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***A Vibrant Indian Military
Industrial Complex for Self
Reliance***

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About The Author :

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A Vibrant Indian Military Industrial Complex Needed **for Self Reliance**

According to Stockholm International Peace Research Institute (SIPRI), today India is world's largest arms importer with country's spending on defence hovering between 2.3% and 3% of GDP. While India's massive spending on import of weapons and defence hardware reflect the keenness to modernize its armed forces and equip them with the capability to take care of the Indian interests beyond the subcontinent, there is a concern that the country which has demonstrated its prowess in space exploration and positioned itself as a software hub of global standing, has failed to acquire self reliance in the vital sector of defence production.

Self-Reliance: Need of the Hour

Indeed, the fact that today India imports about 70% of its defence equipment makes for a very weak case in the quest to transform the country into a global military power. As observed by Dr. Amer Latif, Visiting Fellow at Wadhvani Chair for US- India policy at Centre for Strategic and International Studies (CSIS), "India believes strongly that providing for its own requirements is indicative of being a global power." Of course, the policy of India's Ministry of Defence (MOD) is to equip India with the capability to produce 70% of its required military equipment domestically by the end of this decade. But as things stand now, the prospects of realizing this goal within the set timeframe appears bleak. Over the next one decade, India is planning to buy defence equipment worth US\$100-billion and if the country fails to progress sufficiently enough to develop the required military hardware domestically a large chunk of this amount would go towards import. "Unless some drastic action is taken quickly and the private sector is incentivised to come into the defence production, the situation is not going to work" says Kutub Hai, Head, Mahindra Defence Systems.

Indeed, for quite some time now, there has been an animated debate in the country over the viability of building a robust domestic military industrial complex to help India usher in an era of self reliance in defence production. India's pro active Defence Minister A.K. Antony has all along been making a strong pitch for the Indian defence self reliance. "A country like India cannot indefinitely depend upon foreign weapons," says Antony. Antony has spiritedly

urged the Defence Research and Development Organisation (DRDO) to strengthen its “core competence” and augment its “research and development” base to minimize Indian dependence on imported hardware. He has also driven home the point that “India’s image as a global leader in IT should be reflected in the national defence domain.” Going a step further, he has urged DRDO to do to the Indian defence sector what ISRO has done to the Indian space exploration. In the similar vein, the veteran BJP leader L.K.Advani has stated that a country as large and populous as India with such a vast pool of scientific and technological talent must not remain exclusively dependent on imports for meeting its defence needs.

Import: A Solution with Hundreds of Problems

Even if India had invested a fraction of the mind boggling amount it had spent on arms imports since 1950 on expanding the scope of its indigenous defence research and development, boosting its engineering and manufacturing skill and enhancing the infrastructure and expertise of its academic centres of excellence like IITs (Indian Institute of Technology), the country would have by now not only become self reliant in meeting the requirements of its defence forces but would also have positioned itself as a major exporter of arms and ammunitions. But then, the sad part of the story, as stated by Air Marshal P.K.Barbora, a former Vice Chief of Indian Air Force (IAF) in terms of exports, the defence industry of Pakistan is ahead of its Indian counterpart. According to Barbora, India should go for reverse engineering—an area where China has proved its excellence—to boost its self reliance in defence production. Perhaps one of the least noticed offshoots of defence self reliance is that technologies developed for defence hardware have a variety of civilian applications. Both ISRO and DRDO have a programme to exploit the spin offs by transferring the technologies to industrial enterprises for commercialization. Here the recipient industries should be asked to improve the scope and performance of the products through constant research and feedback.

The figures made available by SIPRI reveal that between 1950 and 2010, India imported arms worth US\$64.84-billion from USSR/Russia. During the same period, India imported US\$15.3-billion worth of arms from Britain against US\$4-billion from France and US\$1.9-billion from Germany. Not to be left behind, while Netherlands exported arms worth US\$1.5-

billion to India between 1950-2010, Israel exported arms worth a little over US\$ one billion during the period.

USA, which happens to be a late entrant to the Indian defence market, is looking at emerging as a major arms supplier to India once New Delhi starts paying for a series of recent acquisition contracts. These include US\$1.1-billion for six C 130 J Super Hercules Transport Aircraft, US\$4.1-billion for ten C-17 Globemaster heavy transport aircraft and US\$ 2.2-billion for eight P-81 long range maritime patrol aircraft. Not surprisingly then as revealed in a recent Frost and Sullivan report between 2011 and 2015, Indian defence budget is expected to grow at more than 8% year on year. The defence budget for 2012-13 to be presented in the Indian Parliament in March is likely to touch Rs.2, 00,000-crore to support the modernization process of the Indian defence forces. Indeed, for the European, Russian and American defence and aerospace enterprises facing bleak prospects of marketing their wares in their home turfs, India's swelling defence budget with a large allocation for import seems to be a veritable "manna from heavens". But for India the continuing dependence on imports would also mean a certain vulnerability to the technology denial regimes and a variety of coercion that would render the imported hardware unserviceable. And on the top of these, murky role of shadowy middlemen in getting the defence deals clinched through "kickbacks and influence peddling" continues to dominate the Indian defence import.

Turning Technology to Advantage

In a way, the technology denial could act as a spur for the indigenous development of defence systems and hardware. As pointed out by V.K.Saraswat, Chief of the Defence Research and Development Organisation (DRDO) the technology embargo has helped the country develop many critical products hitherto imported. In particular, Saraswat said the indigenous development of many high performance systems for longer range Agni missiles has made "mincemeat" of the US sponsored technology embargo and trade sanctions." There are now around 300-400 industries working with strategic sectors—defence, nuclear and space. For DRDO, they have succeeded in building ground systems, components and subsystems. They are now graduating into integrating missiles. It is heartening to note that 60-70% of missiles components are made by Indian industries. However, we need to concentrate on research

aspect especially since the technology denial regimes have not been relaxed,” observes Saraswat.

DRDO which was earlier blamed for delays and far from satisfactory quality of its products is now sprucing up its act to meet the needs of the armed forces in a timely and cost effective manner. Of course, Saraswat did admit that there was a mismatch between technology maturity, industrial capability and project goals during 1980s and 1990s which did affect projects like Arjun Main Battle Tank(MBT) and Light Combat Aircraft Tejas . Marking a break from the past, the 120-mm tank guns developed for Arjun by the Armament Research and Development Establishment (ARDE) of DRDO has proved to be a distinct improvement over the Russian guns. Meanwhile, DRDO has initiated work on FMBT (Future Main Battle Tank) to insulate against delays that plagued Arjun programme. The Combat Vehicle Research Development Establishment (CVRDE) of DRDO which is spearheading FMBT project has adopted public -private sector cooperation route to realize the tank that will be the backbone of Indian army’s armoured column into mid-21st century. This high profile project of national importance will largely co-opt domestic companies like Kirloskar Oil Engine, BEML (Bharat Earth Movers Limited), Mahindra and Mahindra, academic institutions like IIT and Pune based Automotive Research Association. An Indian ‘prime contractor’ would assemble FMBT engine with the engine components supplied by a network of contractors. “Our approach is not engine specific; we are looking at developing the complete range of technologies needed to build engines. Not only design but also manufacturing, testing and evaluation,” says CVRDE Director P.Sivakumar. Perhaps Indian defence production sector can adopt this innovative route to realise the systems and equipment posing technological challenges.

Rightly, the decision of the Indian Defence Ministry to bring the US\$12-billion Future Infantry Combat Vehicle(FICV) project under “make India procedure” is a welcome step towards helping the Indian defence industry take up technologically complex, high profile projects. The finally selected Indian company for FIVC is free to choose its technology partners. But the intellectual property will be Indian and Government will fund the technology development up to 80%. The successful culmination of FIVC project is expected to radically transform the landscape of defence production in India.

End Fascination for Imported Hardware

But all said and done government agencies concerned with defence, DRDO and other stake holders in the Indian defence sector are not the only ones responsible for the current state of Indian defence production. Defence forces too should take the blame for India's poor track record in defence self reliance. For they not only want the products that meet all their stringent requirements in one go but also have developed the tendency to change the product specifications mid way through the course of development. For instance, IAF wanted the Tejas to be equipped with a higher performance engine many years after the development of aircraft was initiated. Going in for a higher thrust engine mid way would mean bringing about many modifications in the aircraft structure, implying an investment in terms of expertise, time and money. This glaring lack of harmony and proper interface between DRDO and defence forces has gone to slow down the pace of indigenisation. Moreover defence forces should help the producer improve the performance quality by providing feedback on a regular basis. As such, it is quite essential that the defence forces are made a stake holder in any project involving the development of the military equipment. Further, the mindset that only imported hardware makes for excellence should be given a goodbye if India has to attain self reliance in defence production sector.

How indigenous development and production not only saves a massive outgo of funds on imports but also makes for self reliance in addition to contributing to the skill enhancement of local industry and the flow of spin off technologies to the civilian sector is demonstrated by the successful culmination of the Tejas fighter aircraft project. Compared to the phenomenal Rs.75, 000-crore that India would need to shell out for 126 French Rafale fighters which has emerged winner in the keenly contested medium, multi role combat aircraft (MMRCA) tender, the money invested on Tejas appears a peanut.

The facilities set up, skill levels acquired and quality control measures fine tuned for Tejas are no doubt a precious national asset that could be scaled up as and when required with a very little investment to build better and more lethal fighter aircraft. India's investment since 1983 on creating a range of infrastructure for Tejas including a manufacturing base and flight testing of 20 Tejas prototypes is less than Rs.10, 000-crore. And development of a Tejas naval variant which is now getting ready for maiden flight is considered a tribute to the

maturing defence industrial base in the country. The LEVCON test rig set up at HAL for Tejas naval is considered a technological leap for the Indian defence industry. Only a handful of countries boast of such an advanced test facility.

Indeed, the success of Tejas has nudged the Defence Research and Development Organisation (DRDO) to take up the development of Medium Combat Aircraft (MCH) with stealth features and formidable strike capability. However, to sharpen the edge of aerospace technology in the country, the Indian Defence Ministry should ensure that vital technologies being transferred by Dassault Aviation, the producer of Rafale and armament integrator Thales as part of the MMRCA contract are absorbed by the Indian industry fully well. It is high time India stopped accepting technology as a “black box”.

Make India’s Aerospace and Defence Production Base Vibrant

Nothing else demonstrates India’s poor track record in defence production more stunningly than India’s plan to acquire 75 Swiss origin Pilatus basic trainer aircraft. In sharp contrast, Pakistan’s aeronautical complex at Kamra has managed to build 327 Mushshak three seater light aircraft for training, communications and observation. Although initially license produced version of Sweden’s Saab MF1-17, Pakistan has modified and adopted it to meet its specific training needs. Moreover, Pakistan Air Force (PAF) has managed to train its pilots on home-grown aircraft. Unfortunately to a large extent, IAF’s training programme has been dependent on foreign trainer aircraft that were available in limited numbers. By all means, this begs the question why India a technological power does not manufacture even a basic trainer for the fourth largest air force of the world. With its expertise and infrastructure HAL, would have easily designed and developed a range of fighters required by IAF.

Clearly and apparently, India’s indigenous aeronautical scene was quite encouraging till 1970s. India’s state owned aerospace enterprise HAL(Hindustan Aeronautics Limited) which owes its origin to the vision and entrepreneurial spirit of Seth Lalchand Hirachand was active in the development and upgrade of Marut HF- 24, a single seat ground attack fighter and two seater basic trainer jet HJT-16 Mark 1 Kiran . In comparison to 1970s, things are now far from salutatory for the Indian aeronautical sector. On its part, China it not only self sufficient in terms of trainer aircraft but also has exported a large number of them to a number of third world countries.

HAL'S current plight reflects a depressing saga of monumental failure to build the foundation of a resurgent aeronautical industry. Indeed, HAL had lost the golden opportunity of turning itself into an Indian Embraer. As ruefully recalled by one of the former chiefs of HAL (during the interaction with this writer) HAL's plan to develop civilian aircraft was consistently sabotaged by "vested interests". Moreover, there were occasional reports of a strong "import lobby" in the country supported by foreign aerospace and defence outfits working overtime to sap the vitality of HAL and make India dependent on imports.

Even after two successful instances of aircraft development -- HF-24 Marut in 1960s and now Light Combat Aircraft(LCA)Tejas which is now winging its way towards final operational clearance along with a joint development project with Russia for the fifth generation fighter on the drawing board, has India not learnt enough to be able to create a fighter liker Rafale aircraft from concept to operation? The time lag between the completion of Marut project to the commencement of the LCA was about 24 years by which time HAL had lost the expertise and talent it had acquired over the years. Whatever the technical manpower was created in the design department of HAL withered under frequent doses of licences production of foreign aircraft.

Meanwhile, there are talks of transforming HAL into a world class aerospace enterprise with a forward looking vision. HAL along with seven other defence PSUs, 40 units of Ordnance Factory Board (OFB) and fifty laboratories under Defence Research and Development constitute the mainstay of defence production scenario in India. Of course, HAL had all the potentials to make India self reliant in all aspects of aeronautical engineering. Bureaucratic and political interference along with a long standing domination by defence personnel more interested in meeting the needs of the forces than making India self reliant in defence production are all at the root of the present plight of HAL. Moreover, the excessive thrust on licence production went to kill the creative spirit essential to design, develop, and manufacture innovative products. Added to that, HAL was not exposed to the competitive environment since it was complacent with the captive orders from the Defence Ministry. Because the work culture of HAL was from competitive and innovative, many of the experienced and talented engineers left this premier Indian aeronautical and defence outfit.

Around 85% orders of HAL are government driven and often armed forces have complained about the poor quality of products. Although HAL has closely worked with front ranking

aerospace enterprise including Boeing, Honeywell, Airbus, Pratt & Whitney, Rolls Royce and Israel Aerospace Industries (IAI), it has failed to master many of the cutting edge technologies going into aerospace products. On the plus side, HAL has brought about qualitative improvement in its flagship product Advanced Light Helicopter Dhruv which is not only in service with the Indian defence forces and coast guard but has also been imported to a few third world countries. Currently the two high profile projects on hand of HAL are Intermediate Jet Trainer Sitara and Light Combat Helicopter (LCH). HAL has also a plan to build Light Utility Helicopter (LUH) for use of the Indian defence forces.

Turning HAL into a World Class Aerospace Hub

Of course, over the years the defence delegations and teams from aerospace companies which visited HAL have been quite impressed with the facilities and expertise it has built up over the years. But their observation is that engineers here though talented lack exposure to modern management practices. “I have spent thirty years in aerospace industry and worked with global companies like Boeing, Airbus and Northrop Grumman but I can say that HAL is superbly equipped with infrastructure, but one needs to use them to bring out a product. Most of the talent are just a waste as the higher management lacks the vision,” says an American aerospace professional.

According to K.Tamilmani, Chief Executive Officer (CEO) of Bangalore based CEMILAC (Centre for Military Airworthiness Certification), facility under DRDO, creation of an autonomous body for design, development, testing and production of aero engines can help India attain self reliance in aerospace sector. Tamilmani states that amalgamation of expertise and competence available in both the public and private sectors should be fused to create a high tech platform. HAL and Gas Turbine Research Establishment (GTRE) have already built up a sound infrastructure and sufficient level of expertise in the area of aero engines. Moreover, resources available in private enterprise including Kirloskar, Larsen and Toubro and Godrej could be harnessed for giving a quickening impetus to the process or realizing aero engines of varying thrust ranges. On another front, emphasize would need to be laid on state of the art manufacturing facilities, quality assurance and quality production of international standards. “India has the capacity, teams, technology, demand and industry. We need to integrate them to be in the race” observes Tamilmani. For this to happen, the

Government should need to set aside a huge amount of money to fund research and development in research organisations and academic institutions. That is how USA had made it to the top of the world defence production scenario. No wonder then that US Government continues to fund leading defence contractors like Boeing and Lockheed and Martin for research and development of newer and better performing systems.

Indeed, to be able to move out of the syndrome of “dependence and import” India should demonstrate its technological excellence by producing at least one engine with enough parameters of thrust to weight capabilities. Around this engine India can create a platform that will meet all the requirements of IAF. In this context, ground covered by India’s home-grown Kaveri engine designed and developed by GTRE to power Tejas holds the hope of making India self-reliant in power plants required for a variety of applications. Against the original objective of generating 80-kN thrust, Kaveri is now able to generate 70-kN thrust. With little fine tuning, Kaveri engine can be made capable of generating 80-kN thrust.

However with IAF projecting need for a higher thrust engine for the Mark II version of Tejas, GTRE is planning to join hands with the French engine major Snecma to take forward Kaveri technology to realise an engine generating 90-kN thrust. This engine will feature the state-of-the-art single crystal technology. Mastering a complex technology involved in a high performance aero engine will provide India a solid spring board to develop a variety of engines of different thrust ranges meant for use in ships, missiles, UAVs, armoured vehicles, aircraft and helicopters. China is yet to fully master the technology of aero engine. Moreover, the engine technology has a massive application in civilian area and the technology developed by DRDO can be transferred to the Indian industries active in the area of engines. This would give a massive boost to the power plant industry in the country.

Strengthen Public Private Partnership

All said and done, an enormous human resources initiative and financial investments are required to build teams and attract and nurture talent to sustain the growth of Indian defence and aerospace sector. Perhaps India’s defence and aerospace sector can take a leaf out of ISRO’s experience of hand-holding small and medium industries contributing to the Indian space programme. Thanks to this innovative approach, today Tanuku based Andhra Sugars is capable of producing a range of liquid propellants including liquid hydrogen for the launch

vehicles of ISRO. Similarly, ISRO has been encouraging –through funds and technology— academic institutions like IITs and Universities to build mini and micro satellites. The idea is to help the students master the basics of satellite technology. Perhaps HAL and DRDO can take up similar initiatives to involve Indian private industries and academic institutions in the quest to achieve self reliance in defence sector.

The recent decision of the Indian Government to allow defence PSUs float joint ventures with private companies in the country could go a long way towards bolstering domestic defence industrial base. This could in a way increase the opportunities for obtaining advanced technologies from foreign sources. The eight defence PSUs are now in need of massive transformation. Significantly, many small and medium level industrial units in India have a good amount of resources and skill level to produce hardware meeting the stringent international standards. Meanwhile, micro, small and medium enterprises (MSME) sector says it is banking on the forthcoming revision of the Defence Procurement Policy which may reserve 20% minimum sourcing from the defence supplies contract to MSMEs which already supply a large volume of components, special alloys and metal parts for military hardware. “Successful SMEs (Small and Medium Enterprises) will be the ones which can innovate, adopt technologies, deliver customized solutions, develop and maintain a global standard in manufacturing quality and specifications while retaining their cost advantage” says Dhiraj Mathur, the executive director of Price Waterhouse Cooper.

For Private Sector Industry: A Bigger Pie of the Defence Production

Samtel Display Systems is now in a position to supply all types of MFDs (Multi Function Displays) for all the Indian fighter aircraft including Tejas. Until recently India relied on imported MFDs for its combat aircraft. Buoyed up by the success in developing MFDs, Samtel is now looking at manufacturing infra red search and track (IRST) sensor capable of spotting an enemy aircraft passively without alarming them to the presence of another aircraft. Vishakapatnam based Flash Forge is fabricating critical valves and pipes for the Indian navy’s under construction fleet of six French origin Scorpene submarines. They are a part of the expanding breed of small and medium enterprises that are making a mark on Indian government controlled defence sector. They are niche players who have cornered a key role in indigenising the defence industry by developing the cutting edge technologies.

Indeed, their potentials need to be harnessed at a faster pace to speed up the process of defence indigenisation. They can very well become an important part of India's military industrial complex. "Indian companies should tie up with MNCs, utilise offset opportunities and leverage the expertise that arise from such synergies" says Karthikeyan Natarajan, Senior Vice President and Global Head (integrated engineering) of Mahindra Satyam.

In a development of significance to the Indian aerospace sector, the Bangalore based QuEST Global has become the first Indian private company to become the direct supplier of subsystems to the European Airbus industries. The company has an aerospace supply chain ecosystem in its Special Economic Zone (SEZ) in Belgaum in North Karnataka. QuEST Global, which has acquired engineering services division of UK based GKN Aerospace, has been a supplier of aero-structures and actuator systems to the international aerospace players. Indeed, overseas acquisition by Indian defence, engineering and aerospace companies could help bring in expertise and technologies not available within the country.

India should also exploit the potentials that vehicles major Mahindra & Mahindra has built up in the area of aerospace. The acquisition by Mahindra of the Australia based Gipps Aero has invested Mahindra Aerospace with the capability to produce small aircraft. In 2007, Mahindra had bought Bangalore based engineering firm Plexion which had human resources in the area of aerospace. This led to a 2008 tie up between Mahindra Aerospace and National Aerospace Laboratories (NAL) to build a five seater aircraft named NM-5. The prototype of the aircraft was developed and tested at Gipps Aero facilities in Australia. Meanwhile, Mahindra Aerospace is looking at setting up a facility near Bangalore to produce aerospace subsystems and hardware for the global aerospace firms. On the other hand, Bangalore based Dynamatic Aerospace, in tie up with Spirit Aero Systems is assembling the flap track beam for A320 family of Airbus aircraft. In 2008, Dynamatic Aerospace acquired Oldland CNC, a high end engineering enterprise in Bristol with a strong focus on the production of aerospace components. This acquisition has provided Dynamatic Aerospace with unique state of the art aeronautical manufacturing facility possessing complex five axis machining system. Dynamatic Aerospace as part of its quest to enhance its capabilities in large aero structures, composites and complex engineering is building a new manufacturing facility in Bangalore. "It will enable Dynamatic to emerge as preferred strategic supplier to global tier ones and aerospace companies" says Udayant Malhotra, CEO of Dynamatic Aerospace.

In what has been perceived as a shot in the arm for Indian defence and aerospace sector, Tata Advanced Systems (TAS) has entered into tie up arrangement with several international enterprises including the ones to manufacture components for aerospace and defence giant Boeing. Further, it has taken a one third stake in Italy's Piaggio Aero while it has signed a Memorandum of Understanding(MOU) with Israel Aerospace Industries(IAI) for a joint venture that would develop, manufacture and support a wide range of defence and aerospace products including missiles, UAVs, radars, electronic warfare system and homeland security systems. On another front TAS is already manufacturing Sikorsky helicopter cabin from its facility in Andhra Pradesh. TAS has also joined hands with US aerospace and defence giant Lockheed Martin to manufacture structural assemblies for C-130 aircraft. India's heavy engineering giant Larsen and Toubro (L&T) has formed a joint venture with European aerospace and defence consortium EADS to develop electronics warfare devices.

Harness Force Multipliers for Self Reliance

All these joint ventures should serve as a platform to acquire the latest genre technologies and help India move faster on the road of defence self reliance. On another front, setting up of exclusive economic zones catering to defence, aeronautics and IT could go a long way towards sharpening the entrepreneurial skill for the design ,development and production of components, hardware, subsystems and even the entire systems under one roof. An aerospace SEZ spread over an area of 2,500-acres in South Gujarat close to Delhi-Mumbai industrial corridor will have manufacturing, testing and MRO facilities. Parallely, there is an immediate need to considerably enhance the domain skill of the Indian IT companies active in the area of aerospace and defence. Both Gujarat and Karnataka are pushing for the setting up of full-fledged aerospace universities with a view to create a talented manpower pool for expanding the frontiers of Indian aerospace sector.

Perhaps the Indian aerospace sector could follow the path of auto sector which started its forays into the international auto market almost two decades ago as spare parts and components supplier to the global auto giants. The immediate thrust of the Indian aerospace sector should be on mastering fifth generation technologies including stealth, super cruise and high performance composites

Analysts believe the offsets that would flow to the Indian industry after the country enters into a final contract with Dassault aviation for the acquisition of Rafale fighter aircraft will have the potential to revitalize the Indian aerospace and defence space. The offset obligation forming part of India's defence acquisition programme has as its objective boosting the skill and production level of Indian defence and aerospace industry by binding a foreign vendor winning an order worth more than Rs.300-crore to invest at least 30% of contract value by way of sourcing services, hardware, manufacturing and technology transfer. (For MMRCA contract the offset obligation has been laid down at 50% of the contract value)

But then the task of monitoring the discharge of offset obligations by overseas vendors is easier said than done. Despite the tall claims on offsets by the Indian Defence Ministry, the details are rather sketchy. The Ministry claims that it has managed to sign offset contracts worth as much as US\$2.1-billion and another US\$8.5-billion are at various stages of negotiations. However the recent decision to include civil aviation and homeland security sectors for offsets discharge would pave for the transfer of technologies that are "really not cutting edge". This dilution of the scope of defence offset is by no means a welcome development.

Meanwhile there is a concern that Indian artillery has not added a single piece since Bofors deal created a storm of controversy in the country in 1980s over the alleged kickbacks. The forces are now short of modern guns/ howitzers of various categories. And Indian defence ministry's efforts to import artillery systems have been bogged down in uncertainty over the allegations of 'wrong doings and kickbacks'. This is a challenge and opportunity for India to initiate the development of artillery systems by diverting a part of the US\$4-billion outlay meant for artillery modernisation for research aimed at developing artillery guns of varying specifications within the country. Clearly and apparently, developing artillery guns is not a challenging task for India. For by harnessing expertise available in the country, it would not be difficult for India to produce all types of artillery systems it requires. As it is India's excellent research and industrial base in the area of metallurgy can be harnessed to speed up the development of artillery systems. Moreover, the recent discovery of blueprint for manufacturing of the Bofors guns that was in possession of OFB (Ordnance Factory Board) for more than two and a half decades, while making for a shocking state of affairs could be used as a major input for developing Indian artillery guns. In 2009, the

consultancy firm KPMG in a report revealed that only 20% of Indian army's equipment is state of the art, 30% are maturing fast and a staggering 50% totally obsolete.

Against this backdrop, S.D.Dimri, Director General (DG) of OFB has stated that modernisation plan for manufacturing and support infrastructure of all OFB units is essential to bring them to the level where they will be able to meet the needs of the defence forces in a fast track mode and with an eye on performance standard. OFB units have a core competence in manufacturing highly sensitive chemical compositions, propellant, explosives, missile fuses, and rifles, machine guns, under barrel grenades launcher, fire control system, and active and passive night vision devices. OFB also make available advanced aluminium alloy used in the Indian space programme.

Need to Avoid Duplicity of Efforts

There are cases of scientific and research organisations in the country working on the same area resulting in an enormous waste of precious resources including human talent. For instance both ISRO and DRDO are into the development of Synthetic Aperture Radar (SAR) which is immune to cloud, darkness and haze. Of course, many of the technical specifications that DRDO is looking for its SAR may be different from the SAR that ISRO is developing. But at the fundamental level many technologies—such as materials and electronic components-- that are common to SAR can be shared by the two organisations. Similarly, there are many elements such as electronics, propellants, navigation and guidance which are common to both the launch vehicle and the missile. ISRO and DRDO pooling their resources, expertise and infrastructure could make for a win-win combination to turn India into a technological super power and transform the Indian defence production scenario. But for this happen Government of India would need to introduce a lot of policy changes whereby ISRO, a civilian organisation committed to the peaceful use of outer space, is allowed to work with DRDO in areas of mutual interest. Moreover, there is a need for a full fledged national agency to assess the resources in terms of human talent, infrastructure, status of research and technology development in various scientific organisations as well as industrial enterprises to synergistically harness the available resources for a speedier self reliance. Moreover, the Indian industry in private sector, whose track record in investing in research and development is quite dismal, should not only be incentivised to invest in original research

but should also be enlightened on the long term multiple benefits accruing from investment on fundamental research and technology development.

The strategy to put in place a robust Indian military industrial complex geared to make India self reliant in defence production should harness the resources, expertise and infrastructure available in the country with a thrust on developing innovative, cutting edge technologies to help in the constant up-gradation of military equipment and combat systems. Public private partnership, floating joint ventures with foreign partner willing to offer the latest in technology and manufacturing process, nurturing the talent in academic and research institutions, acquisition of overseas companies focussing on aerospace and defence, enhancing the domain skill of Indian IT companies, setting up aerospace and defence parks in the exclusive economic zones as well as a pro active government policy oriented to support defence research and development and private sector enterprises taking up the development of technologically challenging defence systems could pave way for the long cherished Indian self reliance in defence production. In the ultimate analysis the focus should be on turning Indian from being an importer to the exporter of the defence hardware. And that alone could qualify India to lay claim to being a global military power.



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