

STRATEGISING AVIATION INDUSTRY

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The year 2003 was of great significance for the world of aerospace, as we celebrated the centenary year of the first manned flight. Since the beginning of the human race, mankind always dreamt of emulating the birds, to fly and soar in the expanse of the blue yonder. That dream was virtually fulfilled about 100 years ago when on December 17, 1903, at Kitty Hawk, North Carolina, the 1903 Wright Flyer became the first powered, heavier-than-air machine to achieve controlled, sustained flight with a pilot aboard. It flew forward without losing speed and landed at a point as high as that from which it had started. With Orville Wright as pilot, the aeroplane took off from a launching rail and flew for 12 seconds and a distance of 120 feet. The aeroplane was flown three more times that day, with Orville and his brother Wilbur alternating as pilot. The longest flight, with Wilbur at the controls, was 852 feet and lasted 59 seconds¹. This event started the most dramatic stage in the history of modern aviation. Almost all nations in the world, including India, commemorated aviation's centenary celebrations in a grand manner, which in a sense was a glowing tribute to several illustrious pioneers of modern aviation.

The year 2003 also happened to be the defining time for India's economy, especially the private sector. Independent business analysts have stated that while 56 years of political freedom did not usher significant improvement in the quality of governance, the 12 years of India's liberalised economy since 1991 has been greatly rewarding. In that period, an inward-looking Indian industry have learnt to seek and compete for markets abroad, and a whole new generation of entrepreneurs has emerged, grabbing an extensive

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1. *Milestones of Flight* by Smithsonian National Air and Space Museum, 2003.

range of new opportunities. With the result that India today is seen as the world's purveyor of hi-tech services like software, engineering, pharmaceuticals, biotech and even Back Office Operations. The Business Freedom Index has gone up from 19 per cent in 1991 to 49.5 per cent in the year 2003. Putting an end to the "Licence Raj", and allowing private companies to enter industries such as banking and finance, insurance, telecommunication, petroleum, pharmaceutical, steel and many others, not just demolished the complacency of the old guard, but spurred the adoption of modern technology and management practices by the private sector, which are comparable to international standards². Though, there are still miles to go, with several areas lagging behind and improvements necessary, the private sector is justifiably upbeat about India's future and is confident that the nation will emerge as a significant economic and industrial powerhouse.

Interestingly, it was a private sector entrepreneur's forceful idea to establish an aircraft manufacturing facility in India that set in motion the saga of the Indian aviation industry. A visionary industrialist, Seth Walchand Hirachand, had to overcome several difficulties and considerable odds to establish Hindustan Aircraft Ltd (HAL) at Bangalore on December 23, 1940³. But within three years, it was taken over by the government and since then, it has remained a public sector enterprise. In the backdrop of the outstanding rise of the Indian private sector and the paradigm shift in the state policy committed to disinvest Public Sector Units (PSU) to the private sector, it would be relevant to see what import these developments would have on the Indian aerospace industry. But before that, we take a quick look at the significance and importance of aerospace to India's national interests.

Aviation or aerospace facilitates two major functions; national defence requires air power and international business cannot function without a civil aviation network⁴. While, air power is one of the key elements in the defence capability of a nation, air travel is indispensable to domestic and international business. In this context, a strong and vibrant defence industrial

2. *Business Today* News Item, April 2004.

3. K.A.V. Pandalai, *50 Golden Years of Aeronautical Society of India* (Bangalore: NAL).

4. Keith Hayward, *The World Aerospace Industry* (London: Duckworth and RUSI, 1994).

base and particularly aeronautical prowess is of vital concern to India's security as well as commercial interests. Aviation has now become a critical component of global transportation. In order to support the long-term growth of the Indian economy, the government must improve the total capability of the aviation system to design, build, and operate all of its elements to build its military capability and civil aviation network.

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AEROSPACE AND TECHNOLOGY

Today, threats to national security are not limited to hostile military action and could take a variety of forms such as terrorism, militancy, exploitation of ethnic divide, disruptions of economic centres, and the denial of resources and technologies. Aerospace technology has predominantly increased the options available to deal with conventional military threats as also to counter the terrorist menace. However, advanced aerospace technology is zealously controlled by the Western nations under the technology control regime, and, therefore, it has to be developed indigenously at national research laboratories or obtained through technology collaboration with a foreign partner. It is almost axiomatic that a robust indigenous aerospace industrial capability that reduces external dependency is essential to build a nation's defence preparedness and safeguard national security. A dynamic and vibrant aerospace industry is crucial to the strategic vision of India for making it militarily and economically strong.

The combat effectiveness of armed forces is in fact a reflection of the scientific, technological and industrial capabilities of a nation. In this context, air power has been assuming a pervasive role in maximising the effects of military power⁵. The impact of advanced aerospace technologies on the

5. Jasjit Singh, *Air Power and Joint Operations* (New Delhi: Centre for Air Power Studies, Knowledge World, 2003).

conduct of war has been quite evident in several regional and limited armed conflicts during the past 40 years or so, notably, the Arab-Israeli Wars, Beka'a Valley operations, Desert Storm, Kosovo, Afghanistan and the recent Iraq War. Leaving aside the ethical aspects of a few of these recent wars, the

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main lesson learnt is that the relationship between military strategy and technology will grow even stronger in the years ahead and more specifically in the field of aerospace⁶.

The aircraft was first used as a third dimensional weapon during the two World Wars; but progressively, it also acquired

another dominant role in the commercial world, that of air-transportation. Today, global aerospace is poised on the brink of dramatic changes such as advanced composites materials; innovative aerodynamics; stealth technologies; microelectronics; digital flight controls and avionics; computer-aided solutions; super jumbo airliners; and many more. The recent successful flight of NASA's scramjet, X-43 A at speeds in excess of Mach 7.0 is an indication of the kind of mind-boggling research and development happening in this field. We need to do some sombre introspection as to where we stand in the race for aerospace competency.

INDIAN SCENE

Though, India's entry into the modern industrial arena is of recent date, some ancient manuscripts indicate that the Indian civilisation had extensive knowledge of mathematics, engineering and even aeronautics⁷. It is obvious that for several centuries there was no attempt to exploit these advances in aeronautics made by the early Indians and many years went by while India's

6. Jaquelin K. Davis, "Technology and Strategy: Lessons and Issues for the 1990s," *Annals*, September 1991.

7. *Ancient Indian Aeronautics* (Delhi: Research Institute of Ancient Scientific Studies, January 1964).

scientific achievements remained obscure and inaccessible. For years on, the Indian society and economy remained essentially dependent on trading and agriculture without much technical or scientific bias. During over two centuries of British rule, India did not get the benefits of the Industrial Revolution, except for what the colonial power introduced to facilitate its administrative control over the Indian subcontinent, such as railways, telegraph and a few ordnance-related factories. As a result, almost until the time of independence, India had no significant industrial infrastructure.

About six decades ago, a private industrialist's ambitious venture to set up an aircraft manufacturing facility in India set in motion a saga of the Indian aviation industry. When Seth Walchand Hirachand laid the foundation of HAL at Bangalore, he was writing one of the most innovative chapters in India's nascent industrial era. A decade later, the first flight of the indigenously produced HT-2 piston-engine basic trainer on August 5, 1951, was a landmark event for India's fledgling aviation industry. The HT-2 was designed and developed by a team of designers and engineers led by Dr V.M. Ghatage, who also spearheaded indigenous production of the HJT-16 or Kiran Mk I, a basic jet trainer for the Indian Air Force, in the early 1960s. The next noteworthy achievement of HAL was unveiling of India's first home-grown fighter aircraft, the HF-24, designed and developed by an Indo-German team under the overall direction of Dr Kurt Tank and Dr Ghatage. About four decades later, the maiden flight of the technology demonstrator of the light combat aircraft (LCA) in January 2001, the HJT-36 in March 2003, and very recently that of the Saras light transport aircraft on September 13, 2004, have further demonstrated India's scientific and technological capabilities in the aerospace sector. Indeed, there is no doubt that since its inception over 60 years ago, the Indian aviation industry has made enormous progress. As a developing nation, India can boast with ample justification of having one of the largest aeronautical infrastructures in Asia. Over the years, Seth Walchand's dream project, HAL of the 1940s, has been gradually transformed from essentially a *repair and overhaul* agency into India's flagship aerospace company.

EVOLUTION OF THE INDUSTRY

It may be recalled that the prevailing geopolitical situation in the Indian subcontinent soon after India achieved its independence was manifestly hostile to the Indian sovereignty and integrity. Since the day India became free from the British rule, the nation faced multiple threats and the perils of war constantly loomed large on its borders. On the other hand, with the adoption of the policy of non-alignment after India gained independence, self-reliance in core industries, including defence, became the principal pillar of our national industrial and economic policies. But India having limited access to aviation technology and grossly inadequate aeronautical industrial infrastructure, the self-reliance model was clearly not workable to be self-sufficient in weapons and arms production for national defence.

Particularly, in the 1950s, India faced a grave security threat from a militarised and belligerent Pakistan, which had joined defence pacts with the US, such as Southeast Asia Treaty Organisation (SEATO) and Central Treaty Organisation (CENTO). The Indian government was, thus, compelled to import requisite quantity of aircraft and other weapons from abroad to bolster its armed forces. As a result, India's defence procurement process in the 1950s has been seen as the crisis reaction to the military developments in Pakistan, which, under the SEATO and CENTO umbrellas, received modern weapon systems generously supplied by the United States. India, thus, had no option but to meet the urgent operational requirements of the armed forces through imports and licensed production. Direct purchase and licensed manufacturing from different foreign sources became the main routes for acquisition of most of the defence systems since 1950. This was more pronounced in the case of the Indian Air Force, as HAL did not possess the technology and infrastructure to manufacture a suitable type of combat aircraft. To build the operational capability of the air force, several types of fighters, bombers, transport aircraft and helicopters were directly purchased and also planned to be produced under licence by HAL. For more than three decades since the mid-1950s, licensed production and direct purchase continued to be the main source of aircraft induction into the air

force; however, this process was interspersed by development and production of a few indigenously designed aircraft.

In the geopolitically unstable Indian subcontinent, India also had to look for a reliable strategic partner and the Former Soviet Union (FSU) willingly came forward in support of the Indian government. India's defence ties with the FSU became particularly stronger with the FSU offering the then top of the line MiG-21 fighter aircraft and technology transfer along with manufacturing plants to India, on incredibly concessional business terms. This was the single most technological and infrastructural expansion in the history of the Indian aviation industry. By default, it also established "licensed production" as the preferred industrial strategy option, relegating indigenous design and development to less significance for a long time to come. The licensed production mode certainly facilitated periodic expansion of HAL's technical facilities but in the process, nurturing of its aircraft design capability suffered. In the long-term, this industrial strategy had an adverse effect in building up the core competencies in design and development, till the LCA, advanced light helicopter (ALH) and HJT-36 projects came on the scene.

HAL PRODUCTION DATA

India's aerospace potential and capabilities are vested in 14 divisions of HAL, the Defence Research and Development Organisation (DRDO) labs, and, to a limited extent, the private sector. HAL constitutes the major component of India's aerospace industry with its workforce of about 35,000. Since its inception, HAL has built an imposing number of over 3,300 aircraft, comprising fighters, trainers, transport aircraft and helicopters; this includes 12 types of aircraft from in-house R & D and 13 types by licensed production. HAL's production data is as shown in Table 1.

SCENE SINCE COLLAPSE OF THE FSU

However, in the early 1990s when the Cold War ended, resulting in disintegration of the FSU—India's main defence supply source—the Indian

Table 1

Production	Aircraft	3,300 +
	Aero-engines	3,400 +
Overhaul	Aircraft	7,700 +
	Aero-engines	26,000 +

Source: HAL News Letter, February 5, 2003, Aero-India 2003.

aeronautical industry was severely affected. Consequently, the Indian Air Force which operated over 70 per cent Soviet/Russian aircraft and equipment was in a serious predicament to maintain its operational capability. Further, India's hi-tech programmes, including the prestigious LCA project, already under the threat of Damocles' sword of the technology control regime, were at the risk of severe disruption on account of sanctions imposed by the USA after the Pokhran II nuclear tests by India. On the other hand, our aircraft industry not having ever given serious thought to investment in commercial aircraft production, the nation continued to be totally dependent on the import of civil airliners, business aircraft, accessories and even maintenance. The collapse of the FSU to a great extent exposed the vulnerability of the Indian aviation industry. Although a sense of urgency to be self-reliant in the aeronautical sector was noticeable, the desired dynamism was lacking in its implementation. HAL and the Indian Air Force had to put in relentless efforts to maintain the desired level of operational deterrence—but that is another story. We also lost the opportunity to induct aerospace experts from the inactive Russian design bureaus to bolster HAL's design and development division. Due to several other reasons, the Indian aviation industry over the years was not able to achieve the level of self-reliance that was envisaged in the 10-year plan launched by the DRDO in the mid-1990s. In spite of manufacturing an impressive number of over 3,300 aircraft/helicopters, HAL could not make much impression in the global aerospace market; though by virtue of its large sales turnover, HAL does figure in the top 50 of the world's aerospace companies listing.

In spite of HAL's chequered history as the flagship of the aeronautical industry, while analysing the evolution of the Indian aviation industry, it is

not possible to identify if there was any central direction or cohesive attempts on the part of the government to strategise systematic development of the industry. HAL's growth seemed almost entirely as an upshot of the expansion of the Indian Air Force over the decades. The growth of HAL has been of a cyclic nature and invariably linked with the periodic induction of new aircraft and equipment in the air force inventory. Introduction of new weapon systems by way of direct purchase or licensed production facilitated infusion of new technologies and associated technical infrastructure.

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At the same time, one must grant full credit to HAL for the skilful manner in which the company not only absorbed the complexities of new machinery, tools and technologies, but also supported the air force operations through production of combat aircraft, helicopters, and transport aircraft, through licensed production or indigenous process, besides undertaking repair, maintenance and overhaul of the air force fleet. Also, HAL's record of homegrown aircraft production is worthy of mention, considering the technological hurdles that it had to negotiate from time to time.

FUTURE CHALLENGES

However, the fact remains that India's efforts to acquire cutting-edge technology and resources will be continually restricted and controlled by the international caucus that has been in complete command of frontier and cutting-edge aerospace technology. Today, it is evident that the aerospace industry is virtually globalised, operating as a highly organised network of interdependencies, primarily amongst the advanced industrialised nations. Would it, therefore, be valid for our aviation industry to carry on functioning as a state-owned enterprise limited only to meet the operational needs of the India's armed forces and ignore the dramatic changes that are taking

place in the world of aerospace business? Should we not as a nation take a bold initiative to enter the mainstream global aviation? Is the time appropriate for India's aerospace industry to make some attempts to emulate the manner in which the Indian private sector has displayed its competency in

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information technology (IT), software, biotech, auto and engineering industries? The answers to these questions and more would have to be addressed by the government and the management of HAL.

HAL with its excellent infrastructure, skilled technical manpower and reasonably low labour cost, is in a position to exploit its full potential and compete at the global plane. But, in reality, this has not happened. Some more questions that come to mind are:

- Is it that there has not been any direction from the government for strategic development of the Indian aviation industry?
- Therefore, is HAL possibly comfortable to coast along because of a captive home defence market, that too without any serious competition?
- Are the limitations of access to core technologies inhibiting HAL from taking the initiative in risk-prone hi-tech programmes?
- Has a business model like collaboration or joint venture ever been seriously considered to facilitate induction of advanced aerospace technology?
- Is it the 'public sector' mindset that has induced lack of aggressive export and innovative business strategy?

Though authoritative answers to the questions above are not easy to obtain, the author believes that India's aerospace industry has enormous potential to be a global performer. But it will require the Ministry of Defence Production and HAL management to carry out large-scale organisational reforms. This paper makes a preliminary attempt to examine how India's

aerospace industry can be restructured to meet the future challenges in the world of aerospace and, more importantly, to enter into business competition at the global level. While there are several areas of concern that need to be addressed, due to space constraints, this paper will focus on two or three fundamental issues, that is, PSU Autonomy; Private Sector Participation; and Export Strategy.

AREAS OF CONCERN

HAL has been basically geared to meet the operational needs of the armed forces by manufacturing aircraft and aero-engines under licensed production, and undertaking overhaul and maintenance services, mainly for the air force. However, with the launch of the advanced light helicopter, light combat aircraft and intermediate jet trainer projects, HAL is certainly shifting closer to the indigenous design and development model. But for years having got used to manufacturing aircraft under licence for a captive home defence market, the following important areas seem to have been given less attention:

- *Core Technology.* There is considerable external dependency in microelectronics, aero-engines, materials and modern avionics. Core technology is a critical area that could inhibit the industry in design and development of hi-tech world class products. Over the past decade, the world had become virtually a global market place. A distinct trend has emerged towards global integration despite cultural and geographical distances. There are visible signs that exchange of technology is much easier today than it was a few years ago⁸, but it would demand entry into the established global network. Collaboration and partnership ventures have turned out to be the flavour of the current business practices.
- *Core Competency.* Thanks to the years of experience in aircraft production under license, HAL has shown very high level of competency in the field of licensed production, under transfer of technology agreements.

8. Richard Rushton, "Perceptive Leadership," *Business Today*, October 24, 2004.

But integration and upgradation skills have not been developed to the point that is competitive at the global level. For example, we will need to achieve the level of competency of the Israeli Aircraft Industries to be able to successfully compete at the global level.

- *Diversification.* Almost since its inception, HAL has been committed to the production of aircraft and systems for the armed forces. In the beginning, it was mainly out of compulsion and later it was out of necessity. Since the emphasis has always been primarily on production for the air force and the other Services, including the coast guard, there was no scope to plan to look into other aviation schemes. As a result, diversifying to civil aviation projects has never been given high priority, despite tremendous national and global opportunities.
- *Private Sector.* In the past, as the government policy, private sector participation was not permitted in any business which was related to “national defence and security.” Fortunately, this archaic policy has been reviewed, and the defence production sector has been opened up to private entrepreneurs and also 26 per cent foreign direct investment (FDI) has been permitted. This was indeed a welcome development, but it has not really taken off as yet for several reasons.
- *Privatisation.* Until recently, privatisation was an *unthinkable* word in the public sector domain. There is still resistance to change the mindset due to decades of dominance of the public sector culture. But the winds of change are palpable and today quite a few PSUs are following corporate management practices. The government’s disinvestment policy, enunciated by former Cabinet Minister for Disinvestment Arun Shourie, despite resistance from the Leftist parties, is likely to be sustained as a result of the market forces.
- *Exports.* A look at the last five years’ average of export figures of HAL shows that these have been less than 5 per cent of total sales. Possibly, with its order book overflowing with commitments to own defence forces, HAL did not find the need to venture into international marketing. Also, HAL had not come out with any world class marketable product

that had export value. Until recently, the government had maintained a principled policy of not exporting defence equipment but that policy is now undergoing a sweeping change. During the last few years, there have been encouraging signs in the government's public announcements on promoting export of defence products. To facilitate export, the aerospace industry has to produce products of world standard and marketable value to successfully face global competition.

REFORMS IN PUBLIC SECTOR

While the government made historic changes in its trade and industry policies by opting for economic reforms in 1991, its implementation was rather ineffective in the early years. Despite a discouraging business atmosphere, and formidable '*red tapism*', India's private sector has done extremely well to develop skilled technical manpower, acquire world-class management practices, face up to global competitiveness, and make substantial offshore earnings. These developments should impact on the functioning of our PSUs and generate new ideas in favour of reforms. The following developments lend support to this concept:

- The government's strategic economic policies substantially favour disinvestment and support for privatisation.
- The rise of hi-tech capability in the private industry.
- The growing credibility of India's science and technology, engineering, IT and pharmaceutical sectors.
- Emergence of stronger links between the private industry, national laboratories and academia.

PSU AUTONOMY

In the backdrop of the above developments, it is now an appropriate time to integrate strong attributes of the private sector and the legacy of HAL's aerospace expertise and industrial assets to initiate a restructuring process. Post-independence, the government's avowed policy of establishing a socialistic pattern of society and self-reliance, resulted in setting up of a

string of PSUs in diverse fields like steel, fertilisers, petrochemicals and others, including defence production. Defence industry has been an essential element of defence policy in which the government exercised both technical and political control over decisions. The Planning Memorandum of 1945, and the Industrial Policy Resolutions of 1948 and 1956 placed munitions, aircraft and shipbuilding industries in the public sector under the control of the central government⁹. The state

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indeed has a right to exercise reasonable control over the Defence PSUs (DPSUs) since their functioning directly relates to the national security. However, it is time that DPSUs are given increased functional and operational freedom to conduct their business in a changed techno-economic environment. To enhance their efficiency and productivity, DPSUs have to develop a policy of competitive business strategy, not only at the national level but also in the global market. Ownership *per se* has rarely been a useful guide to the shape of state-industry relations in aerospace. The US federal government, without owning a single share in the US aerospace companies, maintains complete control over their business through suitable policy formulations.

The new Industrial Policy of 1991 and the Document of Economic Reforms of July 1993 stressed the need for “Continuity with Change.”¹⁰ In spite of several hurdles arising out of the “Licence Raj” culture, in the last two decades or so, the private sector has achieved remarkable progress in the engineering and manufacturing capability. A number of such factors have combined to generate some rethinking on the role of DPSUs, vis-à-vis the private sector. It is time to free HAL from the mindset of a public sector undertaking and move it into the arena of professional corporate management. As a first step, the HAL Board of Directors needs reconstitution with representatives

9. Baidya Basu, “The Private Sector and Defence Production,” *Indian Defence Year Book, 1998–99*.

10. Vijayalakshmi K. Gupta, *Defence and Industry Interface in R&D Production*, NDC Papers 1/2000.

or advisors in addition to the present set-up, from entities like the Indian Space Research Organisation (ISRO), Council of Scientific and Industrial Research (CSIR), Department of Science and Technology (DST), Indian Institutes of Technology (IITs), corporate sector and financial institutes—an optimum mix of professional managers, financial experts and technocrats. PSU autonomy should eventually lead to progressive corporatisation.

In the past, HAL has been almost entirely committed to meet the operational requirements of the defence forces. As a result, its exposure to the international market has been rather limited, and exports very nominal. In the long-term national interests, our aerospace industry has to be globally competitive and export-oriented, in a big way. A nation with low or moderate level of indigenous design and development capability and lagging in a modern technology base perforce must seek greater quantum of foreign collaboration¹¹. A case in point is Embraer of Brazil, which also started as a state-run enterprise in 1969. When it ran into financial problems in the early 1980s, it was privatised and, in the mid 1990s, Embraer went in for collaboration on a large scale with the West European aerospace companies¹². Today, Brazil is among the top three leading countries in the world in the production of commercial regional jet airliners and earning billions of dollars in the export market. No such dramatic transformation of HAL is expected in the near term but it is believed that granting functional autonomy to the DPSUs would facilitate several changes in their business culture.

A CASE FOR THE PRIVATE SECTOR

Since the opening up of the economy in 1991, slowly but surely, we are witnessing significant changes in the industrial and economic policies of the government. An important fallout has been the announcement of the opening up of the defence manufacturing business for participation by the private sector industry in early 2001. Later, the government came up with the

11. Ajai Singh, "Self-Reliance in Indian Defence", a paper presented at a defence seminar at Vadodara, April 10, 1998.

12. Brazil: Aircraft Industry Overview, www.strategis.ic.gc.ca/SSG.

licensing policy in January 2002 after due consideration of the views of the industry. Concerted efforts are being made to support private sector enterprise and there is also a major shift in the government policy with regard to the functioning of PSUs. In spite of formidable red tape hurdles,

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India's corporate sector has done exceedingly well to develop skilled technical manpower; acquire world class management practices; pursue global competitiveness; and tap offshore markets. These developments have already generated some

rethinking on the running of our PSUs. Perhaps the time has come for HAL to integrate its aeronautical expertise and industrial assets with the private sector's strengths and marketing skills to initiate a restructuring process.

The following developments lend support to this concept:

- India's ongoing economic reforms since 1991 and new government policies supportive of private sector participation.
- The government's new strategic policies on divestment and privatisation, despite some hiccups now and then, essentially from the Leftist parties.
- The rise of hi-tech engineering and software capability in private industry.
- The growing credibility of Indian science and technology in areas like space and nuclear technology, precision engineering, software, IT and the pharmaceutical sector.
- Emergence of stronger links between Indian corporate houses and multinational entities.
- Setting up of research centres and business development arms by multinationals in India, leading to collaborations and joint ventures.

The Society of Indian Aerospace Technologies and Industries (SIATI), based in Bangalore, has been actively engaged in promoting coordination between the private sector and HAL to give a fillip to indigenous development and growth of industrial infrastructure for aerospace

components in India. However, there are several areas, which need review and even major policy changes to promote private sector participation in the defence industry. In this regard, one of the leading aerospace experts in the country has suggested some steps as follows¹³:

- Permit the use of idle capacity of government-owned research and development (R & D) facilities and hi-tech machines to private industries.
- Build up aerospace technology competency and competition amongst the private sector.
- Encourage smaller, fast track projects for private industries to gain technology experience.
- Graduate the private industry from vendor or sub-contractor status to “partner” level.
- Share long-term plans with the industry to the extent feasible.
- Encourage emergence of hi-tech private industry in strategic sectors, including defence.
- Promote the aerospace sector to develop a global vision.

CHANGING DYNAMICS—INDIGENOUS PROJECTS

In the aeronautical sector, the LCA programme, apart from ALH and the intermediate jet trainer, HJT-36, has made a significant impact in the design and development philosophy of the Indian aerospace industry. Thanks to the LCA project, the Aeronautical Development Agency (ADA), Aeronautical Development Establishment (ADE), and other DRDO labs have brought in state-of-the-art design software and new technologies to the Indian aerospace industry, which have been developed in close coordination with R&D labs, HAL and academic institutions. As a result, today several hi-tech design tools are employed at HAL and ADA, such as 3D CAD/CAM; software packages like CATIA, FINESSE, FINEGRAF, AUTOCLAVE; mesh-less analysis; distributed processing; parallel computing and computational fluid dynamics tools. A Virtual Reality Centre is fully

13. R. Narasimhan, *Restructuring India's Defence R&D Development and Production* (Bangalore: National Institute of Advanced Studies, 2003).

functional at ADA with tools and techniques for creating and studying virtual prototypes. The LCA project has also made some dramatic shift in the manufacturing philosophy of the aerospace industry¹⁴. The following are some significant changes that the private sector needs to take note of :

- The process of indigenisation and self-reliance has become the theme of the new aircraft projects. It is planned that the first set of series production would have more than 60 per cent indigenous content.
- The project has involved several large and small private sector industries. The private sector specialist industries are expected to meet about 30 to 40 per cent of the LCA components and equipment.
- Considerable skills have been developed in integrating complex technologies related to avionics systems, digital flight controls and mission critical software. HAL and DRDO labs are willing to share their technology expertise with the private sector.
- LCA and other indigenous projects such as ALH and HJT-36 should provide greater opportunities for private sector participation in the aerospace industry.
- Further, when in the near future, HAL takes up commercial aircraft production, as per the indications, there will be multiple opportunities for the private sector.

PRIVATE SECTOR VIEWPOINTS

The May 2001 policy made by the preceding government of the National Democratic Alliance (NDA), allowed private companies with a licence from the Defence Ministry to participate in all facets of defence production, excluding missiles, ammunition and equipment of strategic importance. The measure also put a cap on foreign participation in partnership with Indian firms at 26 per cent. To date, no foreign entity has entered any defence joint venture and only 16 licences have been issued to Indian private firms. But none of the 16 companies has received firm orders from the Services,

14. Air Marshal P. Rajkumar, director, Aeronautical Development Agency, Bangalore, in an interview, 2003.

according to an industry executive. Atul Kirloskar, chairman of the Confederation of Indian Industries (CII) National Committee on Defence has stated that the response in the three years since the initiative was launched, has been poor, mainly because the government procedures surrounding defence production and certification are too cumbersome. The private companies, he said, are not given a level playing field such as customs duty exemption and taxation benefits afforded to DPSUs and ordnance factories¹⁵. Out of a total capital account budget of about Rs 22,500 crore, earmarked for new equipment and weapons, imports constitute around Rs 13,500 crore. The balance Rs 9,000 crore worth of defence equipment is supplied by the DPSUs and ordnance factories. The private sector has made the important suggestion that the overseas companies be required to partner with private Indian companies in order to be considered for the import/manufacturing of specific defence equipment¹⁶.

During several joint seminars between the private industry and the armed forces, the following suggestions have been repeatedly tabled by the private sector:

- The long-term strategic planning and the Services requirements based on the geopolitical scenario and threat perception to be shared with the industry.
- The Ministry of Defence to give more weightage to the Indian companies, as this would encourage the foreign companies to establish joint ventures in India. There are numerous examples of this approach in the IT, engineering and pharmaceutical sectors.
- An effective clearance system within a given time frame would encourage the foreign companies to start joint ventures. Presently, they are unsure of expeditious implementation of the government policies and also the outcome of their investment.
- Unless assured of some share of project funding, the R&D effort in core technologies cannot really take off.

15. *Defense News* (Washington), September 6, 2004.

16. *Ibid.*

- The private sector is in a position to access expertise in core technologies and integration skills for specific project needs and maintain continuity in skill development.
- High quality projects motivate aeronautical engineers and software experts. Job satisfaction and professional challenges are the key factors.
- Evolve a strategy for India to become a major supplier of defence systems in the global market. In many Western countries, the Ministry of Defence actively supports export of defence equipment. A solid base of private sector manufacturers can create a high level of export potential for defence products.
- The private sector is confident of creating world class production units such as Raytheon, Lucent Technologies, Thales, GEC and many others. These foreign companies are coopted in their national committees for defence equipment specifications and certification.
- The private sector is in an influential position to establish multinational collaborations for technology transfer and joint ventures.
- Similarly, the private business houses have abundant international experience and expertise in export marketing, which can be effectively applied to shore up defence exports.

PRIVATE SECTOR: CHARACTERISTICS

In view of the rise in the productivity and competency in the private sector, its participation in defence production is considered vital to make the defence industry more vibrant and productive. However, defence planners must appreciate some important characteristics of the private industry, which need to be thoroughly recognised. These are as under:

- The private sector is driven by profits, since it is accountable to the shareholders and its survival depends on the profitability of the company.
- It is averse to risk capital in a uncertain defence market.
- The sector is more vulnerable to financial troubles—could close down and dry up supply.

- India's emerging corporate sector is very strong on marketing, especially at the global level.
- It is highly competent in flexible and world class management techniques.
- However, it has little or nominal R&D and design strength, mainly due to lack of investment.

EXPORT PROMOTION

No aviation industry in the world can hope to be a profit-making business without tapping the export market. Defence exports play an important role in the strategy of military industrial development. Export of defence hardware serves not merely a commercial function, as it can be an indirect tool for power projection and to some extent foreign policy influence. Since the end of the Cold War and ensuing peace dividend, the military aircraft market has severely shrunk. Even so, ALH, LCA and HJT-36 have good export potential through international marketing collaboration, as has been demonstrated by British Aerospace Systems and Saab of Sweden in promoting the sale of the JAS-35 Gripen fighter. But the civil airliner market offers better opportunities. Both Boeing and Airbus Industries have forecast that India alone will need at least 215 airliners worth over \$ 18 billion in the next 20 years¹⁷. Even if we start a collaborative airliner project today as a joint venture with private sector participation, we will reap handsome dividends in a decade from now. Our industry has the requisite technological infrastructure, skilled manpower resources and business acumen. Project funding can be arranged through international collaboration and government support. While the Indian government has to take a proactive stand in promoting the commercial aircraft project, it is the private sector that can play a major role in tapping the overseas marketing. What is needed is to

17. Statements by respective companies at Aero-India 2001 and 2003.

evolve a long-term strategy to boost India's aerospace exports as a public-private sectors joint enterprise.

RECOMMENDATIONS

In personal discussions and interviews with aerospace professionals, scientists and managers with business experience, the following recommendations¹⁸ have come forward:

- Hive off selected defence assets at depreciated value to private industries with appropriate exit ban conditions.
- Promote utilisation of defence labs and other facilities for civilian industries' use.
- Provide tax holidays to the private sector. This is an accepted norm of the government to promote an emerging business segment.
- Foreign aerospace companies supplying defence equipment to India are exempt from customs duty fees. Similar customs exemption should be given to private entrepreneurs.
- Assist companies involved in defence production to obtain credit facilities.
- Bring in the state-of-the-art ERP solutions and IT-based environment to promote optimal indigenous development.
- Create an organisation like Aeronautics Commission as an empowered entity with a secretary, Government of India, as its chairman, to coordinate and direct the entire gamut of aerospace industries.
- Establish a joint public and private sector aerospace Technology Review Board to function as an arm of the Aeronautics Commission.
- The Aerospace Technology Review Board to be tasked to formulate a workable 'road map' for time-bound implementation.

CONCLUSION

In the context of India as an industrially developing nation, the Indian aeronautical industry has made spectacular progress during the six decades of its existence. However, due to the unstable security environment and

18. Narasimhan, n. 13.

geopolitical compulsions in the early years of freedom, India had to resort to import of defence equipment or take recourse to licensed manufacturing. HAL started as a private industrialist's personal enterprise, but later the company firmly established itself as a premier defence public sector unit, with virtually no participation of the private industries. With the paradigm shift in India's macro-economic policies in 1991, the private sector gradually surged forward and came into prominence of its own. By 2003, 'India Incorporated' had clearly demonstrated its business acumen and competence, and made some successful forays in the world market. The impact of achievements of the private sector was powerful enough for the government to accede opening up of the defence production to the private industries. Since then, the private sector's attempts to capitalise in its new business arena have not proved fruitful due to mismatch between its normal business practices and the peculiar characteristics of defence procurement procedures. It is essential that the government should rationalise the process by modifying some of the rules of the game. The government should also encourage the private industries to understand the operational requirements of the armed forces. It will need to change its philosophy from state autonomy to joint production in the defence sector to the extent possible. Eventually, the process should lead to coopt the private sector as a strategic partner of the armed forces in their modernisation plans.

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The aerospace industry is sustained by a large diversity of specialist suppliers, where the private industry can play a significant role. The growth in industrial production in India, following liberalisation since 1991, has certainly made the Indian private industry more capable and responsive to the needs of the aerospace industry. A vibrant aerospace industry will

automatically lead to a sound ancillary sector capable of supporting the core aerospace functions. In the long-term, a synergised approach involving public-private sectors amalgamation should prove not only cost-effective but also would enhance the global competitiveness of India's aerospace industry. ■