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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.

Expenditure

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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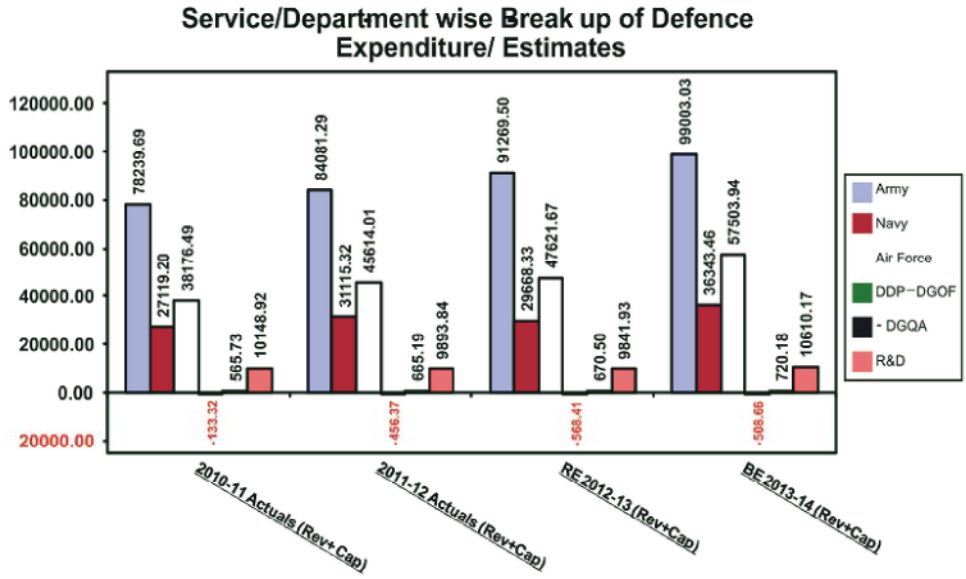


Fig. 1: Expenditure

- 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 .These components also have wide civilian applications.
- An integrated Observation Equipment has been developed for the Artillery Observation Post. It facilitates surveillance, acquisition and ranging of targets for accurate firing during day the night under all weather conditions. The equipment has been accepted for introduction in Service and is under production phase.
- We also have developed technology for C band phase shifters from special grade of substituted lithium ferrite material; this has been transferred to CEL and ECIL for production.
- Aluminium-Lithium alloy sheets have been developed for the LCA programme. Electro slag refining technology has also been developed for conversion of the high quality copper scraps into value added products of high purity Copper.
- An integral turbine rotor for use in Prithvi missile has 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.

The considerations would also include the 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 and Export of Indigenously Developed Sensitive 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

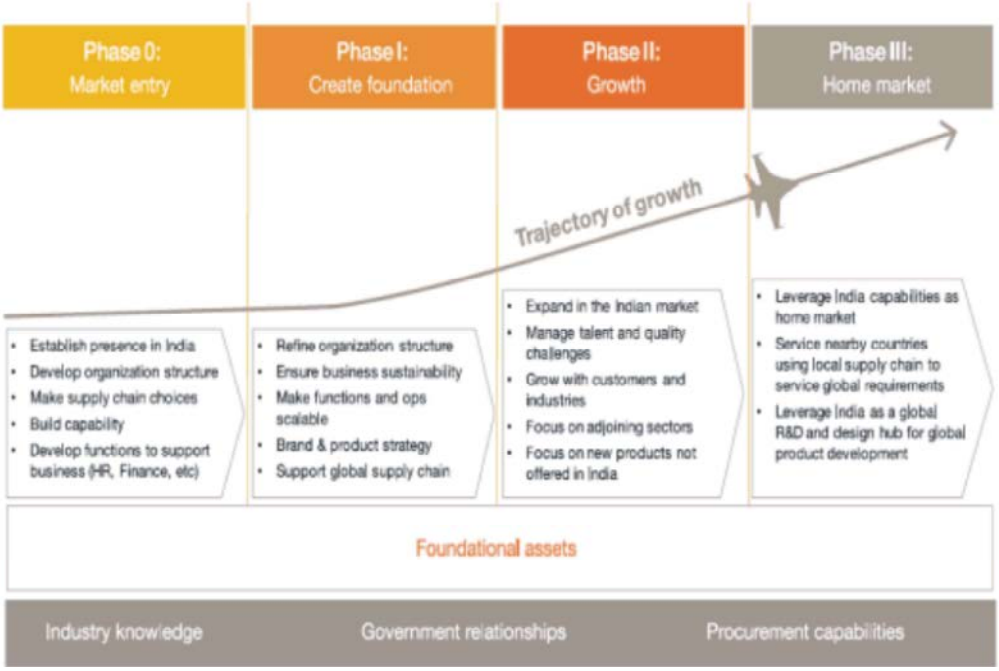
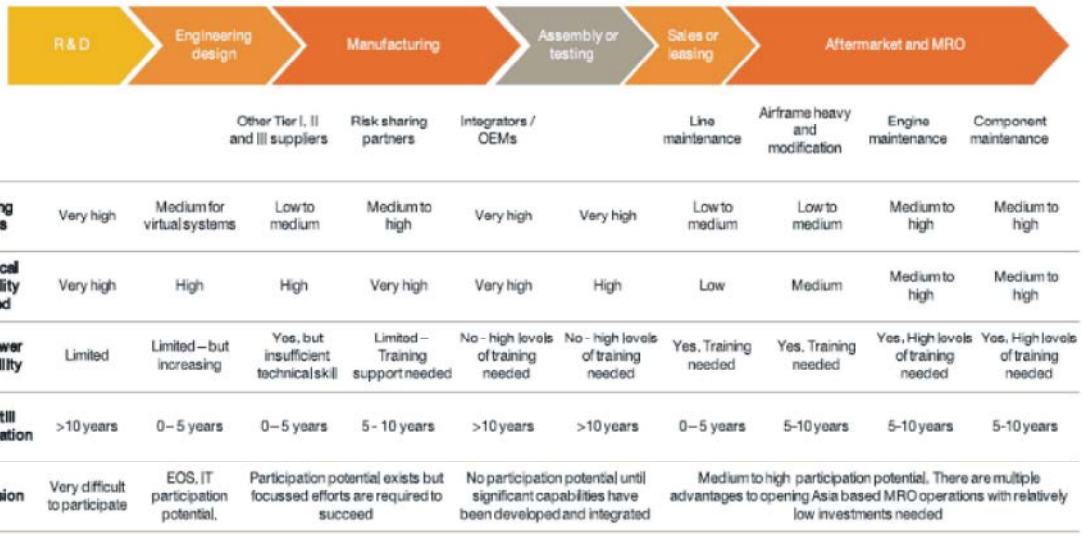


Fig. 2: Foundational Assets

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:



			Other Tier I, II and III suppliers	Risk sharing partners	Integrators / OEMs		Line maintenance	Airframe heavy and modification	Engine maintenance	Component maintenance
Funding needs	Very high	Medium for virtual systems	Low to medium	Medium to high	Very high	Very high	Low to medium	Low to medium	Medium to high	Medium to high
Technical capability needed	Very high	High	High	Very high	Very high	High	Low	Medium	Medium to high	Medium to high
Manpower availability	Limited	Limited – but increasing	Yes, but insufficient technical skill	Limited – Training support needed	No - high levels of training needed	No - high levels of training needed	Yes, Training needed	Yes, Training needed	Yes, High levels of training needed	Yes, High levels of training needed
Time till participation	>10 years	0–5 years	0–5 years	5 - 10 years	>10 years	>10 years	0–5 years	5-10 years	5-10 years	5-10 years
Conclusion	Very difficult to participate	EOS, IT participation potential.	Participation potential exists but focussed efforts are required to succeed		No participation potential until significant capabilities have been developed and integrated		Medium to high participation potential. There are multiple advantages to opening Asia based MRO operations with relatively low investments needed			

Fig. 3: Aerospace Value Chain

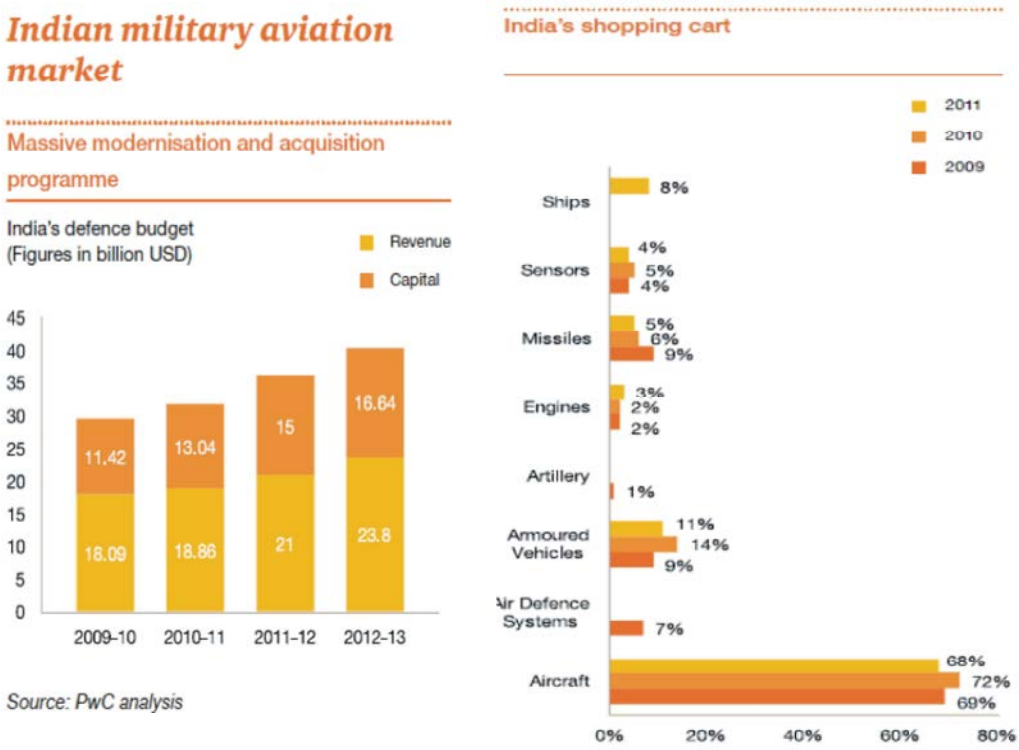


Fig. 4: India's Shopping Cart

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

Category	Name	Quantity	Induction likely from
Combat aircraft	Medium multi role combat aircraft (MMRCA)	126	2016
	Fifth generation fighter aircraft (FGFA)	214	2019
	Advanced medium combat aircraft (AMCA)	250	2020
	Tejas light combat aircraft (LCA)	264	2013
	MIG 29K	29	2013
	Sukhoi 30 Mk 1 fighters	42	2014
Transport aircraft	Multi role transport aircraft (MTA)	45	2022
	C17 Globemaster	10	Induction commenced
	Medium lift transport aircraft	56	2020
Trainer aircraft	PC -7 Pilatus trainer	75+ 75	2014
	Hawk advanced jet trainer (AJT)	20	2016
	Multi role tanker transport (MRTT)	6	2015
Specialist	P-8I Poseidon	12 (8+4)	Induction commenced
	Airborne warning and control systems AWACS	2	2018

Source: Media reports and PwC analysis

Fig. 5: India's Big Ticket procurements

Select aerospace majors in India

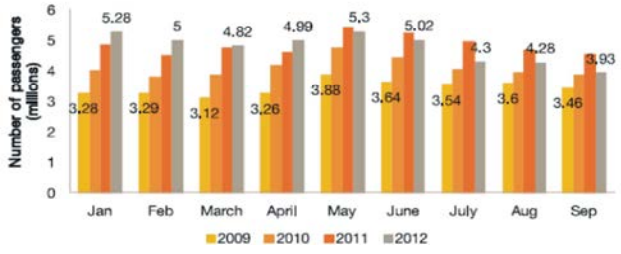
EADS	• Leading supplier to Indian commercial aviation sector (market share of 70% for Airbus and 95% for ATR) • Products such as the C-295 transport aircraft and the A330 MRTT in-flight refuelling aircraft shortlisted in several programmes of the Ministry of Defence (MoD) • MBDA, an EADS affiliated company, has supplied air-to-air and air-to-surface missiles to the Indian Air Force and Navy
Boeing	• Government of India purchased eight Boeing P-8I long-range maritime reconnaissance and anti-submarine aircraft in Jan 2009 • MOD signed an agreement with the US government to acquire 10 Boeing C-17 Globemaster III airlifters in June 2011 (largest defence contract signed by the Indian government with the US) • On the verge of winning contracts for AH-64D Apache attack helicopters and CH-47F Chinook heavy-lift helicopters • Dynamatic Technologies and Tata Advanced Materials Limited (TAML) have delivered P-8I components
Eurocopter	• Led the market with 65% of new aircraft deliveries in 2011 • Is expanding its support and services network in major cities to provide proximity services to customers across India
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 • Formed a joint venture with Tata Advanced Systems, Tata Lockheed Martin Aero-structures, to manufacture airframe components for the C-130J
Finmeccanica	• Significant industrial presence in India, is represented by the Ansaldo STS subsidiary in Bangalore (established in 1996), supplies signaling automation and control systems to South Asian markets • Over the last five years, have received on an average 250 million euros of orders 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 recognised private groups • AgustaWestland and Tata Sons established a JV for the final assembly in India of the single-engine AW119 helicopter for India as well as worldwide markets

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



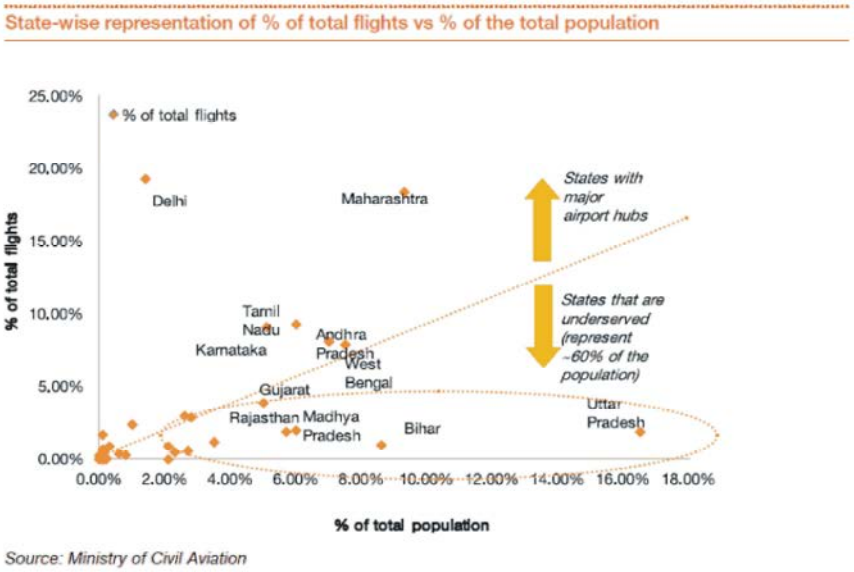


Fig. 7: State- wise representation of % of Flights Vs % of the total population

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:

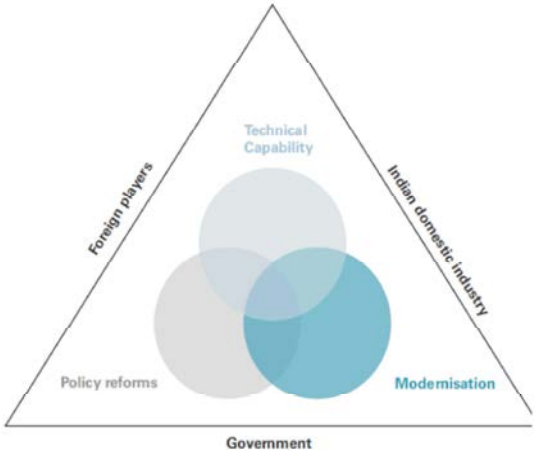


Fig. 8: Projected Premises

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.

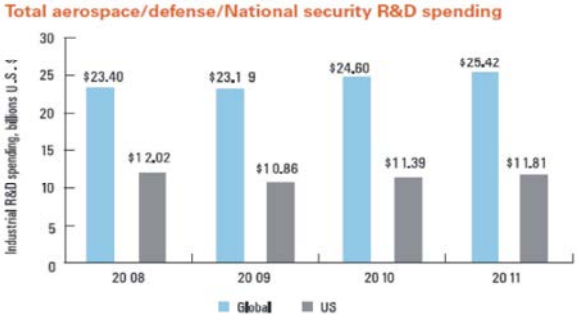


Fig. 9: Total Aero space/defence/national security R&D spending

The Global Aerospace & Defence Perspective:

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.

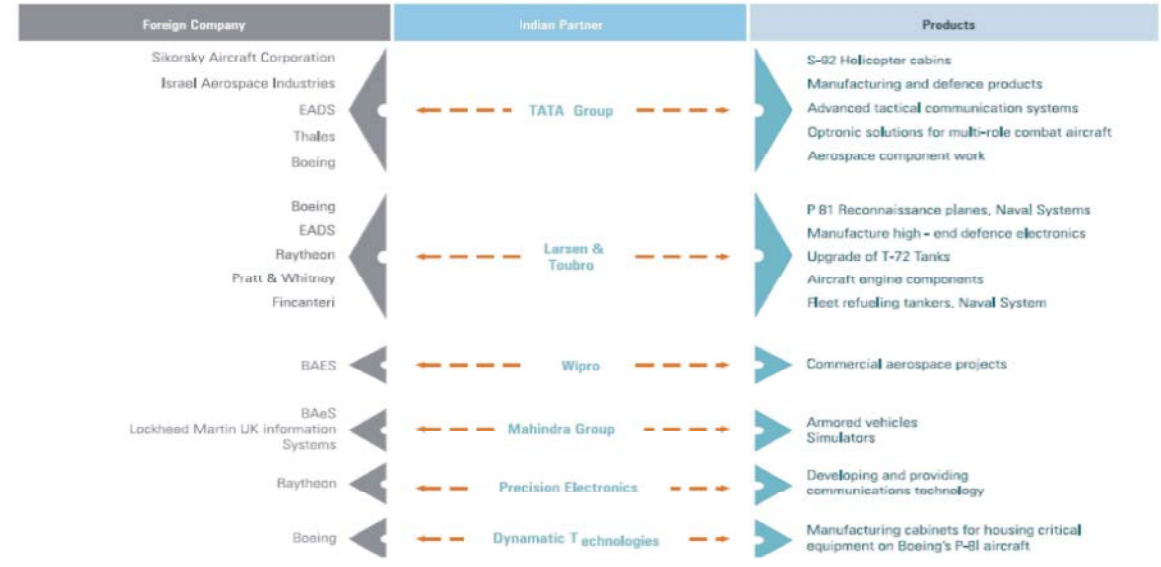
Emerging MRO hubs such as Singapore are now balancing the global MRO equilibrium. It is not incidental that the US remains to be the biggest aerospace and defence manufacturer as well as the largest MRO hub in the world.

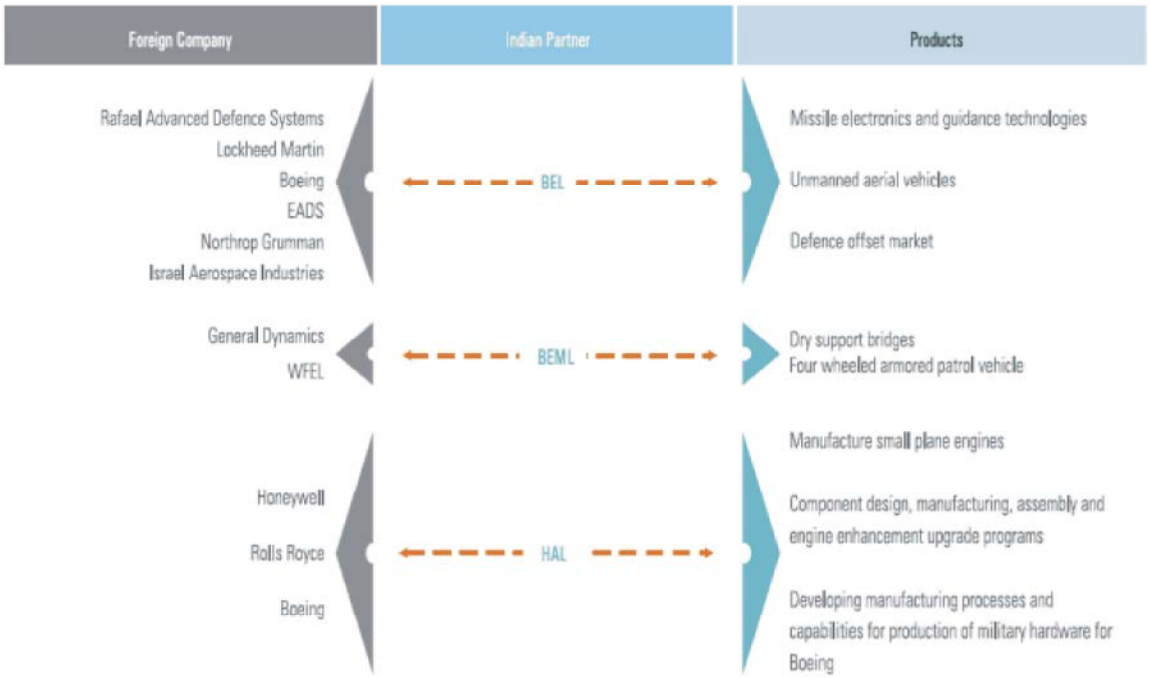
India on the Aerospace and Defence curve

- 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.





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 – Statisticalapproach:

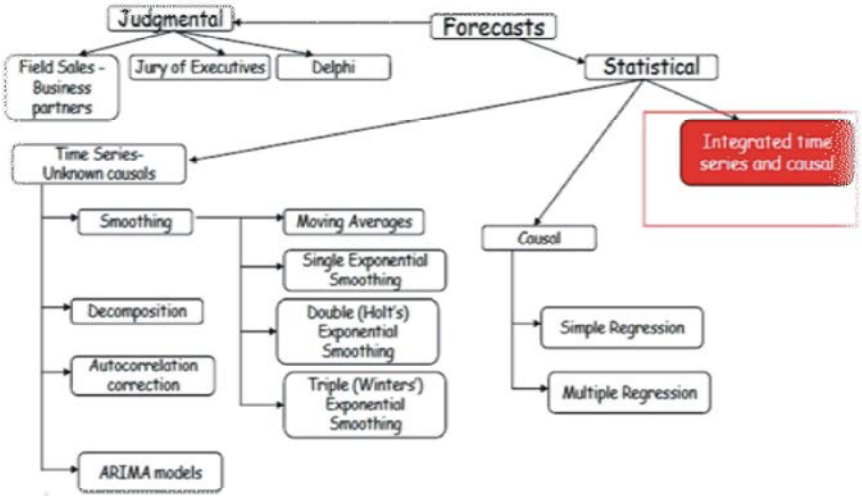


Fig. 12: Statisticalapproach

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!

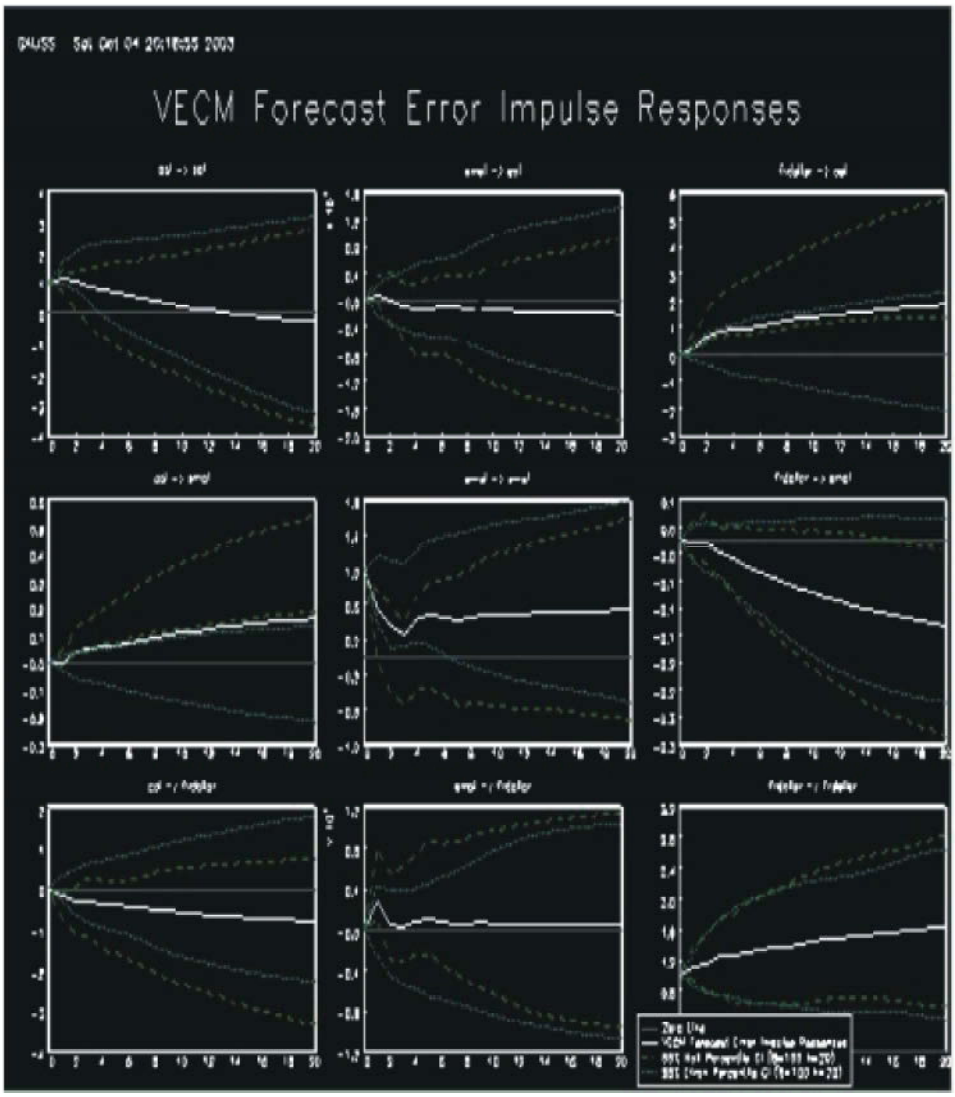


Fig. 13: Vecm Analysis

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