanted the nascent DRDO to rapidly produce advanced technology weapons and systems at par with the Western and Soviet military industrial complexes. There was neither appreciation nor empathy for the situation obtaining on the ground. The fact that the DRDO was commencing operations in an environment which did not have even a basic defence industrial base, no private sector participation, was all discounted.

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The DRDO setup too was flawed because it was hierarchical with seniority taking priority over talent and innovation. The promotion structure, the pulls and pushes of the annual confidential reports sacrificed true R&D. The armed forces too failed to task DRDO with developing a felt need or upgrading an existing system. Their comfort levels with Russian equipment and their pre-occupation with internal and external security concerns led to a progressive dependence on external sources for military needs.

### **Department of Defence Production**

The department of defence production was set up in 1962, in the aftermath of the Chinese aggression to promote self-reliance through indigenous defence production. In November 1965, department of defence supplies was created to forge linkages between the civil and defence production units. The two departments were merged in December 1984 into the department of defence production and supplies which was later renamed as department of defence production in January 2004.

Sixteen new Ordnance Factories have been set up since 1962. All the ordnance factories and DPSUs are engaged in the task of manufacture of equipment and

stores for defence services under the department of defence production. These are:

- a) Hindustan Aeronautics Limited (HAL);
- b) Bharat Electronics Limited (BEL);
- c) Bharat Earth Movers Limited (BEML);
- d) Mazagaon Dock Ltd (MDL);
- e) Goa Shipyard Limited (GSL);
- f) Garden Reach Shipbuilders and Engineers Limited (GRSE);
- g) Bharat Dynamics Limited (BDL); and
- h) Mishra Dhatu Nigam Limited (MIDHANI).

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In addition, the following are also associated with the department of defence production for technical support:

- i. Directorate General of Quality Assurance (DGQA);
- ii. Directorate of Standardisation;
- iii. Directorate General of Aeronautical Quality Assurance (DGAQA);
- iv. Directorate of Planning & Coordination; and
- v. Defence Exhibition Organisation (DEO).

### **Overview Assessment**

India has now come off age in terms of a capable civil industrial complex and a home grown military technological complex. All this has been part of a democratic process - plodding, painful, perplexing and persevering.

From a buyers military we are becoming a partial builder's military - warships from our defence shipyards, aircraft, and helicopters, from HAL and tanks from Avadi. Although their operational viability continue to be debatable. But these are immaterial as the country has realised the value of self reliance and that indigenised equipments can be progressively improved and upgraded. The Tejas (LCA) Mark II being developed as a true fourth generation aircraft at minimal cost is an illustrative example. In the larger interests of 'self reliance', the services must also begin to participate through the process of operational induction and subsequent improvement. The import element at best should be used for unacceptable

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obsolescence to ensure operational readiness. The long term aim of gradual and systemic reduction of import dependence must be achieved by involving all stakeholders of our country.

### **The State of Indianisation and Indigenisation**

Indianisation means converting all equipment to meet our military needs. In this, there has been considerable achievement as proven in the 1971

war and Kargil Op Vijay. The missile boats, MIG 21s, armour and weapons bear testimony to our innovative adoption of equipment.

Indigenisation means building systems or parts there off in the country. Here too we have graduated from assembling knock down kits to building from scratch. All these have been part of an extended trial and error process. The services too have set up considerable a technology infrastructure including base repair depots, EME workshops, naval dockyards for operational maintenance and repair.

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This realistic assessment has to be viewed in sanguine terms. A holistic overview would readily point out that India has individual excellence, brilliance and vision. But organisational obtuseness, the lack of a collective strategic vision, synergy and a hands off political leadership continue to keep us more or less on the "nowhere road"

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In the military sector we continue to be a house divided against itself. The macro realities highlighted below need to be addressed if India is to become a self-reliant military technology complex in the next three decades or so.

## Macro Realities

The Indian psyche, of grossly exaggerating achievements, gloating over screw-driver technology successes, and ultra-sensitiveness to criticism over failure and reluctance to work together in synergy hinders progress.

The way the higher defence decision tree is sub-optimal in function, output and result. The concept of stakeholder/customer satisfaction as an important imperative is absent. The lack of an ownership approach by the armed forces too is an impacting and militating factor as in the case of the LCA, the MBT Arjun, Dhruv Attack light helicopter among others. In all these, the military virtually adopted a hands-off approach and wanted the DRDO/DPSU to hand over a readymade product to them. Then they would examine it for failure!

Collective participation then, as is beginning to obtain now would have yielded better results at lower costs. On their part the armed forces were made to feel apprehensive about acquisitions from abroad and hence had a mind set of wait and watch on "Indigenisation".

The DRDO, defence production, DPSUs, the armed forces, the ministries of defence, finance, home, the ordnance factories and the private sector all need to have direct dynamic, autonomous connectivity. The stove-piped system in the absence of any viable MIS both within and outside further compounds this separateness. Consequently, all resolutions are at the level of the 'secretary' with an approach of "compromising arbitration" leading to an environment of all-round dissatisfaction and mutual distrust.

The private sector has now been given access and the opportunity to participate in the defence sector.

Perceptions of stone-walling by DPSUs prevail in the private sector. The nascence of the latter in matters of military technology seems a good enough reason to keep them away from defence production. However, this appears to be changing with the new DPP of 'make India and buy India' that allows private companies to choose foreign vendors.

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The Kelkar, Rama Rao committees and the very recent Defence Expenditure Review Committee have made comprehensive pragmatic, cost effective recommendations to bring about much needed reforms in the defence sector. Top down political and bureaucratic directives to actualise these and the new approaches outlined above would enable India to move ahead.

### **The Clarion Call of the Present**

An overview of the current of India's military technology complex would reveal that the country needs to achieve near self reliance in critical areas of weaponry,

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engineering, electronics, and hardware over the next few decades to prevent unmanageable asymmetry vis-à-vis our principal adversaries. Propeller shafts, tanks and aircraft, ships engines, heavy guns, precision ammunition, networked surveillance systems, military transportation aircraft and the like all have to be imported in the short run. This in itself is understandable considering the fledgling nature of our evolution and the disparateness within our secular democracy. However, our achievements should encourage us to look ahead with confidence, more importantly the existing infrastructure, the enormous investments made thus far, the private industry participation (nearly 100 indigenous industries support the LCA project) make it possible for the country to start taking definitive steps to cross the Rubicon of dependence to self reliance. Indianisation to indigenisation and Indian, within the

next three decades must be our goal with a well defined road map.

This clarion call has to be heard, listened to and understood. The government must bring together, all stakeholders - the armed forces, DRDO, DPSUs, the ordnance factories, and the private sector under the aegis of a "Military Industrial Commission" facilitated by the Confederation of Indian Industry (CII), Federation of Indian Chambers of Commerce and Industry (FICCI), and Council of Scientific & Industrial Research (CSIR).

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## The Way Ahead

The way ahead should include:

Identification of self reliance goals backed by technology audit by the Military Industrial Commission, followed by prioritization and perspective planning on Indigenisation. R&D needs to be given precedence with technology transfer preferences in selective disciplines. The immediate operational needs of the military, however, must pragmatically be catered for even ex-import during this period if necessary. The acquisition process needs to be speeded up through collegiate decision making.

Second is establishing technology transfer paradigms and policy directives to all DPSUs which must ensure technology transfer, leads to indigenization, an aspect which the MIC must monitor and ensure. This requires the Military Industrial Commission (MIC) to be empowered to negotiate with foreign governments and international defence companies on effective transfer of technology. Our offset policies need to be reviewed and revised accordingly.

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**Empowering MIC:** The success of MIC would lie in its composition, autonomy and executive authority. It must have oversight rights to review 'long term perspective plans' in consultation with the MOD and the military. Realistic RFI/RFP processes, pragmatic "qualifying requirements" have to become more scientific and mission need oriented. The evolving of RFP and QRs must commence early enough through the joint efforts of military/DRDO/private sector. This is where the MIC will need to play a proactive and a dynamic role.

**Review of DPP:** The DPPs are evolving and have potential of being the game changers in making our defence technology "Indian".

The melding of military and civil technology needs to be proactively encouraged. Funding for this could be allotted within the defence budget. The DPP needs to encourage inclusiveness through a collegiate system that gives all stakeholders a sense of security in their vertical expertise. The inhibiting "either or" should

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be replaced by a “both and and” bold strategy. The present approach of the armed forces of evaluating each DRDO system for full functional compliance needs urgent review. The saying that often times the “best becomes the enemy of the good” must be internalised by all defence technology players.

**Operational Induction of DRDO Equipment:**

There are two aspects to this issue. As mentioned earlier indigenous equipment which reaches the stage of ‘initial operational clearance’ should be inducted into the services for exploitation and product improvement. Its formal combat induction, however, could be done once it has met all necessary acceptable parameters as per the GSQR. For example, the LCA Tejas, the ALH Dhruv, MBT Arjun, UAV Rustam, Akash Missile should be operationally inducted once the minimum acceptable QR has been met. The only rejection criteria should be overriding safety issues. This is not unusual even in developed countries. An illustrative example is the Patriot missile which was operationally deployed despite QR shortfalls. This can be addressed by setting up teams from the DRDO and the armed forces who will oversee induction and functioning of all Indian equipment.

Creation of an open transparent acquisition process to meet the main operational requirements of the military is imperative. The acquisition process encompassing trials, offsets, technology transfers should involve service representatives together with DRDO/relevant and DPSU/private industry. The present “Buy, Buy & Make, Make” policies must become expansive and not mutually limiting. This if managed well would enable wider access, open competition and fair practices. This would also enable better understanding of technology transfer aspects with optimum prospects. Attendant offsets would also create a win-win situation.

**Integration of Military Maintenance Infrastructure with DPSUs, PSUs, and Private Sector:** This would be another salutary force multiplier. The military would become relatively freer to focus on its operational ethos. It would enable Indian industry to gain valuable defence technology insights. Synergy with understanding would also develop between the public and private sector.

Importantly the implementation of the Kelkar, Rama Rao and Defence expenditure review committee needs to be mandated and overseen on priority.

**Immediate Steps**

The armed forces must commit to operationalising all Indian systems after achieving ‘initial operational clearance’ despite perceived limitations. This

would enable the scientist, engineer, manufacturer and the user military to look at Indigenisation together. This has been an established practice world over. There has to be a clear understanding on combat readiness needs and as stated earlier the import of proven equipment needs to continue. There have also been some instances where even imported equipment has not met operating criteria. Introducing Indian equipment in selected units for operational exploitation would enable progressive upgrades and product improvement. Equipping an armed regiment with Arjun MkI MBT is a case in point. Post favourable comparative trials with T-90 we are now inducting the Arjun Mk II. Similarly, the APSOH sonar has now replaced all import sonars in the Indian navy. The fitment of Brahmos missiles in Indian navy ships is another sound example. Our persistence with Akash missile is demonstrative of our larger vision. We need to learn from the Chinese model of military modernisation. It has developed WS 10 engines for its prestigious J-10 aircraft with a 20 hour life initially. Subsequent upgrades were done based on operating experience and new variants such as WS 15 developed.

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Readying all production agencies to be capable of performance based logistics and work on front line units of the three services must become policy.

The services must have strong leverage in all DPSUs in terms of equipment, systems manufacture, specification quality assurance compliance and acceptance. Management boards need to be structured accordingly.

### **Salutary Effects**

The above steps will convert the *nowhere road to a somewhere road*. It could be first made into a four lane road that allows a level playing field to the Indianisation and the private path with access to the import highway. This requires planning, process, and participation along with proportionate parity in equity.

### **Strategy of Technology Leap Frog**

The foundations of our defence technology edifice are ready and strong. Rapid advances in science, material development, electronic-engineering fusion stress the advantages of adopting a strategy of technology leap frog. Reinventing the wheel is no longer needed as India is emerging out of the technology denial drought. The West woos us while the East engages us vigorously. France and Israel are good

examples along with Russia. The US too has had reasonable success in India. All this highlights the availability of a range of technologies that can be adopted and adapted to become industrially and militarily Indian.

### **The Prescriptive Approach**

The dynamics of defence technology are complex and require a strategy that includes of didactics, direction, determination, drive, under the aegis of an MIC. This could be created from existing entities like the MOD, the armed forces, public and private sector companies CII, FICCI, DRDO, DPSUs etc.

The Defence Acquisition Council, the DG acquisition, the chiefs/vice/deputy can all be part of the MIC. This could be tiered suitably for policy, planning, review and oversight.

Defence procurement procedures need to promulgate policies for operational induction of indigenous equipment and systems. This can be done by creation of operational units in the three services to absorb all indigenised systems across the spectrum of organisation, operationalisation, infrastructure, participation and review.

The DDP, the DRDO and the service headquarters need to be tasked to review existing relationship structures. Integration, involvement, information management mandates need to be laid out. The minister of state for defence could be given the charter to head the MIC for providing desired political direction.

The MIC charter could be created from the findings and recommendations of the various committees set up by the government within the last two decades.

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Indigenisation perspective planning must be factored into the armed forces long term integrated perspective planning and must take into account the overall internal and external security continuum. It must also include the trends for the next two decades. This would not only avoid duplication but ensure contemporary capability development and more importantly a shift from a platform centric orientation to a systems approach. Above all it must be relevant to the changing operational and security environment.

Instead of lamenting past omissions the country has to apply itself with energy in becoming truly Indian in our areas of operational needs. A review of India's heavy industrial, engineering, electronics, accessories, automotive and manufacturing industries which are exporting equipment and systems to USA, Europe, China would readily reveal how many of these technologies could be effective "Make India" for our military technologies, make military technology 'Indian'. Aero India and Def Expo provide windows of opportunity for valuable technology transfers. Autonomy and accountability with set targets would enable Indian military technology to become a robust high technology industrial complex. A common management information grid bridging all the individual MIS domains should form part of the MIC charter.

### **Maximising Outside Sources**

Existing tie ups with Russia, Israel, France, USA need to be oriented towards self reliance focused technology transfers. All these nations have well developed military industries. At the same time the relevance of the military in these regions is rapidly diminishing. Commercial interests now dominate and this is where India could maximize its new found economic and political salience. For example, US is seriously attempting to cut down its defence budget, so its impact on existing defence industrial complexes needs to be examined and leveraged in our procurement and related off set plans. It calls for a sanguine overview and formulation of pragmatic strategies for becoming Indian in our military technology. The MIC should play an effective facilitation role in partnership with CII/FICCI/PVT/DPSU and the like.

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### **Curtain Call**

Metallurgy, science, technology, industry, security compulsions are interwoven into Indian military technology. We have had reasonable successes in space. We can make greater progress through dynamic management of our existing resources in the defence domain across India. We have to accept that the road to self reliance and independence has to start from interdependence and inter/intra learning.

The collateral spin off benefits in terms of HR, economics, development, self confidence and export potential will prove to be catalysts for India's growth.

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The writing is on the wall. We all need to act upon it. India in the final analysis has to depend on itself. For this we have to seriously undertake Indianisation, indigenisation, integration, and industrialisation in defence technology. *idsa*