India’s Emergence as Aerospace Power -Prospects and Challenges

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Abstract: It is solidly believed that Aerospace Power is about aircraft and satellites which actually mean the total capacity of a nation to exploit the medium of Air & Space. Besides aircraft, weapons and systems and space control and satellites, it involves civil aviation, passenger and cargo, communication systems for management and control, radars, data links, airfields, RANADS, cyberspace and support infrastructure. It also involves a strong technological base capable of absorbing the new hi-tech, a pool of techno savvy and trained manpower, hi-tech training centres and laboratories. With the involvement of a strong manufacturing sector – both public and private, with sufficient depth and dexterity to adapt to the rapidly changing technologies the country can achieve its heights as the number one. Perfect quality in production and obviously the fastidious frame of mind for it, is domineering. The areas of importance dealt with here are Need for Strategy for Export of Defence Products, Export Promotion/ Facilitation, Export Promotion Body, Defence Export Steering Committee, Government Support to Defence Exports, Export Financing and Other Incentives, Use of Offset Policy, Export Regulation, Finalisation of the List of Military Stores, Online and Time Bound Clearance, Export of Indigenously Developed Sensitive Systems. The careful study of the wars undergone and the missiles and weapons used for the success of the concerned nation gives the methodology and ideas to implement for desirable result. By inducting the analysis and the use of this would provide a solid way to make the country to be the number one in the world though the nation aspires for a peaceful world.

Key words: Aerospace · Defence · India · Latest technology

INTRODUCTION

Implementation and Review: For India being the top most country in the world in Air Defence the following regions are well-thought-out and analysed

- India’s Affordable Defence Spending
- Defence Projection and Allocation: The Resource Gap
- Finance Commission Estimates and Defence Expenditure
- Fiscal Responsibility and Defence Expenditure
- Gross Domestic Product and Defence Expenditure
- Defence Expenditure and Central Government Expenditure
- Major Heads of Government Expenditure and Defence

India’s Affordable Defence Spending: Today India’s Armed Forces are well-equipped and are growing stronger with scientific and technical support of Defence Research and Development organisation (DRDO) which aims to make the country self-sufficient in technologies needed for defence. Actively engaged in well planned projects in the field of science and technology, also supports in saving foreign exchange as indigenisation in armament technology is the major motive of DRDO.

- For use in wide bank search and monitoring receivers, a number of microwave components and antenna have been designed and developed.
- An indigenously developed Very Low Frequency (VLF) receiver, employing state-of-the-art digital signal processing techniques for communication with, submerged submarines, has entered production-phase.

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An indigenously developed central earth station for avalanche studies, capable of indigenously receiving meteorological data from remotely located data collection platforms through satellite is under installation. The centrally processed data on occurrence of snow and avalanche would be utilised by the Defence Forces.

A computerised Artillery Combat, Command &; Communication System is in advanced stage of development. The system capabilities include artillery target intelligence, tactical fire control and fire planning and the management of deployment.

A number of microwave frequency components, namely, low noise amplifier, band pass filters, frequency generators, isolators and circulators have been developed using indigenously produced stainless steel powder. The component has passed the engine test successfully.

India has various agencies like DRDO, Bhaba Atomic Research Centre, Hindustan Aeronautics Limited, Bharat Electronics and Vikram Sarabhai Space Centre who have inducted their mission to make the India Best in the World.

The engineering prototypes of ANUCO co-processor have been successfully tested and have shown excellent performance. This co processor functions as a memory mapped peripheral and can be configured for both INTEL and Motorola based CPUs.

An integrated Multi Mission Planning System (MMPS) has been developed and handed over to South Western Air Command, which was operationally used by the Command during exercises.

On specific request of Air Headquarters, work on extensive of this system to provide a Mission Communication Network system (MICON) has been undertaken.
A computerised system with appropriate software models for enhancing the operational efficiency of Eastern Air Command, has been successfully developed and handed over to the Command.

Considerable progress has also been made in the project on modernisation of Operation Rooms with high speed computers, graphical displays and data storage/retrieval systems.


**Challenges in the Military Aviation Sector and the Way Forward:**

- Access to technology
- Access to funding and high interest rates
- Training and capability building
- Tax and regulatory framework
- Availability of raw material
- Multiple platforms and poor vendor development

**Foundational Assets**

![Foundational Assets](image)

**Fig. 2: Foundational Assets**

**Current Project Pipeline:**

- The Working Group for the 12th Five Year Plan on civil aviation has envisaged a further investment of about 67,500 crore INR in airports over the next five years.
- About 25% of this investment is expected to be made by the AAI (17,500 crore INR) and the remainder of about 50,000 crore INR is expected to come through private participation.
Aerospace Value Chain:

Fig. 3: Aerospace Value Chain

Tax Regulatory Framework in India: A domestic or foreign company wishing to do business in the Indian aerospace and defence industry has to comply with the following policies:

- The Industrial Licensing Policy
- The Foreign Trade (Export/Import) Policy
- The FDI policy and Foreign Exchange Management Act (FEMA)
- The Civil Aviation Regulations
- The Defence Procurement Procedure and the Offset Policy (specific to defence acquisitions)
India’s big-ticket procurements

<table>
<thead>
<tr>
<th>Category</th>
<th>Name</th>
<th>Quantity</th>
<th>Induction likely from</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combat aircraft</td>
<td>Medium multi role combat aircraft (MMRCA)</td>
<td>126</td>
<td>2016</td>
</tr>
<tr>
<td></td>
<td>Fifth generation fighter aircraft (FGFA)</td>
<td>214</td>
<td>2019</td>
</tr>
<tr>
<td></td>
<td>Advanced medium combat aircraft (AMCA)</td>
<td>250</td>
<td>2020</td>
</tr>
<tr>
<td></td>
<td>Tejas light combat aircraft (LCA)</td>
<td>264</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>MiG-21s</td>
<td>94</td>
<td>2011</td>
</tr>
<tr>
<td></td>
<td>Sukhoi 30 Mk 1 fighters</td>
<td>42</td>
<td>2014</td>
</tr>
<tr>
<td>Transport</td>
<td>Multi role transport aircraft (MTA)</td>
<td>45</td>
<td>2022</td>
</tr>
<tr>
<td>aircraft</td>
<td>C-17 Globemaster</td>
<td>10</td>
<td>Induction commenced</td>
</tr>
<tr>
<td></td>
<td>Medium lift transport aircraft</td>
<td>56</td>
<td>2020</td>
</tr>
<tr>
<td>Trainer aircraft</td>
<td>PC-7 Pilatus trainer</td>
<td>75-75</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>Hawk advanced jet trainer (AJT)</td>
<td>20</td>
<td>2016</td>
</tr>
<tr>
<td></td>
<td>Multi role tanker transport (MRTT)</td>
<td>6</td>
<td>2015</td>
</tr>
<tr>
<td>Specialist</td>
<td>P-8i Poseidon</td>
<td>12 (8+4)</td>
<td>Induction commenced</td>
</tr>
<tr>
<td></td>
<td>airborne warning and control systems (AWACS)</td>
<td>2</td>
<td>2018</td>
</tr>
</tbody>
</table>

Source: Media reports and PwC analysis

Fig. 5: India’s Big Ticket procurements

Select aerospace majors in India

- EADS: Leading supplier to Indian commercial aviation sector (market share of 70% for Airbus and 90% for ATR).
- Boeing: Government of India purchased eight Boeing P-8I long-range maritime reconnaissance and anti-submarine aircraft in Jan 2009.
- MBDA: an EADS affiliated company, has supplied air-to-air and air-to-surface missiles to the Indian Air Force and Navy.
- Lockheed Martin: C-130J Super Hercules (first major military contract between the US and India in more than 40 years) is their largest programme in India.
- Airbus: Has formed a joint venture with Tata Advanced Systems, Tata Lockheed Martin Aerospace, to manufacture aircraft components for the C-130J.
- Thales: Significant industrial presence in India, represented by the Aérospatiale STS subsidiary in Bangalore (established in 1998), operates sonar systems automation and control systems to South Asian markets.
- Over the last five years, they have received an average of 250 million euros per year from India. Forecast for 2010-2014 is about 500 million euros per year.
- Has been establishing partnerships with key public companies BEL, BHEL, HAL and BDL as well as with many private and public sector organizations.
- AgustaWestland and Tata Sons established a JV for the final assembly in India of the single-rotor AW-109 helicopter.

Source: Company websites

Indian commercial aviation sector

The Indian aviation sector has continued to experience high passenger growth over the last few years.

Growing passenger numbers in domestic market

![Graph showing passenger numbers in domestic market from January to September.](image)

- January: 3.29
- February: 3.32
- March: 3.17
- April: 3.25
- May: 3.28
- June: 3.64
- July: 3.64
- August: 3.6
- September: 3.46

Emerging Opportunity for Defence and Aerospace in India:

- India has evolved as the most lucrative defence market globally with a mega acquisitions program coupled with the government’s proactive stance, a healthy foreign supplier base mix and an increasing number of deal closures seen over the past few years.
- Deals worth USD 24.66 billion (approximately) have been signed by the Indian Ministry of Defence (MoD) with global integrators in the past 48 months and another USD 41.99 billion (approximately) deals are in the process of getting signed.

Projected Premises:

The Global Aerospace & Defence Perspective:

- Government support – A vital facilitator.
- Technology-enabled manufacturing.
- Research and Development (R&D) - Indispensable ingredient for sustained growth.
- Providing the right market dynamics.
- Human Resource Skills – No substitute to trained manpower.

North America and Europe currently contribute more that 60 percent of the global MRO market.

According to an in-depth study offered by OAG Aviation Solutions in partnership with AeroStrategy estimates suggest that by 2018, USD 67.3 billion a year will be spent on the maintenance, repair and overhaul of military aircraft throughout the world.
Emerging MRO hubs such as Singapore are now balancing the global MRO equilibrium. It is not incidental that the US remains to be the biggest aerospace and defence manufacturer as well as the largest MRO hub in the world.

India on the Aerospace and Defence curve

- Defence Procurement Policy 2011
- Defence Production Policy
- Proposed liberalisation of the Foreign Direct Investment (FDI) policy

Ministry of Aviation 12th Five-Year Plan

- Developing and production of 20 seat turboprop.
- Developing aircraft quality material processing and quality standards.
- Encouraging international joint ventures by providing allotment of land for factories.
- Establish tax benefits to attract foreign manufacturers
- Establish a National Aviation University to address the growing education and training requirements for aerospace engineers.

<table>
<thead>
<tr>
<th>Foreign Company</th>
<th>Indian Partner</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel Aerospace Industries</td>
<td>TATA Group</td>
<td>P-88 Helicopter engines, Manufacturing and defence products, Advanced tactical communication systems, Gyrscopic solutions for multirole combat aircraft, Aeronautical component work</td>
</tr>
<tr>
<td>EADS</td>
<td>Lanner &amp; Taudra</td>
<td>P-81 Reconnaissance aircraft, Naval Systems, MANUFACTURE HIGH- End defence electronics, Upgrade of T-72 Tanks, Aircraft engine components, Aircraft refueling tanker, Naval Systems</td>
</tr>
<tr>
<td>Boeing</td>
<td>Wieco</td>
<td>Commercial aerospace products</td>
</tr>
<tr>
<td>EADS</td>
<td>Mahindra Group</td>
<td>Armored vehicles, Simulators</td>
</tr>
<tr>
<td>BAeS</td>
<td>Pratik &amp; Whitney Forensics</td>
<td>Developing and providing communications technology, Manufacturing cabinets for housing critical equipment on Boeing’s P-80 aircraft</td>
</tr>
<tr>
<td>Lockheed Martin UK Information Systems</td>
<td>Precision Electronics</td>
<td>MISSILE ELECTRONICS AND GUIDANCE TECHNOLOGIES, UNMANNED AERIAL VEHICLES, DEFENCE OFFSET MARKET</td>
</tr>
<tr>
<td>Boeing</td>
<td>BEML</td>
<td>Dry support bridges, Four wheeled armored patrol vehicle</td>
</tr>
<tr>
<td>Rafael Advanced Defence Systems</td>
<td>OEL</td>
<td>MISSILE ELECTRONICS AND GUIDANCE TECHNOLOGIES</td>
</tr>
<tr>
<td>Lockheed Martin</td>
<td>BHEL</td>
<td>UNMANNED AERIAL VEHICLES, DEFENCE OFFSET MARKET</td>
</tr>
<tr>
<td>Boeing</td>
<td>HAL</td>
<td>Four wheeled armored patrol vehicle</td>
</tr>
<tr>
<td>EADS</td>
<td></td>
<td>MANUFACTURE SMALL PLANE ENGINES</td>
</tr>
<tr>
<td>Northrop Grumman</td>
<td></td>
<td>COMPONENT DESIGN, MANUFACTURING, ASSEMBLY AND ENGINE ENHANCEMENT UPGRADE PROGRAMS</td>
</tr>
<tr>
<td>Israel Aerospace Industries</td>
<td></td>
<td>DEVELOPING MANUFACTURING PROCESSES AND CAPABILITIES FOR PRODUCTION OF MILITARY HARDWARE FOR BOEING</td>
</tr>
</tbody>
</table>

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<tr>
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</tr>
</thead>
</table>
Stakeholder – Government:

- Formation of a national modernisation strategy with key focus areas
- Specific implementation plan of the governing policies including inter-ministerial coordination
- Creation of innovation hubs
- Simplification and uniformity in taxation
- Address concerns of global companies on IP protection
- Ideation and implementation of initiatives such as RURs

Stakeholder – Global Industry:

- Increasing supply chain base in India through strategic partnerships
- Large involvement in accreditation of Indian suppliers for global certifications
- Greater involvement in setting up of training schools for acquiring specialised skills for this industry
- Invest back through R&D channels in order to facilitate local knowledge and in turn add value to their supply chain
- Increased attention to customisation of products for Indian markets and requirements
- Customise their go-to-market strategy in line with the Indian governments vision

Stakeholder – Indian Industry

Private Sector:

- Self assessment and prioritisation of their real skills and abilities which are complementary and synergetic to the requirements of the industry
- Backward integration for the formation of a new tier in the global supply chain
- Greater focus on hygiene factors which are at par with global quality requirements
- Focus on developing R&D capabilities
- Develop a good sense of the market dynamic and nuances at play in the global Aerospace and Defence industry

Forecasting – Statistical approach:

VECM Analysis – Statistical Approach: Vector error correction models (VECMs) with a prespecified number of cointegrating relations, a finite number of lagged differences, deterministic terms and exogenous variables can be specified, estimated and used for Forecasting, Causality and Impulse Response Analysis.
By incorporating the suggestions done and working on the guidelines would pave the way to achieve
The result of the nation would be as number one in the world. The technologies and the strategies that are
recommended give the right proportion of the methodologies that are to be taken in effort.

Jai Hind!

Fig. 13: Vecm Analysis

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