INDIAN DEFENCE INDUSTRY: INSULATION GRADUALLY MELTING

A. VINOD KUMAR

Kirby Place in the heart of Delhi's Cantonment area glazes from the reflections of a multi-storeyed tinted-glass building standing testament to a new evolution in India's defence industrial movement. This barren military area has a visible paradox in this new edifice that houses the corporate office of a private joint venture company with foreign stake, called BrahMos Aerospace. Being India's first privately registered military aerospace joint venture with Russia, BrahMos nevertheless, is very much under government control, but stands to epitomise the new transformations in the Indian defence industrial base. Impelled by unique changes in the global defence industry and domestic economic impulses, these transformations are crucial for the future of the Indian defence sector, the country's military modernisation programme and its future military requirements. This essay attempts to gauge the finer nuances of this transformation, explores the new possibilities dawning on the Indian defence industry and examines the prospects of a new industrial model suited for India's future strategic requirements.

WINDS OF CHANGE

The sweeping changes in the global defence industrial base were triggered in the early 1990s as part of the post-Cold War global geopolitical transformations. With the fall of the Soviet Union, military expenditure suddenly plummeted owing to the apparent peace dividend. The global

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defence industrial base, challenged by diminishing military budgets and dwindling domestic and export markets, prepared for an inevitable transition marked by impulsive attempts at conversion to civilian technologies. Conversion processes in most defence industrial bases were launched with much fanfare but failed to make a substantial difference due to many systemic inconsistencies, as also owing to the disinclination among weapon majors, especially in the US and Europe, to disengage from their traditional strongholds. Instead, these dominant industrial zones applied conversion as a means to diversify to semi-defence areas like communications, surveillance and transport systems. Though this seemed more like a diluted form of conversion, it enabled the revitalisation of the sagging fortunes of the industry and helped reinstall some stability in the industry. Evidently, giant contractors struggling to sustain in the light of bleak prospects, found this opportunity a means to restructure their industrial organisation, at both the organisation (micro) and the sector (macro) levels.

Comprehensive restructuring of the global defence industry was itself a rigorous process involving various inter-disciplinary and trans-management programmes including consolidation, concentration and diversification. This vibrancy was inevitable considering the high stakes involved and the complex nature of the organisational structure, mainly the duality of control in prominent bases between private contractors as producers and the government as the policy initiator. Ineffective conversion attempts blew up the impending crises in favour of strong sentiments towards widespread consolidation as a steadfast platform for reviving the industry. With a major chunk of the top ten defence companies based in the US, the consolidation trend was kicked off

during Clinton's first presidential tenure through some significant rationalising initiatives.[1] Soaring production costs and layoffs in colossal groups like Lockheed, General Dynamics and Northrop made it evident that some kind of restructuring was imminent to impose fiscal and corporate discipline.[2] The initial success and optimism generated by rationalisation widened the thinking in Washington on the need to apply mergers as the primary tool in the consolidation efforts.[3]

Consolidation of the US defence industry started with some dramatic mergers forming new industrial entities and the demise of many old monoliths. Though it initially resembled a devastating exercise, on the ground it enabled transmutation to a robust industry with potent industrial majors joining hands to form new entities and synergising their capabilities in technology, capital and manpower towards common goals and powerful brand values. Amalgamations brought in a new spirit of industrial kinship and the willingness to unite for the increasingly diminishing pie. In 1987, the US had seven producers of military aircraft. By the end of the 1990s, only two behemoths remained, namely, Lockheed Martin and Boeing Douglas, with Lockheed acquiring Martin Marietta and Boeing buying McDonnell Douglas and Rockwell's defence arm.[4] The integration of Grumman with Northrop created a comparatively smaller entity, called Northrop Grumman, further expanded through the buy-out of Vought Aircraft. Raytheon hit bulls-eye by integrating the military wings of Hughes and Texas Instruments to become the world's largest defence electronics corporation. Loral pulled off a coup by acquiring in one bout many majors like Ford Aerospace, Fairchild-Weston and IBM's Federal Systems Division.

Taking the cue from the US, the European defence base initiated widespread

1. John Lovering, "Loose Cannons: Creating the Arms Industry," in Mary Kaldor ed., *Global Insecurity* (London and New York: Printer 2000), p. 151.
2. Terrence Guay and Robert Callum, "The Transformation and Future Prospects of Europe's Defence Industry," *International Affairs*, vol 78(4), October 2002, p. 32.
3. See Keith Hartley, "Arms Industry and the Globalisation Process," Centre for Defence Economics, University of York, published in www.york.ac.uk/depts/econ/rc/unesco.pdf.
4. Lockheed also acquired the fighter aircraft operations of General Dynamics (with F-16 in the inventory) while Martin Marietta acquired the aerospace division of General Electric in 1993, and space operations of General Dynamics the next year. See Ruchita Beri, "Transformation of Global Defence Industry," *Asian Strategic Review* 1995-96 (New Delhi: IDSA, December 1996), p. 198.

consolidation efforts, the most notable being the formation of the first European trans-national consortium – EADS (European Aerospace, Defence and Space Company[5]). EADS happened through a massive merging process involving commercial aircraft manufacturer Airbus, helicopter supplier Eurocopter, space company Astrium, missile firm MBDA, and launching of the Eurofighter consortium and the A400M military transport aircraft project. As such, restructuring of the European defence industry was a bold effort through a dual approach of looking inward and also thinking trans-national, after governments washed off their hands during the crisis. Europe's first vertical integration came after GEC agreed to sell its defence arm (Marconi Systems) to British Aerospace, creating a single-holding British giant renamed as BAE Systems with combined capabilities in as varied areas as aviation, land and sea systems and defence electronics. At the same time, failure of a government-supported initiative for a pan-European consolidation by merging British Aerospace with DASA of Germany and Aerospatiale of France in turn enabled not just an inward British consolidation but scope for a competitive European market. More consolidation came when the French privatised Thomson-CSF after integrating it with Dassault Electronique and Aerospatiale in 1997. Subsequently, Thomson-CSF acquired Racal of the UK to form Thales, thus, taking third place in Europe after EADS and BAE.[6]

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Revitalisation of the sector in the former Soviet Union, coinciding with its

5. As the first major intra-European aerospace and defence venture, EADS, launched on July 10, 2000, combined the entities of Airbus, Ariane, Aerospatiale Matra, DASA, and Spanish CASA, with combined annual revenue of $22 billion, putting it behind Boeing and Lockheed Martin, and just ahead of BAE Systems among the top arms producers. *The Military Balance: 2000-2001* (Oxford: Oxford University Press, 2000), p. 36.
6. Similarly, the EADS subsidiary Eurocopter and Italy's Agusta merged with the UK's Westland to form Agusta Westland in 2001, and virtually became the European challenge to the US (Boeing) in the rotorcraft market. Also, the combination of missile interests of EADS, BAE and Finmeccanica in the same year created MBDA as the world's second largest maker of missiles, behind Raythoen of the US.

politico-economic changes, made it a painful effort involving numerous stuctural adjustment challenges. Throughout the 1990s, the new bases in Russia, Ukraine and East Europe were struggling to adjust with the emerging global defence industry dynamics. Though the scattered presence of design bureaus and production units across various republics impeded the process, the Russian and Ukrainian bases consolidated the assets into new corporate units based on competency areas like military aerospace, while also faciltating scope for competition within. True integration with the global industry happened with the setting up of Rosoboronexport Federal State Unitary Enterprise in November 2003 as the sole state intermediary agency presiding over 80 per cent of Russian dual-use exports, and for promoting international collaborations and Russian products at the global markets.

A closer examination of these processes would reveal a proactive kind of corporatisation and marketisation strongly factored by the coincidental advent of globalisation in the global economy during this period. If the first phase of transformations in the early 1990s is to be seen as a panicky salvaging effort by the industry, the second phase of restructuring was more market-driven with governmental control receding at national and global levels. Corporatisation was signified not just by new control stakes, but also by the trans-nationalisation of production and distribution systems. Defence majors began exploring newer markets, cheaper development and production facilities through new trans-national investment plans. With marketisation becoming the key, outsourcing of sub-systems, joint ventures, collaborations and joint research and development (R&D) efforts denoted the integration of the defence industry with the global economy. These transformations were palpable through the fresh treatment this sector received on par with other manufacturing sectors, and its strategic character shifting towards a professional market-oriented outlook. Declining governmental control over these bases also meant

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military products being put to the mercy of the markets. The deconstruction of national identity mattered on the product range which increasingly inhibited single national origins.

THE INDIAN DEFENCE INDUSTRY: FROM INDIGENISATION TO PARTNERSHIP

In line with these global changes, the Indian defence industrial base, totally state-owned and deemed a vital national security asset, started experimentations with reforms in the 1990s after a concerted tryst to achieve self-sufficiency in defence development and production. However, this could by no means imply abandoning the "self-reliance model" India has been vigorously following since the 1950s. Self-reliance always meant meeting India's immediate demands through imports from foreign sources while also simultaneously striving for indigenous capabilities in defence production. Being at the disadvantageous side of the technological divide, India pursued a long-term goal of self-sufficiency in defence production, but realised the inevitability of depending on foreign sources for access to critical military technologies, components, and often complete military systems. However, the insatiable thirst to develop indigenous technology and the reluctance among many Western nations to share advanced military technology forced India to persist on its own indigenisation efforts, but with limited success.

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In hindsight, one can find an inconsistent pattern of indigenisation drives being followed ever since the 1950s. Unlike countries like China with a similar pathway of industrial progress, the Indian defence industrial movement was a sprinkling of intermittent shots at indigenisation and overwhelming dependence

on foreign sources, notably embodied by the licensed production mechanism with the Soviet Union and some European countries. In effect, this production method, with an undeniably active collaborative character, became the mainstay of the Indian defence sector once advanced military technology became too meagre in the 1960s. Considering that licensed manufacturing had maintained a stable equilibrium as a production method and also a model of technology assimilation from multiple sources, it seems the Indian concept of self-reliance had in some ways deemed it as an inclusive component of indigenisation. Such thinking is strengthened when construed that licensed production has been, and continues to be, a key catalyst of India's defence industrial growth. Although it was the licensed production partnership with the Soviet Union in the 1960s that is treated as the hallmark of the "era of licensed production," as early as 1941, Hindustan Aircraft Limited (HAL), as the predecessor of Hindustan Aeronautics Limited, initiated this trend by assembling the Harlow trainer aircraft and overhauling aircraft types, including the Tempests, B-24 Liberators and C-47 Dakotas, etc. during World War II.[7] The B-24 Liberator overhauling became a legend in itself after the Indian Air Force (IAF) and HAL managed to salvage and rehaul from scrap many pieces of Liberators abandoned in a scrapyard at Kanpur during the World War.

The birth of licensed manufacturing in independent India began in 1948 on the Percival P.40 Prentice T.3 with the first aircraft flying on April 30, 1948.[8] The same year, India also tried out its first indigenisation exercise through the Hindustan Trainer 2 (HT-2) – the debut venture of the design and development cell launched at HAL by Jawaharlal Nehru as part of the self-sufficiency movement. As a matter of fact, the early attempts at indigenisation were more notable in the aviation sector through extraordinary projects like HT-2, Kanpur I and Kanpur II, which demonstrated the innate skills of pioneers like Dr. V.M. Ghatge. HT-2, being India's first indigenously designed powered aircraft was also symbolic of India's defence commerce aspirations when HAL exported over 12 HT-2 aircraft to Ghana in 1958, denoting the very first export of any

7. See "Hindustan Aeronautics Limited, 50 Years On," *Vayu Aerospace Review*, July-August 1990.
8. See D*iamonds in the Sky – Sixty Years of HAL 1940-2000* (New Delhi: Society for Aerospace Studies, 2001).

aircraft developed and manufactured in India. Though this was the opening chapter of indigenisation in independent India, licensed production was still followed as the primary industrial model during those initial years. The agreement with De Havilland of the UK for licensed production of the Vampire FB52 fighter-bomber in 1956 and similar agreements with the UK's Folland Aircraft and Bristol Aero-engines to manufacture the Gnat light fighter and its Orpheus 701 turbojet engine were some of those notable ventures. Inevitably, the series production of Vampire and Gnat aircraft, for which an Engine Division was set up in 1957, raised the confidence of HAL designers to develop new indigenous aviation systems which resulted in projects like the HUL-26 Pushpak and the HAOP-27 Krishak.

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However, the most ambitious venture of them all was the HF-24 Marut advanced fighter jet in 1957. Conceptualised by the legendary German designer Dr. Kurt Tank, the Marut was to be India's first true fighter design which could catapult India into the bigger league of aviation majors. After the first prototype based on the plan to install the 3,700 kg Orpheus B.Or.12 engine flew in March 1961, the project hit a major bottleneck when the British decided to abandon the Or.12, forcing HAL to depend on the un-reheated Orpheus 703 for the Mark.1 version of the aircraft. Though the hunt for a suitable power-plant went on, successive failures to acquire the Russian RB-153 and RD-9F, SNECMA's Atar 09K-53 and the E-300 turbojet finally forced the HF-24 to enter production and service with the underpowered, licensed built Orpheus 703, thereby, undermining the whole *raison d'etre* of the aircraft. Nevertheless, the aircraft performed active service till the Mk.I version was phased out in 1974 and the Mk.II, replaced by the MiG 23 BN in 1982. The Marut, remembered for its effective handling and promising design that was meant to cruise supersonic at 40,000 ft, finally met a disappointing end thanks to unkept promises and politics that embroiled the engine-making process. It would be

over 40 years since the Marut's first flight when another indigenously designed system, the light combat aircraft (LCA) would take to the Indian skies. The analogy here is clearly apparent by the fact that the LCA experienced similar issues in the power-plant fructification even after four decades of conceptualising the first indigenous fighter. This also underpins the perception that even after 40 years, India's design and development capabilities failed to reach the desired levels even when a colossal infrastructure was built up for the licensed production model.

Thereby, the twin-edged strategy of indigenisation and licensed production in parallel tracks could be regarded as a compulsion which the Indian defence industry could not do away with. The progress from the 1960s is simply an example of this quandary. Even when new projects like the HJT-16 Kiran intermediate jet trainer typified the excruciating indigenisation attempts by Indian designers, the advent of Soviet assistance in the 1960s, alongside licensed deals with some European nations in the coming year, again catapulted licensed production as India's primary defence production model. After initiating production of the MiG series as frontline fighter jets, HAL also licensed produced the Cheetah and Chetak helicopters from the French Aerospatiale stable and Jaguars from the Anglo-French ventures. Similarly, the Heavy Vehicle Factory (HVF) in Avadi licensed manufactured the Vijayanta tanks based on the British Vickers during the 1970s and 1980s, followed by the Ajeya main battle tank (MBT) based on the Soviet T-72 MBT. Consequentially, licensed systems dominated the land forces in such a manner that no design activities were taken up in this segment for a long period until the launch of the Arjun MBT and Indian National Small Arms (INSAS) projects in the early 1980s. Throughout this period, the Ordnance Factories (OFs) engaged in indigenous production of weaponry, mostly with foreign inputs, which still constituted large quantities of relatively low to medium technology items.[9]

As licensed production and direct procurement overshadowed indigenisation, analysts argue that there was a gap of nearly three decades in India's effort towards indigenous production, especially in design and

9. Deba Mohanty, "Changing Times – India's Defence Industry in the 21st Century," BICC Paper no. 36, Bonn, 2004.

development capabilities which constituted the main spectrum of self-reliance.[10] This was apparent in the massive time-gap in critical military technologies with the advanced world, and illustrated the below par quality of the defence industry as well. Without doubt, licensed production was the crucial propellant of the self-sufficiency movement and the Soviets proved to be a trusted source in technology sharing at least till the early 1990s. However, this arrangement put in place a gargantuan military industrial complex, with a colossal manufacturing infrastructure catering to the forces' requirements with little scope for innovation. In retrospect, when we accredit the foreign contribution to the creation of India's military industrial complex, a share of the blame for the retarded design and development capabilities could be attributed to the dependence on this foreign hand.

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The new wave of indigenisation in the 1980s was derived out of a realistic appreciation of these deficiencies. A whole new series of projects covering aerospace, missile forces, naval and land systems launched under the leadership of the Defence Research and Development Organisation (DRDO) in the 1980s was meant to be a paradigm shift in India's defence industrial movement. Lots has been written on the results of this ambitious industrial drive, often deemed as a limited success. More than the merits of this contestation, there are some fundamental questions to be addressed. Has this wave of indigenisation helped bridge the critical gap in access to advanced military technology and creation of new ones? Also, has the performance index, in production and development, achieved any substantial

10. Ajay Singh, "Quest for Self-Reliance," in Jasjit Singh, ed., I*ndia's Defence Spending: Assessing Future Needs* (New Delhi: Knowledge World, 2001).

change through these programmes? The mismatch between the nature and objectives of this drive has thrown up mixed signals. Even though indigenisation was meant to break the decades-old dependence on foreign sources, the new programmes progressed in consonance with existing licensed production ventures while new ones were contracted during this period. For example, ventures like the LCA moved in parallel track with the licensed production of Jaguars, and the MiG series even as new licences were obtained for production of aircraft like the Dornier Do-228. It would be speculative to ascertain whether technology of these licensed aircraft had influenced the designs and systems of the indigenous projects and whether reverse engineering worked at some levels.

Nonetheless, giving merit to the fact that indigenous programmes were aimed at developing technologies with a 25-year premium, the thorny task here is to explore the actual scope envisaged for foreign technological inputs in these indigenous programmes. Going by the public posture of individuals and organisations associated with these projects, it was evident that the philosophy of indigenisation envisioned by that generation was to create a credible domestic design and development capability with negligible dependence on foreign sources. If so, it implied a departure from the traditional thinking on self-reliance, which had scope for foreign technology assimilation at all possible points. Significantly so, one cannot quell the curiosity to know if the indigenisation attempts since the 1980s had achieved the objective of total development self-sufficiency and if not, whether things would have been better had the insulation been less stringent. Thereby, it is relevant to know whether the DRDO had undertaken a capability auditing before leaping onto these ambitious ventures. Assuming that technological development capability has not progressed much from the Marut years, the possibility of such a scrutiny seems to be remote. While the domestic private sector might have been treated as a non-entity in this scheme of things, the impulses for this drive might be the massive public sector manufacturing infrastructure and the new breed of rookie scientists from the burgeoning technological institutes.

The indigenisation programmes of the 1980s revolved around a set of self-motivated and complex projects like the intermediate guided ballistic missile programme (IGBMP), LCA, advanced light helicopter (ALH), Arjun main battle tank (MBT), air defence ship (ADS), advanced technology vehicle (ATV), and so on. Other than the ALH project and some dual-use defence technologies developed by DRDO, most of these projects suffered the unrelenting procrastinations and limited successes, with some lingering at development stages even 15 years outside the drawing boards. Even as discretionary funds carried these projects beyond many revised deadlines, the process of technological assimilation was an excruciating factor constraining these programmes. The most notable embodiment of these inadequacies is the nearly 20-year-old programme for an indigenous fighter jet – the Tejas LCA. Though the capital allocation for the LCA would be inequitable with global standards, its timeframe and cost outruns belied its intended objectives and end-user obligations. With the LCA project failing to meet the requirements of the IAF for the 1990s, the air force is now looking for alternatives to cover its fleet shortages. International sanctions and technological constraints have also been cited for the delays of this project even when the power-plant jinx continues to trouble its complete indigenisation goal.

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However, the real bothersome issue now is the redundancy this aircraft is likely to face when commissioned in 2010. At that time, its first customer, the IAF, would have numerous off-the-shelf choices of technologically superior aircraft through easier off-the-shelf procurements.[11] One cannot rule out the possibility of the IAF preferring advanced fourth-generation jets like the

11. These would include the Eurofighter Typhoon, SAAB Gripen, Dassault Rafale, F-22s, and probably newer versions of F-15s and Sukhoi Su-30s, among others. In fact, the French government, which recently withdrew the Mirage-2000s from the race for the IAF's fighter requirements, had in turn offered Dasault Rafale for the competition. See Shiv Aroor, "France May Offer Rafale for Mirage," *The Indian Express*, February 16, 2006.

SAAB Gripen, Dassault Rafale, Boeing F/A18 or Eurofighter Typhoon[12] that suit its future operational requirements and can counteract operational asymmetry with its nearest military competitors. Moreover, by the time the LCA gets operationalised, many of these aircraft would have moved into higher stages of technological upgrades which could place them on the threshold of the fifth-generation technological benchmarks, thus, making prospects for redundancy of the LCA more acute. Though many foreign experts believe the LCA would hit the fourth-generation requirements conveniently, the expected schedule for its deployment and production only adds to the traumas of the technological divide. On the other hand, the other intended customer, the Indian Navy, could be forced to follow the IAF example in deciding the aircraft for its future carrier requirements, for which the naval version of the MiG-29, among others, is already in the race. Also, the Aeronautical Development Agency (ADA) would have to produce a series of convincing results of crucial capabilities like STOVL (short take-off and vertical landing) and VOTL (vertical take-off and landing) which are crucial for carrier-borne jet fighters.

Despite all the brickbats for this project, for a country like India with deficient technological capabilities, the LCA is an effort with enough milestones to its credit. True, the project has exceeded the original expectations of budgeting and timing. Yet, it claims to offer cheaper production costs, and used a timeframe which is almost comparable with counterparts of the same generation like Rafale, Eurofighter and Gripen, which were all conceptualised before the LCA and were developed in defence bases with proven industrial capability and knowhow to produce advanced fighter jets. However, this is not to ignore the fact that India could not advance much in these capabilities despite attempting it first almost three to four decades earlier. Thereby, the question often raised with the agencies involved with this project is about their prudence

12. In an interview to the author in 2004, the then Chief of Air Staff, Air Chief Marshal S. Krishnasamy had indicated the need for immediate replacements for the ageing MiG fleet and future replacements for Jaguar and Mirage fighters. See A. Vinod Kumar & J.C. Mallik, "We Believe in Qualitative Relations, Not Power Projections," *Vayu Aerospace and Defence Review*, II/2004. The IAF has already announced its clear requirement for 125 multi-role fighter aircraft and has already solicited information from leading aircraft manufacturers. "F-16 on IAF Radar for Fighter Jet Purchases," *Indo-Asian News Service*, February 7, 2005, www.hindustantimes.com/news/181_1231836,0008.htm "India to Buy 126 New Warplanes," BBC, February 7, 2005,http://news.bbc.co.uk/1/hi/world/south_asia/4242589.stm

in rejecting the scope of foreign technological assimilation which could have hastened the progress of the LCA's development.[13] The LCA, on its part, is billed to be one of the world's smallest, supersonic, multi-role, single-seat fighters designed to function as the IAF's frontline, multi-mission tactical aircraft. This puts it in a class that is much beyond the MiG-21 that it was to replace and offers more utility as a multi-role fighter which the IAF desperately seeks. Above all, the LCA is a flag-ship national project intended to construct a long-term advanced infrastructure for the aviation industry. Large portions of investment have gone into developing a design and development base vital to foster a sustained presence in this field. Thereby, at least some of the R&D efforts made out of this investment have been successful, which include indigenously developed competencies in aerodynamics, flight mechanics, carbon fibre composites for air frames, propulsion system, excluding the engine, and superlative avionics and flight control systems.

Above all, the LCA is a flag-ship national project intended to construct a long-term advanced infrastructure for the aviation industry. Large portions of investment have gone into developing a design and development base vital to foster a sustained presence in this field.

On the other hand, it is not just the LCA that exemplifies shortcomings in the indigenisation process. Realistic progress continues to evade on major missile development programmes launched in the 1980s. Other than early variants of the Prithvi and Agni, most other programmes linger at the development stages many years after conceptualisation. While technology assimilation has been comparatively less demanding for missile programmes thanks to the strides gained by India's space programme, reliability and accuracy seem to evade the capabilities of missile systems currently under development. Similarly, the fate of prestigious programmes like the ADS, India's debutant indigenous aircraft carrier, and the ATV, the indigenous nuclear-powered submarine, are no

13. See Rahul Bedi, "More Delays for India's LCA Demonstrators," *Jane's Defence Weekly*, January 8, 1997; Pierre Sparaco, "US Nuclear Sanctions Could Kill India's LCA," *Aviation and Space Week Technology*, July 20, 1998; and Pierre Sparaco and Paul Manm, "LCA's First Flight Slips to Mid-1997," *Aviation and Space Week Technology*, December 2, 1996.

different. The keel is yet to be laid for the ADS years after official sanction, reportedly owing to design complications and non-availability of suitable resources. The ATV remains shrouded in mystery and is reportedly stumbling at the nuclear power plant stage. The embarrassing tale of the Arjun MBT programme, launched in the mid-1970s to supplant the Russian and British systems has been an unassailable blot on the whole indigenisation process. Despite many revised deadlines and umpteen abortive field trails, a limited edition of this MBT is now into serial production, but with glaring doubts about its reliability and firepower.

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Amidst all these setbacks, the indigenisation exercise has moved forward in a determined fashion thanks to success stories like the Dhruv ALH, BrahMos, INSAS and the INS Delhi class destroyers. It is significant to note that the Indian Navy, with its own indigenous technological competencies and flexible assimilation policy, has cruised ahead of the other Services in its development programmes. INS Delhi is the first of a new class of destroyers built by Mazagon Docks under the navy's Project 15 programme, with the latter undertaking the design based on its own requirements. A compelling factor that can be merited in the INS Delhi story is that unlike most other indigenous programmes, it incorporates a whole gamut of foreign systems and technology for an Indian design, thereby embodying a dependable model of industrial partnership to attain self-reliance by integrating the competencies of Indian firms like Mazagon, Garden Reach, Hindustan Electronics Limited among others with firms from Russia, France and Israel. Based on the INS Delhi experience, the navy developed newer vessels like the INS Mysore (1999) and INS Mumbai (2001), and would suitably apply these lessons for its 15-year ship-building programme.

Why then were other projects like the LCA denied the benefits of this model? Not many in the defence R&D establishment might give a convincing reply. Still,

there are enough indications that these lessons are being imbibed after two decades of experimentation, and sparked off by the dramatic transformations at the global level. With *laissez faire* winds removing politico-economic constraints on supra-national defence cooperation and the dominant industrial culture shifting in favour of joint development and partnerships, why should a country like India, with a long history of cooperation with foreign partners, confine itself to an insulated framework? Consequentially, we can believe that this shift in approach might have resulted in the successful development of projects like the BrahMos and Dhruv ALH. The Indian policy establishment had realised in the late 1990s the need to exploit all suitable avenues of technology cooperation so as to realistically ensure a self-reliant industry. The elucidation has been made clear early this decade and followed up through policy changes, reflecting in the successful development of the BrahMos supersonic cruise missile, which has imparted a new industrial example for the country through its composition and technology sharing arrangement.[14] Similarly, HAL's partnership with Israeli firms on avionics and related systems ensured a timely development and delivery of the Dhruv ALH to its destined customers. The agreement on joint marketing is expected to help Dhruv approach markets even in competitive regions like Europe.

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The immediate lesson given by these unique cases is the inevitability of technology assimilation, especially from foreign sources, as a key factor in achieving design and development capabilities. Though not categorically

14. The BrahMos cruise missile is a successful example of the first ever joint venture as a private project between India and Russia, although controlled at the governmental level. The decision to register it as private project itself shows the appreciation of the potential to tap the global market in this format, transcending the constraints imposed for state-owned enterprises.

expounded, many of the delayed programmes had undeclared insulation from foreign involvement. And in other cases, political and economic sanctions played spoilsport during the Cold War. Nonetheless, the Indian government had greeted global transformations with caution on deciding the level of integration to be achieved with the global industrial base. Such apprehensions were visible in the reluctance to engage with foreign partners in delayed indigenous programmes despite offers knocking at its doors. For example, even when the BrahMos offered tremendous scope for partnership with the Russians, New Delhi remained undecided on the Russian offer for joint development of advanced aviation and missile projects. Though the procurement process is now streamlined for a steady inflow of off-the-shelf buying, such enthusiasm is absent on joint venture proposals. For a country infamous for a 17-year saga to acquire an advanced jet trainer, such uncertainties evoke little surprise. For, ambiguity in decision-making is an infirmity the Indian defence industry has experienced right from independence. After years of dependence on diversified sources of technology and knowhow to develop its defence industrial base, the country is now at a crucial phase of transition where dependence could be supplanted by interdependence and insulation replaced by partnerships. How this could be done is a collective challenge the industry has to reckon with!

When India's defence forces have to depend on off-the-shelf and licensed production for their requirements and an ambitious 20-year indigenous plan shows diminutive promise, the impression of a systemic deficiency cannot be concealed.

NEED FOR A RESTRUCTURED DEFENCE INDUSTRIAL BASE

When India's defence forces have to depend on off-the-shelf and licensed production for their requirements and an ambitious 20-year indigenous plan shows diminutive promise, the impression of a systemic deficiency cannot be concealed. In some ways, these expose the collective failure of the defence industry, as a state-owned entity, to stand up to technological innovations at the global level. While

technology would be the primary deficit, the inability to tap the country's massive private sector right from the initial years is something even critics miss out. Prosperous industrial bases, especially in the West, have developed their defence industries with strong private involvement — in some cases, with dominant stake holding. India, on its part, has often contemplated integrating the private sector in defence industrial development, but never had the political determination to do so in an area considered to be sacrosanct. If some historical accounts are to be believed, the government had mulled over private participation during the war years. If and when a real contingency were to arise, many in the R&D establishment would conveniently pass the buck on to the technological handicaps of the private sector to cater to such a high-technology area. A retrospection of possible outcomes of private participation in defence development and production in the past would be fruitless at this juncture. Rather, merit should be given to the fact that technologically weak and oversensitive (about defence autonomy), India of the pre-1990s had little scope for such camaraderie.

Yet, at the height of the indigenisation movement of the last two decades, nodal agencies like DRDO used the services of the private sector in many ventures, but often confining them to mere production sub-contracts or ancillary component supplies. Save for such scant contribution to the defence industrial index, the Indian private sector was denied any major role in conceptualisation, design, or development of weapons systems. This, undoubtedly, deprived the sector of technical and capital support, with programmes losing on benefits of an initial competitive phase seen in advanced industrial bases. With the ascendancy of neo-liberal policies in the 1990s, the role of the private sector in defence has gradually gained legitimacy. If former closed economies like Russia and China can form inter-competing defence corporations and consortiums, then why should India hold back? There is increasing recognition at the policy level of the need for larger public-private cooperation in this sector. The new thinking is reflected through the various industrial promotion events like Def Expo and Aero India which serve as platforms for enhanced private-public cooperation and to showcase their potential.[15]

15. The Def Expo and Aero India are biennial defence industrial promotion events held alternatively in New Delhi and Bangalore respectively, which bring together the whole gamut of Indian PSUs, private sector firms and foreign companies in the military and aerospace sectors to showcase their products and capabilities.

Leading Indian groups like L&T, Tata, Mahindra, and Kirloskar, among others, are already involved in some major defence projects. Tata's successful integration of the Pinaka multi-barrel rocket developed by DRDO, L&T's development of the universal missile launcher with DRDO and Kirloskar's competencies in naval propulsion systems are recent examples of assertion by the private sector in defence R&D. Still, not many foresee a grand transformation through their entry owing to lack of a solid defence technological base in the country, and also owing to the pervasive mistrust in the R&D establishment. DRDO, on its part, believes that a world-class technological base exists through its labs and defence public sector undertakings (PSUs). What it feels is missing is ample industrial support for its technology through world-class manufacturing infrastructural support, including from the private sector.[16] However, considering the tight insulation of the sector till recently, such criticism seems misplaced. Moreover, DRDO has access to numerous factory floors of defence PSUs with proven manufacturing capabilities. In fact, most countries face this technology-infrastructure gap as strategic technologies normally outpace the requisite industrial capabilities.

The government had allowed the private sector to start fully-owned defence industries five years ago, but till now, only 22 letters of intent have been made out. A few licences have been issued, but, as the defence minister said, "The response has not been much" in actual investment because there is still a mismatch between capabilities and intentions.

As a matter of fact, such debates cannot eclipse the real problem of technology generation and the huge gap it creates with the advanced world. For, it is an undeniable fact that the Indian defence industrial base cannot be deemed a strong developer of strategic technology, be it through indigenisation, assimilation or even reverse engineering. The government had allowed the private sector to start fully-owned defence industries five years

16. R. Prasannan, "A Shot in the Arm," *The Week*, February 16, 2006.

ago, but till now, only 22 letters of intent have been made out. A few licences have been issued, but, as the defence minister said, "The response has not been much" in actual investment because there is still a mismatch between capabilities and intentions. The ostensible reason for an indifferent response from the private sector is that the procedures prescribed are cumbersome. While this can be remedied through bureaucratic reforms, the problem still lies in the private sector's fear that it may not be cost-effective to set up advanced production facilities when orders are limited. Though it is worth exploring the possibility of joint ventures between defence PSUs and private firms (and also foreign partners) to rectify this, actual policy back-up is yet to come.

The Kelkar Committee, which calls for sweeping changes in the sector, had recommended greater freedom to the defence PSUs to form joint ventures with private and multinational consortiums and be empowered for "cross investment in foreign countries so as to obtain technology."

There are roughly over 60 large, medium and small-scale domestic entities that are directly or latently involved in the Indian base at either the production or development stages. Why then, even over five years after allowing the private sector and 26 per cent foreign direct investment (FDI) into the sector, are there no joint ventures worth the name? Out of the 22 who responded, 10 are in the automotive sector and were earlier involved in defence production. The items for which letters of intent were issued are not genuinely hi-tech ones. The underlying issue here is that though the government was clear on the guidelines for the private sector to set up shop, the same enthusiasm has not been seen on preparing a framework for private sector involvement on a strong footing in R&D, which is a sensitive area, or for joint ventures with PSUs, most of which are still trapped in pre-liberalisation mindsets. Touching upon this element, the Kelkar Committee, which calls for sweeping changes in the sector, had recommended greater freedom to the defence PSUs to form joint ventures with private and multinational consortiums and be empowered for "cross investment in foreign

countries so as to obtain technology."[17] Kelkar also observed that the OFs and PSUs must have "greater freedom to become global players in defence production and effectively perform the role of designer and integrator of large systems and platforms."

Undoubtedly, any extent of reforms of the sector would be incomplete without a credible restructuring of the public sector bodies. Being a sector monopolised completely by them, the private sector can only aspire to have a secondary role in the opportunity that comes by. Considering that the PSUs and OFs have among the largest manufacturing infrastructure in the world, the thrust of any reform process, as Kelkar pointed out, should be on capability building, through partnerships. For example, the Indian automobile sector, which has seen revolutionary growth in the past decade, can share competencies with defence PSUs to carve out a world-class defence automotive hub. The shortfalls in R&D are also rectifiable if the private industry holds a stake with DRDO on a risk-sharing basis – a model mooted by DRDO, provided the mistrust moves over. Assuming that capability building gives spontaneous results for national military requirements, the next phase of this process could be the creation of a globally competitive industrial base, which can compete in the export markets and also be promoted as an outsourcing hub, like the information technology (IT) sector. To achieve this, restructuring of PSUs would be inevitable, even to the extent of disinvesting the government stake. In fact, Kelkar stops short of recommending this despite a dominant thinking in industry circles that defence PSUs should not be kept aloof from such processes, when even Navaratnas are taken up for disinvestment.

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The scientific and industrial communities are convinced that India could emerge as a hub of defence manufacturing, given the interest shown by Euro-

17. See Sujan Datta, "Reform Wind in Defence," *The Telegraph*, November 10, 2005.

American giants in outsourcing, meriting its cheaper and technologically-trained manpower base. Even without the offset clause which has been added to the reforms guidelines, quite a few global giants are already at work. HAL has been supplying passenger doors to Airbus, uplock boxes for Boeing-777, tail rotor blade assemblies to Bell Helicopter of the US, rolled rings and forgings for Rolls Royce and Snecma engines. The Eurocopter will have structural packages from HAL, and Northrop Grumman wants to source aircraft assemblies and digitisation service to HAL. While most companies are focussing on India as a new product destination, their governments might be cautious on outsourcing, fearing loss of jobs. At the 2004 Def Expo, government officials expressed the desire to attract outsourced offset contracts and involve the private sector in such efforts. However, the small-scale sector, which has contributed in equal measure to the industry, could be worried about such opportunities being hijacked by the big sharks.[18] Considering their numbers and proven capabilities, the government might do well by incorporating them in equal measure.

On the other hand, despite *laissez faire* in full form, foreign capital still seems to elude the Indian industry but for some ventures like BrahMos. The decision to register BrahMos as a private company revealed the new thinking on tapping the global market in this format, escaping the constraints of state-owned enterprises. Undoubtedly, there is deeper understanding that foreign capital could facilitate a greater inflow of technology, vitally needed for bettering industrial standards and faster integration with the global industry. Yet, it is hardly forthcoming! Though there are stray examples like HAL's tie-up with Israeli firms to develop avionics for the Dhruv ALH and its joint marketing, unlike other high-growth sectors, the defence industry got no worthwhile FDI proposals even over four years after its opening up. However, there is no dearth of global defence majors lining up at Indian markets showcasing their products. No one doubts that such gestures are aimed only at the procurement process, with a hefty Rs. 45,000 crore capital acquisition bill averaging the last few budgets.

For decades, foreign sources have remained the mainstay of India's defence procurement, but restricted to licensed production. Though talk of co-production

18. "Kelkar Report: Section of Military Unhappy," *The Hindu*, May 2, 2005.

and joint ventures has been doing the rounds in the last few years, lack of any tangible proposals exposes the intricacies associated with foreign investments. It is pointed out that the 33 per cent offset clause invoked by the government is the primary deterrent for FDI in defence. For a defence industry which nourished itself through offsets, and aspires to become an outsourcing hub, such guidelines might seem fair enough. Though FDI inflow may still be slow, reports suggest that even the once-jinxed Kaveri project is receiving interests from global engine majors, including Pratt and Whitney.[19] Also, some chinwags have been doing the rounds on Indo-Russian partnership in joint development of some aviation projects – a la the BrahMos model. In fact, there is no dearth of models. The Su-30MKI owes its existence to the parameters set by the India, creating a brand new fighter jet by harnessing Russian technology with the skills of India, France and Israel in the process.[20] Why has this joint approach not been examined for other projects? In fact, there are many permutations that can be tried out for joint development, stake holding, and what not!

A LAISSEZ FAIRE INDUSTRIAL CULTURE STILL MISSING

The aforementioned problems and solutions notwithstanding, the Indian defence base and its end-users continue to run short of technology to cope with the new revolution in military affairs (RMA). While 'sunset' technologies continue to flow through various sources, cutting-edge still depends on 'sunrise' technologies that are difficult to come by despite any level of cooperation. Regardless of all the goodwill about private-public camaraderie, the *laissez faire* industrial culture is yet to clearly emerge. The jigsaw puzzle is more complicated by the government's continual emphasis on self-reliance, also reiterated by the Kelkar report. Self-reliance as a concept had a confused existence in the past 40 years. This rather absolutist goal

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19. Prasannan, n.16.
20. Bharat Verma, "Military Industrial Complex: Crafting a Winning Strategy," http://www.bharatrakshak.com/SRR/Volume12/bharat.html.

was derived as a means to strengthen autonomy in military production.[21] Far from autonomy, the nation and its defence industry were shackled with chronic dependence on foreign sources for technology. Added, the complacency created by the convenience of licensed manufacturing retarded the design and development capabilities to a worrisome extent. Self-sufficiency as a long-term goal gives scope for maximum accommodation of all possible industrial models. But self-reliance is something which needs clear elucidation, especially on the element of foreign cooperation. In the 40 years or more of India's self-reliance pursuits, conceptual ambiguity on foreign inputs was strengthened by the oscillation between indigenisation and licensed production. Though some sections believe indigenisation gives ample scope for foreign technological participation, the results of the indigenisation drive of the 1980s and early 1990s give a different conclusion.

The collapse of the offset arrangement with the Russians in the early 1990s caused serious spares problems that grounded many Soviet-era military aircraft, until the IAF's Base Repair Depots (BRDs) and HAL came up with alternatives.

Nonetheless, deep-rooted dependence on foreign sources would not always imply salvation. Its ramifications were most evident during the Cold War when strings were attached to the sale of military equipment, in addition to political complications impacting on product-support, as demonstrated by the Sea King crisis post-1998. The collapse of the offset arrangement with the Russians in the early 1990s caused serious spares problems that grounded many Soviet-era military aircraft, until the IAF's Base Repair Depots (BRDs) and HAL came up with alternatives. A high degree of self-reliance was considered a necessity during the Cold War, to shun dependencies, and the indigenisation drive was meant to address this. Yet, after two decades of experimentations, it is ironical to see the scientific community losing no opportunity to self-eulogise its technological prowess and the political leadership upping the ante. Whether accounted for by

21. Opined by Air Cmdre Jasjit Singh in "Arms Trade Offsets," *Air Power Journal*, vol. 2, no. 1, Spring 2005, January-March.

the polity or not, self-sufficiency could be achieved only when the defence industrial base rose up to the realistic requirements of the country and its armed forces. Being a vital part of the nation's aspirations, it should be a driver of economic growth, employment generator and foreign exchange earner. The Indian defence industry has failed on many of these counts.

CONCLUSION

The future is bright with abundant opportunities thrown up by a liberalised marketplace in which technology would be the primary driving force. Though the new system would enhance faster technology assimilation, the foremost challenge for India would be to ensure rapid integration with the global defence industrial network so as to catch up with the technology race. If the general Indian economy can reap benefits out of global economic integration, there is no reason for the defence industry to stay away. The integration task has to be spearheaded by the R&D establishment which has to desist from reinventing the wheel. Instead of sitting on systems available off-the-shelf or through technology transfer, the focus should be on mastering critical technologies that are costly and inaccessible. For an industrial system to endure in a neo-liberal system, a competitive process is inevitable, something the Indian defence sector has never known. With the industry embedded in the public sector and other players yet to consolidate, creating cross-holding entities would be a means to ensure a level playing field and encouraging more players, right from the conceptualisation stage.

If the general Indian economy can reap benefits out of global economic integration, there is no reason for the defence industry to stay away.

Finally, future planning should look beyond defence PSUs and corporate groups. Along with the small-scale sector, India has to tap the potential in institutions like the Base Repair Depots, and the Indian Institutes of Technology (IITs) with the objective of a long-term R&D infrastructure. Above all, the new environment seeks the need to see dependence on foreign partners from a new perspective – one that gives emphasis to partnership based on interdependence.

The future, undoubtedly, would be of integrating armament competencies effectively between countries and entities with shared interests. This will bring diverse skills together to enhance product capabilities, reduce costs, facilitate mutual economic stakes and create reverse-dependencies that can be politically leveraged. Where would India be in this picture?