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Confederation of Indian Industry
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Unlocking the Potential

The Indian Aerospace
and Defence Sector

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Executive summary

Much has been said about the Indian Aerospace and Defence sector and the plethora of opportunities it presents in the form of a reasonable amount of deals that have already been signed with major global integrators, and a considerable number in the pipeline. This paper is a look at the factors responsible for a successful aerospace and defence sector in any country, the global best practice in terms of these factors and Indian performance as measured by the capabilities in these factors. It further goes on to draw out what needs to be done in India to best leverage its potential and become a global name in the industry and what needs to be done by each of the stakeholders.

After a number of discussions with the industry players, both Indian and global; as well as members of the government, it can be safely said that India is a land of positive opportunity when it comes to the aerospace and defence industry. On each of the critical success factors, from sustained government support, technical capability to enable manufacturing, supporting industry framework to a skilled human resource base, the nascent Indian Aerospace and defence industry has a foothold strong enough to potentially catapult into becoming a leading aerospace and defence hub. However, learning from global examples, some minor challenges need to be ironed out.

Foreword by CII

As India is moving to transform itself from a regional power to a global power, the aerospace and defence sector is increasingly occupying more and more space in the country's long term strategic planning. A USD 10 billion worth 126 medium multi-role combat aircraft (MMRCA) deal is just a case in point. There are several such defence deals either in the pipeline or being envisioned to strengthen India's force structure. Estimates show that the Indian Air Force will have more than 1000 fighter jets and around 60 squadrons by 2030. India will be spending more than USD 80 billion on capital acquisitions in the 2010-2015 timeframe.

The defence deals can be leveraged to gain diplomatic and political mileage. India can make the best use of its defence and aerospace procurement clout to bring home defence and aerospace technology and create world class defence production facilities. India can eventually emerge as a global defence production hub and supply cost effective and sophisticated defence equipment and systems to meet its own defence requirements and the rest of the world's needs.

In order to bring forth various nuances including requirements and opportunities in Indian defence and aerospace industry and what ought to be done to strengthen our technological and industrial capabilities; CII and KPMG have come out with this comprehensive study.

We are hopeful that all the stakeholders will find this study useful.

Gurpal Singh

Deputy Director General & Head
(Defence and Aerospace)
Confederation of Indian Industry





Foreword by KPMG

At the helm of positive regulatory enablers, industry interest and global attention, the Indian Aerospace and Defence industry seems set to grow. The synergetic interplay of factors and stakeholders has resulted in an increased attractiveness of the sector in the market and mega-sized deals seeing the light of the day over the past couple of years.

The government is clear in its vision for this sector - indigenisation of the industry and acquiring advanced technologies which will in turn facilitate the lowering of dependence on imports. In essence, it would create a ripple effect that the government is hoping to initiate in this sector. There is also an appreciation of the fact that this vision cannot be translated into reality unless there is synergy between global and Indian large, medium and small-sized players.

Much has been discussed at various industry and government forums on the Defence Procurement Policy (DPP), which in some sense is the 'guiding document' for the Indian defence sector. It is now well established that this is an effective framework for policy dissemination, a document which has been arrived at through interactions between the government, industry and the markets. The DPP has all the ingredients to become the trigger point, providing this industry with a much required impetus. The market now looks forward to the effective operationalisation of this comprehensive document.

The initiation and altering of the mind sets of stakeholders in liberalising this sector has now happened. It would be safe to reason that the basics have been put in place and now focus needs to be shifted towards overcoming the working challenges which would help further streamline the process for growth. So whether it is the establishing technical

qualification criteria for providing higher Foreign Direct Investment (FDI) on a case to case basis or the Indian industry doing a self capability assessment and understanding their areas for synergetic diversification, all need to be provided a focused approach.

In this evolving Aerospace and Defence value chain it would be unfair to ignore the role that human resource skills, Research and Development (R&D) and the long standing Small and Medium Enterprises (SME) suppliers for Defence Public Sector Units (DPSUs) and ordinance boards are going to play. It would be reasonable to think about a market consolidation, where experienced Indian manufacturing players with a diversification interest in Aerospace and Defence may look at partnering or even acquiring some of these SMEs, most of whom have now brimmed on capacity and capability. This would enable a win-win situation for both parties, where the SME could get a window in the larger game with foreign integrators and enable the Indian manufacturing giants to get a foot in the door on the mammoth opportunity that Indian Aerospace and Defence is set to provide.

These are interesting times for the Indian Aerospace and Defence sector. This paper is an attempt to provide a fair assessment of potential opportunity triggers and critical success factors for making India an even more serious participant in the global Aerospace and Defence sphere. I hope you find our assessment insightful and interesting.

Richard Rekhy
Head of Advisory
KPMG in India





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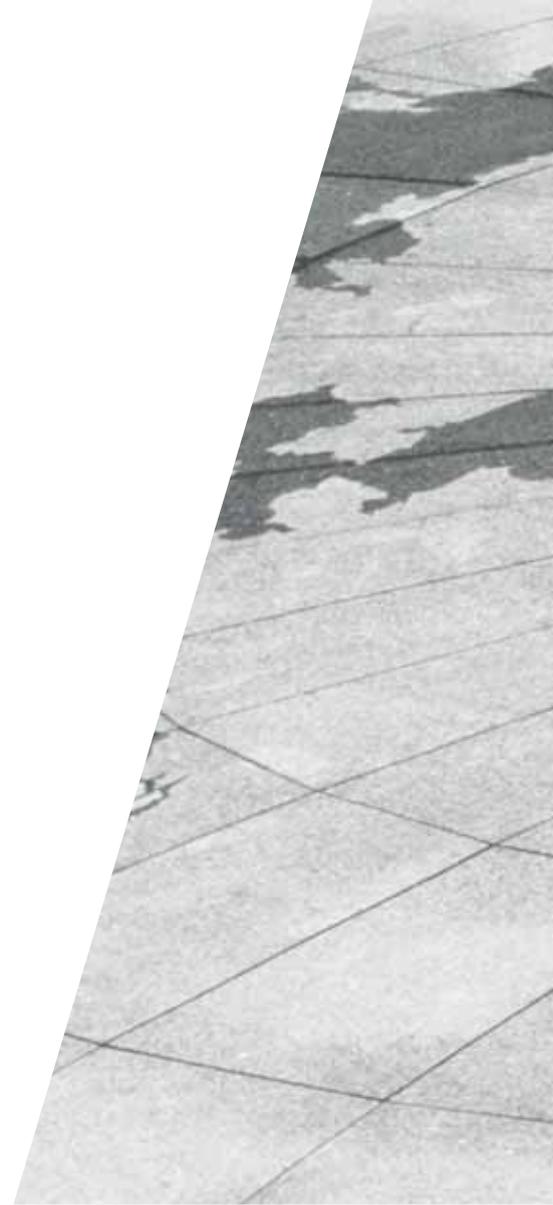
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Emerging opportunity

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. This understanding is further manifested by the large number of tie-ups forged by large Indian manufacturing/technology companies with global Aerospace and Defence companies in the recent past, to enable them a foot in the door in the Aerospace and Defence manufacturing sector.

Our research indicates that 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 signed¹.



Contracts signed since 2007		
Sr. no.	Force	Amount
1	Air force	17.46
2	Navy	6.16
3	Army	0.42
4	Coast Guard	0.616
5	Total	24.656

RFPs in the Process		
Sr. no.	Force	Amount
1	Airforce	14.36
2	Navy	12.833
3	Army	14.8
4	Coast Guard	-
5	Total	41.993

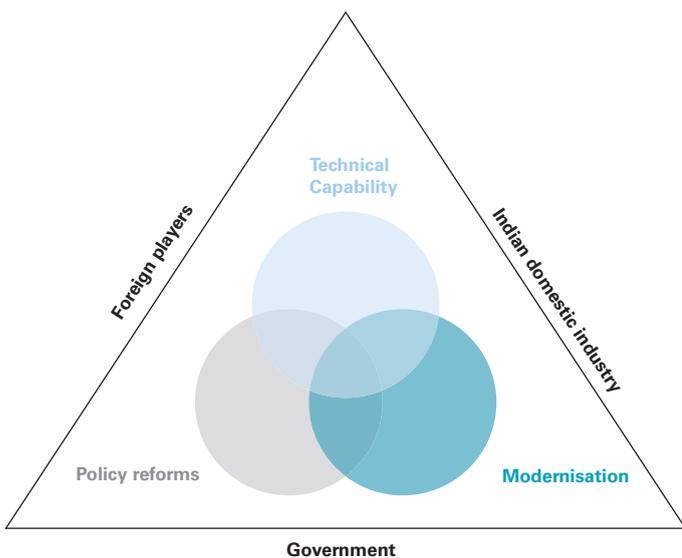
The basic premise that underlie this projected opportunity in Indian Aerospace and Defence are:

1. Government taking steps in **modernisation** of the industry backed by a substantial budget.
2. Positive industry **reforms** and the potential economic opportunities offered by offsets that will necessarily flow back to India as a part of any major defence acquisition and
3. **Transfer of technology and capacity building** with an opportunity to become a part of the global supply chains of major defence equipment producers by leveraging the cost arbitrage in component designing and manufacturing in India.



It would be fair to establish that the Indian Aerospace and Defence Industry today is an interplay of modernisation, reforms and technology, with each aspect becoming instrumental in driving the growth and stability that every stakeholder aspires to achieve.

The following section would help develop a clearer view of the global Aerospace and Defence industry and the factors that have impacted its growth. It will also bring out some of the critical success factors for this growth and demonstrate how they are best leveraged by individual countries.



The global Aerospace & Defence perspective

A. Government support – A vital facilitator

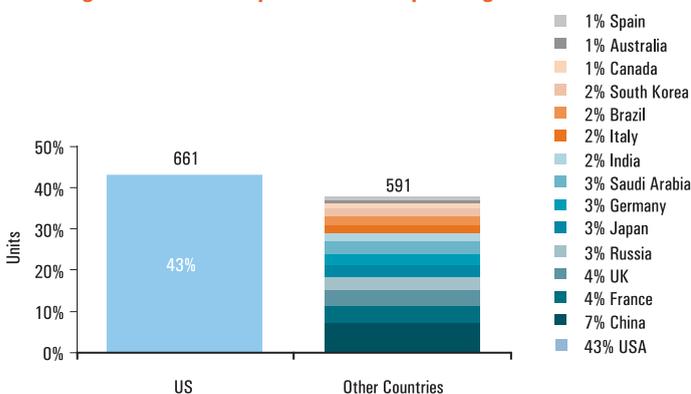
A country's Aerospace and Defence is a matter of national importance. The respective defence ministries of the economies and their policies are key stakeholders in the sector regardless of the level of privatisation. Given the level and quality of investment involved in the sector, the public sector is often the most equipped to kick-start such amounts of funding through tools such as defence budgets, allocations and stimulus programs.

On the other hand, for the long term sustenance of the sector, it is the policies, regulatory ecosystem and the support that the government provides the private sector that needs to be used to leverage the indigenous industrial capabilities of a country. For instance, according to industry experts the US was able to best leverage its government's policies, which have historically been dominated by the Pentagon with a strong focus on advanced technology development and an assured market. In particular its industrial policy, which also has the advantage of being formed much earlier than its European counterparts, allowed the US firms to apply military technologies to the nascent civilian aircraft market and enabled consolidation of the sector. These aspects were in favour of the sector in developing excellent manufacturing and engineering capabilities which eventually led them to dominate the world market. Examples have been seen of the global private sector in the US with Defence interests having actually built their A&D strategies around the US policy on defence and thereby operating in only those markets where the US has a footprint².

Sustainable funding – Keeping the momentum going

Since this industry is highly capital intensive, funding remains a key element in its development. For instance, US is the single largest spender on Aerospace and Defence bigger than the top 15 defence-spending nations put together³. Incidentally, the US is also one of the most advanced nations

Funding trends of the top ten defence spending nations



Source: KPMG Analysis and Morgan Stanley Research

in terms of technology, Research and Development (R&D) activity as well market structure. We are now seeing emerging economies such as India and China coming up the curve in Aerospace and Defence spending.

B. Technology-enabled manufacturing

Defence manufacturing is a high technology industry that involves complex interwoven processes and integration. The use of technology for manufacturing presents not only the opportunity to overcome known industry related challenges and solve complex issues, but also adds the greatest value through innovations in supply chain and design efficiencies. This demands an optimum level of integration between Original Equipment Manufacturers (OEMs) and their suppliers to demonstrate how they can work together to create integrated solutions that make manufacturing more cohesive, efficient and cost effective.

Manufacturing capability is very critical to minimise unit production costs while maintaining the required quality standard. Flexible production lines, procurement of material in bulk, production modelling during the design process, all help to achieve a maximum first time yield. The application of technology in the form of systems engineering and integration, enterprise resource planning, computer-based modelling techniques for the design and development of weaponry, electronic warfare, avionics systems, radars etc are a few examples. In addition, the adoption of network centric warfare (NCW) and war gaming scenarios by military establishments further emphasises the importance and the application of technology in this domain.

Japan, for instance, has made a mark for itself in the world by becoming a pioneer in advanced technology manufacturing processes. Japanese companies such as Mitsubishi, Kawasaki and Honda today are major subcontractors of US firms for civil and military aircrafts where technological ability forms the backbone of their value add. Agencies such as the Japan Aerospace Exploration Agency (JAXA) are developing innovative technologies and evaluation methods for improving the quality and reducing the cost of aircraft materials, components and structures. On the other hand, Israel has devoted a large share of its national resources for development of highly sophisticated military technologies and equipment. The defence manufacturing industry in this country accounts for a notable share of its industrial capacity and includes the in-depth involvement of some large private sector corporations⁴.

² Post-Cold War Policy and the U.S. Defense Industrial Base Kenneth Flamm Volume 35, Number 1 - Spring 2005

³ Morgan Stanley Research, 21st December 2010, Morgan Stanley Europe Aerospace & Defence, Aerospace and Defence Takeoff December 2010

⁴ How to Succeed Without Really Flying: The Japanese Aircraft Industry and Japan's Technology Ideology David B. Friedman Richard J. Samuels MITJP 92-01 Center for International Studies Massachusetts Institute of Technology

C. Research and Development (R&D)- Indispensable ingredient for sustained growth

R&D remains critical to the sustenance of this industry with no other sector more strongly linked to the government R&D spending of a country. Countries such as Russia and US spend large amounts on defence-related R&D every year. A closer look at the US R&D spend in Aerospace, Defence and National Security over the past few years indicates that almost USD 11 billion is estimated to be spent in 2011, which is about 46 percent of the global R&D spend projected in the same year.

Apart from public sources, the private sector also plays a key role in funding R&D spends in various countries. In France, Research and Development activities absorb more than 15 percent of the annual turnover of French aerospace companies, much more than the amount spent by their counterparts. French research excels in propulsion and combustion, composite materials, aerodynamics, acoustics, and embedded electronics and Information Technology (IT) systems, because of which, France is one of the leading players in the Aerospace and Defence sector⁵.

However, in recent times and owing to the global turn of events, governments across the world are looking at budgetary cuts. R&D in defence is now looking to focus on innovations in supply chain and also trying to mobilise the private sector for help in financing these innovations.

Total aerospace/defense/National security R&D spending



Source: Battelle, R&D Magazine, EU R&D Scoreboard

D. Providing the right market dynamics

Small and Medium Enterprise (SME)– An imperative at the base of the Aerospace and Defence

The global aerospace and defence value chain is incomplete without the presence and development of SMEs supporting the larger integrators and the public sector enterprises. These companies typically come with advantages of being leaner, more agile, low set up cost, high level of skills and cost effectiveness in production of smaller systems and sub-systems which form part of the overall value chain. Over the years, it is observed that these players are achieving size and scale and expanding into new areas such as design and development capabilities.

Lockheed Martin has emerged as a great example of an integrator using its market accessibility capabilities to integrate sources from countries like Denmark, Australia, Turkey, Norway, and SMEs across Canada providing various systems, sub-systems and services⁶.

Though this sector has played an important role in industrial development of several foreign economies, closer home, India itself has 50 percent of their industrial production, 40 percent of their total exports and 90 percent of all enterprises coming from this space. We are also seeing global integrators in India providing value added trainings and certifications to their local SME supplier base⁷.



5 <http://www.invest-in-france.org/Medias/Publications/223/Aerospace%20Industry.pdf>

6 The Aerospace and Defense Industrial Base June 2010, Lockheed Martin

7 www.ciidefence.com/events/MSME_DEFENCE/SME_Flyer.pdf

Maintenance, Repair and Overhaul (MRO) – An effective support system for aerospace and defence

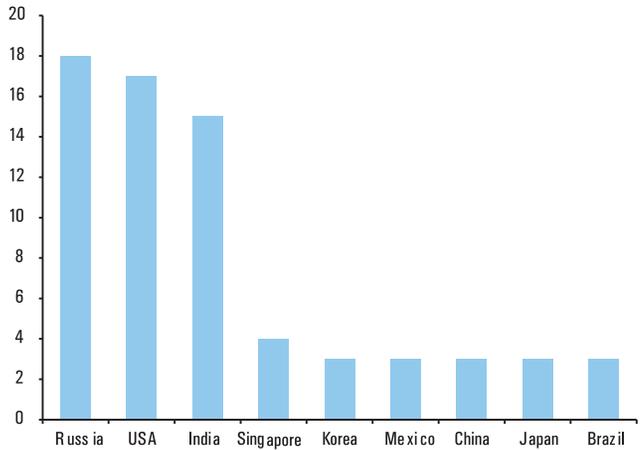
With emerging Aerospace and Defence industries in developing markets, the need to develop new MRO facilities across the globe is now more compelling than ever. More is spent by organisation on Maintenance, Repair and Overhaul than the cost spent on manufacturing and procurement. Global experiences suggest that MROs are not just critical for expanding capacity for new fleet inductions; however, they are more critical in facilitating life cycle extensions for existing fleet and keeping operational costs in check.

North America and Europe currently contribute more than 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 world⁸.

Emerging MRO hubs such as Singapore are now balancing the global MRO equilibrium⁹.

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.

Major MRO and parts distribution investments* 1990-2009*

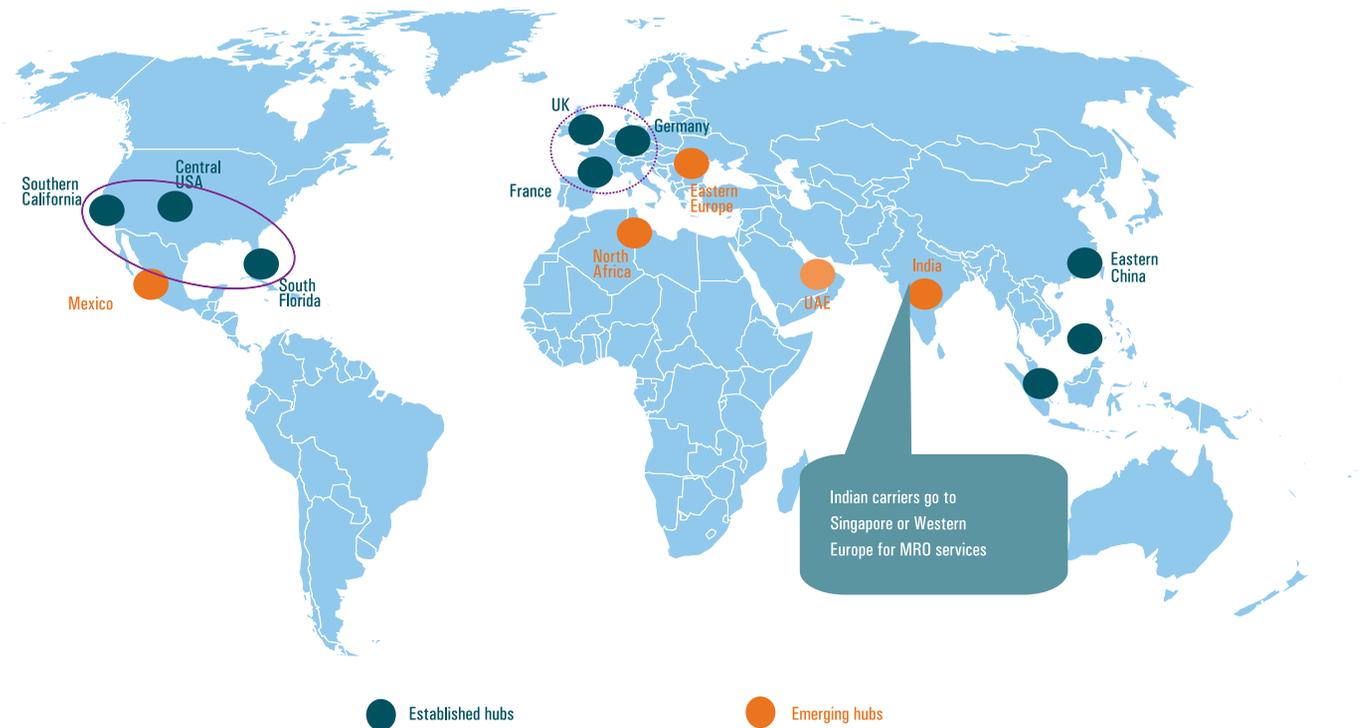


*Includes joint ventures and organic investments for 121 largest OEMs; excludes acquisitions

** 2009 data is as at 31 August 2009

Source: Battelle, R&D Magazine, EU R&D Scoreboard

International MRO facilities are running at overcapacity and looking for low cost destinations to offload work



North America & Western Europe contribute to more than 60 percent of the world MRO market

Source: Aero Strategy report "Air Transport MRO Outlook," April, 2009

⁸ Global MRO spend on military aviation to increase by 14.9% over the next decade, reports OAG, 3 December 2008

⁹ Globalization –The Next Wave Aerostrategy 2009

E. Human Resource Skills – No substitute to trained manpower

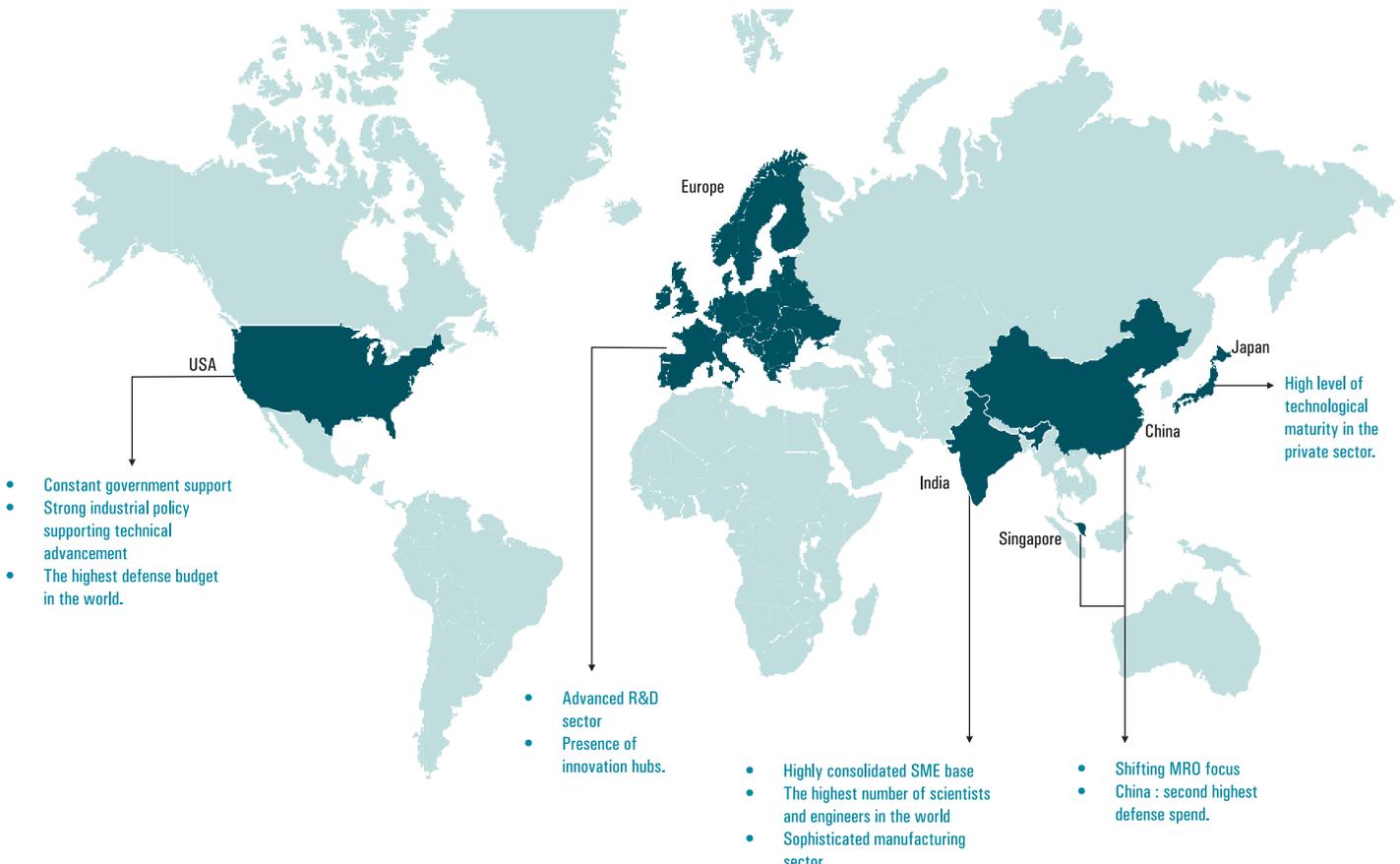
The backbone of the defence sector as is true for most skills led manufacturing industries are its human resource and in turn, the skills and technical abilities of the workforce. Estimates suggest that almost 50 percent of the workforce in this sector is constituted by engineers and management graduates.

Countries like France have developed highly regarded specialist schools like Institut Superier de l'Aeronautique et de l'Espace (ISAE) and Ecole Nationale de l'Aviation Civile (ENAC) in Toulouse and Ecole Nationale Superieure de Mecnique et d'Aerotechnique (ENSMA) in Poitiers to train engineers for this field. As the French industry grew, substantial investments were made in the form of professional federations such as

Groupement des Industries Francaises Aeronautiques et Spatiales (GIFAS) to promote the interests of this sector¹⁰. With a pool of 134000 specialist employees, the French Aerospace and Defence industry today is clearly a European leader¹¹.

Whilst one could also reason that since Aerospace and Defence being a very niche sector with specific skills requirement, it is first important to develop training grounds for the manpower so that they are 'sector ready' for application of these skills. On the other hand, it can also be argued that once the sector comes out of infancy that one would see the setting up of such training schools/innovation hubs. Both arguments may be correct in their own respects and a logical way ahead would be that they both need to function together so that one complements the other.

Countries that best leveraged aerospace and defence critical success factors globally



Source: KPMG analysis

As one of the world's top 10 military markets, India's increasing importance to defence contractors has already been established. As Indian Aerospace and Defence is on the path to growth and development through technology and business from both the domestic private sector and the global integrators, there are valuable lessons that can be learnt from the experience of contemporaries across the globe, who in the past have outdone their potential in this sector.

The global Aerospace and Defence evolution clearly suggests that it requires a synchronised working of the government's will and policy coupled with technology and R&D, proven manpower and manufacturing abilities for this sector to create sustainable growth and economic contribution in a country.

¹⁰ <http://www.invest-in-france.org/Medias/Publications/223/Aerospace%20Industry.pdf>

¹¹ Press Release, Aerospace subcontracting in France: Opportunities for Foreign investors Invest in France Agency

India on the Aerospace and Defence curve

A clear case has been established for some of the factors required to develop and maintain a successful Aerospace and Defence industry in a country. In this section we analyse the presence of these critical success factors and their current status in India.

A. Government support

Support from the central government is vital for development of an Aerospace and Defence sector. The Ministry of Defence (MoD) in India has been proactive in taking feedback from industry participants and other stakeholders towards making current policy environment more industry friendly. The frequent revisions of Defence Procurement Policy (DPP) (7th revision in a span of nine years since the first one in 2002) is a clear reflection of the MoD's willingness to streamline the process of procurement.

Recent policy updates on the Indian defence sector

Defence acquisition in the Indian context is a complex decision-making process. However, the government has introduced a series of reforms in the Indian defence acquisition policies and procedures with the key objective of developing a sustainable defence capability base within India.

(a) Defence Procurement Policy 2011

The DPP 2011 is widely accepted by the industry as a well planned and comprehensive document in spirit. It reflects the government's commitment to enable the domestic defence industry to forge partnerships with international defence majors to bring in latest technologies and manufacturing efficiency. Implementation of this policy and the true effects that it will have in steering aerospace and defence industry forward remains to be seen.

The most notable change in DPP 2011 is the expansion of scope of offset policy guidelines to include civil aerospace, internal security and training within the ambit of eligible products and services for the discharge of offset obligations. The expansion in the list of companies eligible for Transfer of Technology for maintenance infrastructure is also a welcome step to promote the domestic players foray in the given direction.



While the DPP 2011 closely addresses issues related to the concerned stakeholders, the industry still has certain demands which it would like addressed going forward.

- Upwards revision on timelines of offset banking
- Introduction of offset multipliers to facilitate flow of critical technology
- Sustained people focus on development of specialist skills for acquisitions
- Concerns about the Limitation of Liability clause in the contract

(b) Defence Production Policy

On a parallel front, the Defence Production Policy was issued recently, with an aim to “harness the emerging dynamism of Indian industry and capabilities available in the academia and the R&D institutes”. Besides taking steps towards the promotion of SMEs, providing necessary impetus to R&D and addressing the grievances of the Indian industry, the government has been forthcoming to design the domestic manufacturing in line with the futuristic demands from the defence forces.

The Production policy also aims at progressively identifying and addressing any issue which impacts; or has the potential of impacting the competitiveness of the Indian defence industry in comparison to foreign companies. It would be worthwhile to designate a mechanism that works towards enhancement of private sector participation as has been modeled for the DPSUs.

(c) Proposed liberalisation of the Foreign Direct Investment (FDI) policy

FDI in the defence sector remains one of the most hotly-debated topics for the industry. However, mixed views exist amongst industry segments on FDI liberalisation. Where one school of thought believes that enhanced FDI in this sector would provide the much needed boost the defence equipment manufacturing; others believe that such liberalisation would impair the growth of the domestic industry and would shift the control and management in foreign hands. To this effect, the Department of Industrial Policy and Promotion (DIPP) had put forth in the public domain, a discussion paper Foreign Direct Investment (FDI) in defence sector (May 2010) suggesting further liberalisation of the FDI regime from existing 26 percent to 74 percent under the approval route. The MoD has been reluctant to allow a higher FDI considering the sensitivity and strategic nature of the sector¹².

It is understood that there is a window to seek FDI beyond the benchmark limit of 26 percent on a special case to case basis. Such approvals are practically difficult to obtain and are provided in exceptional cases such as transfer of critical/sophisticated technology. It is also observed that most of such approved ventures are with DPSUs. However, what lacks is that there are no express guidelines/ parameters which would be treated as qualification criteria to obtain such an appeal.

In the interim, the government may think of listing out the desired critical technologies for which the special approval for higher FDI on case-to-case base could be permitted.

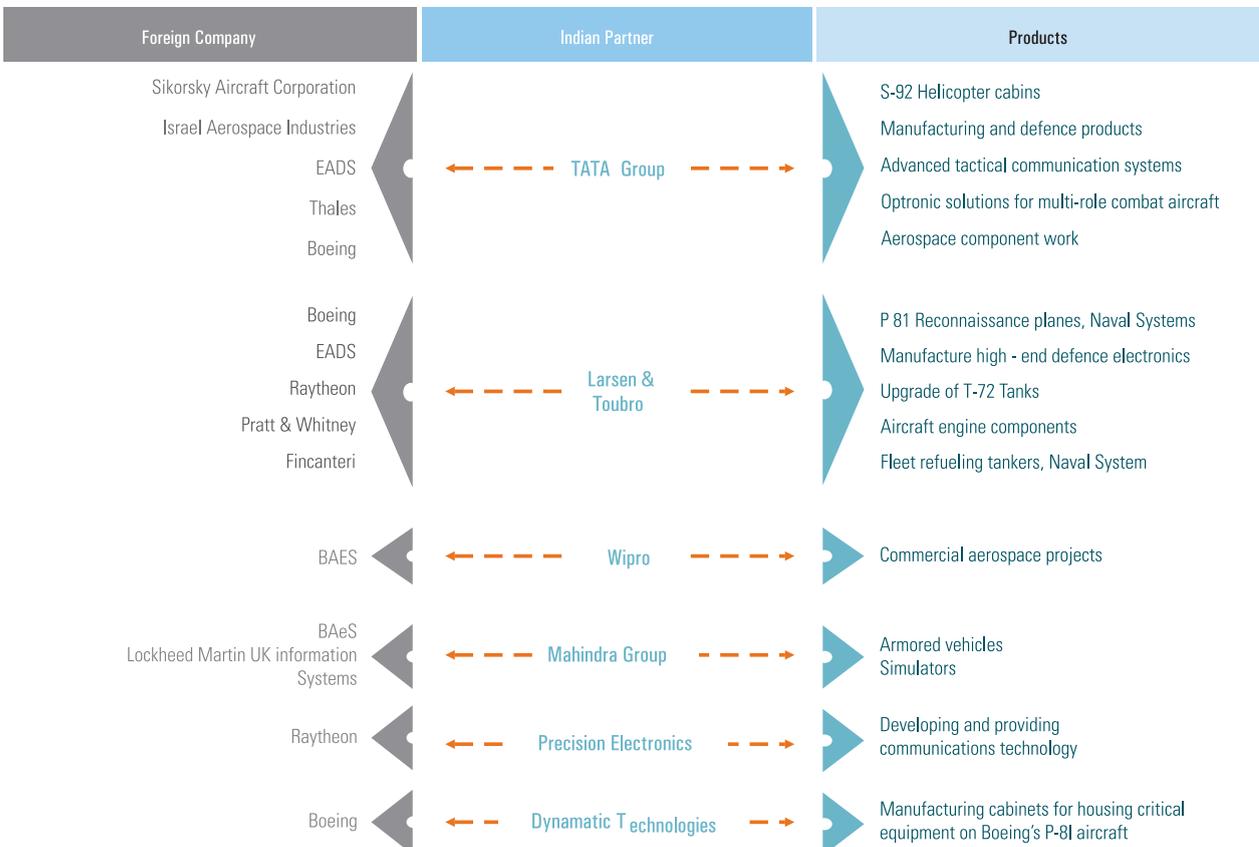
Besides FDI, for a successful joint venture it is important to ensure clarity on profit and cash distribution, management responsibility, recognition of the value of the intellectual property being provided, remuneration of key executives and perhaps most importantly, defined separation process at the end of joint ventures.

Partnerships in action

Government’s supportive policies and opportunity in Indian Aerospace and Defence sector have fostered multiple Memorandums of Understanding (MoUs) between Indian (both public and private) and foreign companies (see figure below). Foreign companies are on board with the potential of the aerospace and defence sector in India and have responded well. Majority of the global top-10 players have signed MoUs with an Indian partner and are on course in translating to partnership for identifiable results.

Examples of MoUs formed by Indian Public and Private Companies with foreign players

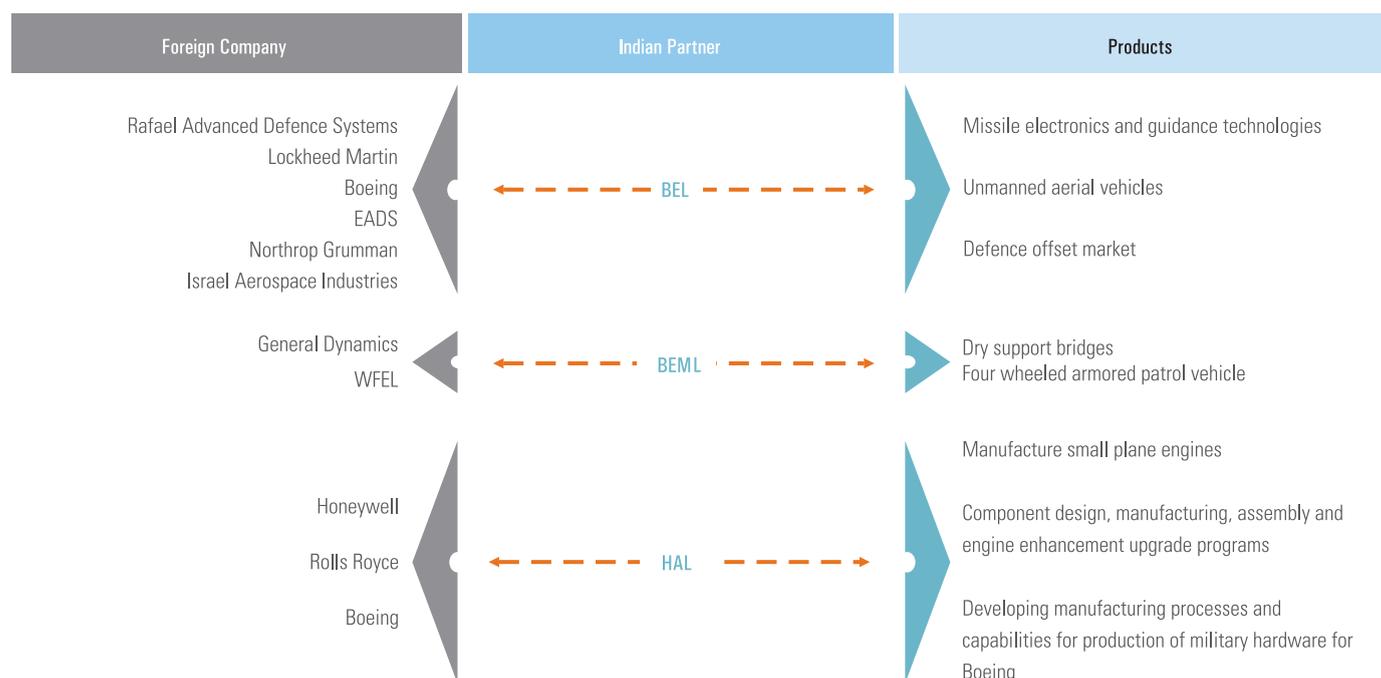
Analysis of defence market opportunity
Key MoUs of International companies in India



Examples of MoUs formed by Indian Public and Private Companies with foreign players (contd.)

Analysis of defence market opportunity

Key MoUs of International companies in India



The introduction of the 'buy and make (Indian)' category of Requests for Proposal (RFPs) with minimum 50 percent indigenous content on cost basis can help ensure a balanced mix of global equipment and localised components in new procurements. With a two-fold effect, this policy on implementation will make the global primes rethink their India strategy to eventually carve out their market share and enable the Indian government to achieve their ultimate ambition of 'Self-Reliance' without having to source every single sub component from Indian vendors.

Tax structure

The tax and duty structure on key inputs/goods forms a significant factor for growth of any sector. Overall tax/duties incidence on the overall cost is known to make or mar the performance and growth of any sector, and defence cannot be an exception. The MoD's sincere efforts to ensure the progressive evolution of DPP and repetitive plea from Indian industry notwithstanding, the Indian (private sector) Industry has been facing regressive and differential treatment in terms of taxes and duties they have to pay vis-à-vis DPSUs and Foreign OEMs. Indian industry players feel that this differential tax/duty treatment places the private players at a disadvantage, thereby restricting their contribution and effort in strengthening the national defence industrial base and in the national endeavour to largely indigenise the sector and reverse the import – indigenous ratio in favour of the Indian Industry through significant 'import substitution'.

The duty/ tax benefits currently extended to the defence sector are highlighted below.

- **Customs duty**

Complete exemption from customs duty is extended on import of various defence equipments or other equipments/ goods required for production, development or maintenance of defence equipments, etc. The benefit is currently available to DPSUs and their contractors / sub-contractors in some cases and work centres engaged in specified defence programmes like Integrated Guided Missile Development Program (IGMDP), Advance Technology Vessels Programme (ATVP), etc.

- **Excise duty**

Exemption from excise duty is also extended on supply of defence equipments or other equipments/ goods required for construction, development or maintenance of defence equipments, etc. to DPSUs and work centres engaged in specified defence programmes like IGMDP, ATVP, etc¹³.

- **Value Added Tax (VAT)/ Central Sales Tax (CST)**

Certain specified exemption on sale of notified goods such as telecommunication equipment, motor vehicles, arms such as rifles, revolvers, etc. to specified defence establishment.

13 Notification No 63/ 95 –CE and 64/ 95 – CE dated 16 March 1995 as amended

Given the limited exemptions/ concessions, the stakeholders especially the private players planning to undertake manufacturing in India suffer a significant disadvantage vis-à-vis DPSUs (including their contractors) and foreign OEMs. Though certain taxes e.g. service tax are a cost that is common to all the stakeholders.

Unlike Customs and Excise duty, currently no exemption is provided from Service tax on taxable services provided to Defence Sector including services received from overseas in relation to consulting, training, maintenance, etc. Moreover, no general concessions are currently provided under VAT/ CST laws. The key disadvantages faced by the stakeholders are discussed below.

Private Players/ Indian arm of Foreign OEMs

- No exemption from Customs duty on import of inputs/ goods required for manufacture/ development of equipment.
- No exemption from Excise duty on inputs/ goods required for manufacture/ development of equipment.
- Supply to DPSUs or Defence organisation are exempt from levy of Excise duty, hence, credit of inputs duties (such as specified components of Customs duty and Excise duty) cannot be claimed
- Supplies to defence sector are not considered 'deemed export' and extended benefits of tax/ duty on procurement of inputs used in manufacture and supplied.

DPSUs

- Supply of manufactured goods to Defence organisation are exempt from levy of Excise duty e.g. supply of Pistol 9 MM, hence, credit of inputs duties (such as specified components of customs duty and Excise duty) cannot be claimed.

Contractors to DPSUs

- No exemption from Excise duty on inputs/ goods required for manufacture/ development of equipment.

The manner in which the current tax/ duty regime impacts the cost and overall efficiency is explained by way of tabular illustrations below.

Table 1
Import /local purchase of equipment by DPSUs or their contractors

Taxes and Duties	%	Product cost
Total Cost of Product		100
Taxes/ Duties on Finished Product in Country of export		
Customs Duty/ Excise duty	Nil	0
Deliverable Product Cost with Taxes		100

As can be seen from the illustration above, DPSUs or their contractors importing equipment enjoy complete exemption from any taxes and duties.

Import /local purchase of equipment by a Private player: ABC Pvt. Ltd.

Taxes and Duties	percent	Product cost
Total Cost of Product		100
Taxes/ Duties on Finished Product in Country of export		
Customs Duty/ Excise duty	Customs duty 24/26 percent Excise duty – 10.30 percent	24/26 – if imported 10.30 – If locally purchased
Deliverable Product Cost with Taxes		110-126

As can be seen from the illustration above, ABC Pvt. Ltd. has a distinct disadvantage vis-à-vis the DPSUs on procurements. Further, ABC Pvt. Ltd.'s supplies to DPSUs are exempt from excise duty, thereby rendering it unable to claim Central Value Added Tax (CENVAT) credit of the some of the duty cost that he may have suffered on procurement of inputs.

Table 2
Equipment supplied by an Indian Private player ABC Pvt. Ltd. to an OEM

Taxes and Duties	%	Inputs		Value Addition	Product cost
		Import	Local		
Cost (Net of Tax)		20	30	50	100
Basic Customs Duty	@10%	2			
Additional Customs duty	10.3%	2.26			
Education Cess	3%	0.13			
Additional Duty of Customs	4%	0.98			
Excise Duty	10.3%		3.1		
Central Sales Tax	2%		0.6		
Total Taxes		5.37	3.7	0	
Total Cost of Product		25.37	33.7	50	109.07
Taxes on Finished Product					
Excise Duty	10.3%				11.23
CENVAT Credit					(6.35)
Cost of Product after Excise Duty					113.95
VAT	12.5%				14.24
Deliverable Product Cost with Taxes					127.9 ~128.9

Indian manufacturers are exempt from customs or excise duty on procurement of inputs required for manufacturing equipment. In the illustration above, it is evident that ABC Pvt. Ltd. is charged additional duty and tax in the form of Basic Customs duty of 2.0, Education Cess of 0.13 and Central Sales Tax (on its inter-state purchases) of 0.6. Credit of other duties is available and can be used to pay Excise duty on finished products supplied (since there is no exemption on supplies). However, due to the cascading effect of duties/

taxes on cost, ABC Pvt. Ltd. pays Excise duty at a higher base of 109.07; and as a result the credit available to it (i.e.6.35) is inadequate to offset the output Excise duty liability. Further, ABC Pvt. Ltd. also pays VAT of 14.24 on supplies since no exemption is available and it cannot offset it against the credit of Central Sales Tax (which is minimal). Thus, the tax/ duty incidence increases its cost and makes him uncompetitive vis-à-vis direct imports.



Since, offset partners export out of India, ABC Pvt. Ltd. enjoys exemption from customs duty on a procurement against a licence, hence the cost of imported inputs remains 20. Out of duty/ tax incidence of 3.7 on the local procurement, it would be able to claim credit of Excise duty of 3.1 which it can use to pay Excise duty on his exports (i.e. 10.68). Since, equipment is exported out of India; ABC Pvt. Ltd. can claim refund of Excise duty of 10.68 as well. Hence, its net cost would be 100.6. Further, when the OEM integrates the system and re-imports, no Custom duty is payable on account of the available exemption.

Table 3
Offsets Physically Exported by an Indian Offset Partner ABC Pvt. Ltd.

Taxes and Duties	%	Inputs		Value Addition	Product cost
		Import	Local		
Cost (Net of Tax)		20	30	50	100
Basic Customs Duty	Nil	0			
Additional Customs duty	Nil	0			
Education Cess	3%	0			
Additional Duty of Customs	4%	0			
Excise Duty	10.3%		3.1		
Central Sales Tax	2%		0.6		
Total Taxes		0	3.7	0	
Total Cost of Product		20.0	33.7	50	103.7
Taxes on Finished Product					
Excise Duty	10.3%				10.68
CENVAT Credit					3.1
VAT	Nil				0
ED Reimbursed					(10.68)
Deliverable product cost with taxes					100.6

Indian manufacturers do not enjoy any exemption from Customs or Excise duty on ABC Pvt. Ltd.'s procurement of inputs required for manufacture of equipment. In the above illustration, ABC Pvt. Ltd. suffers duty and tax cost in the form of Basic Customs duty of 5.0, Education Cess of 0.32 and Central Sales Tax (on his inter-state purchases) of 0.6. Credit of other duties would be available which can be used to pay Excise duty on finished products supplied (since there is no exemption available on supplies). However, due to the cascading effect of duties/ taxes in the cost, ABC Pvt. Ltd. would be paying Excise duty at 117.12. Further, it would also pay VAT of 16.00 on its supplies since no exemption is available and it cannot offset it against the credit of Central Sales Tax (which is minimal). Thus, the overall cost would be much higher vis-à-vis direct imports by DPSUs or their contractors.

Table 4
Offsets –System Integration by an Indian Offset Partner in India, ABC Pvt. Ltd.

Taxes and Duties	%	Inputs		Value Addition	Product cost
		Import	Local		
Cost (Net of Tax)		50	30	20	100
Basic Customs Duty	@10%	5			
Additional Customs duty	10.3%	5.66			
Education Cess	3%	0.32			
Additional Duty of Customs	4%	2.44			
Excise Duty	10.3%		3.1		
Central Sales Tax	2%		0.6		
Total Taxes		13.42	3.7	0	
Total Cost of Product		63.42	33.7	20	117.12
Taxes on Finished Product					
Excise Duty	10.3%				12.06
CENVAT Credit					11.21
VAT	12.5%				16.00
Deliverable Product Cost with Taxes					133.97

In order to encourage private players participation in enhancing domestic capabilities and address the tax/ duty disadvantages faced by the stakeholders, it is imperative that such issues are examined and addressed. This would encourage the private sector to acquire operational efficiencies.

To provide the requisite push to defence manufacturing, the government could also introduce promotional benefits such as tax holidays for companies engaged in defence manufacturing on lines of 80IA benefits available to infrastructure companies.

Public Private Partnership (PPP)

Global industry experience suggests that PPPs could prove to be the first step towards liberalisation of an industry. The trend of having an agreement in place between the government entity and private companies to utilise the resources needs to be encouraged for real growth in the aerospace and defence sector. This would also help improve financial viabilities of indigenous projects. These agreements could be in the form of complex teaming and work share programs to simple lease plans.

Globally, as PPP models and their financing benefits become better understood, service delivery is more effective, and security concerns are answered, and as a result their use becomes more widely accepted. With this comes an expansion of the envelope for which PPPs are considered, from back-office activities to front-line capabilities.

In a nation with rich Aerospace and Defence infrastructure comprising of 39 ordnance factories, eight DPSUs and about 50 DRDO labs and a richer experience spanning decades, it is pertinent to utilise and further boost this capability by enhancement of the role of the private sector¹⁴.

The government constituted 'Kelkar Committee' (2005) had recommended the making of a pro-active framework of government agencies and private players; and providing encouragement to Tier I suppliers to assume the role of integrators. To this effect, the concept of Raksha Udyog Ratnas (RURs) seems to be a gradual step towards formation of a true manufacturing base with active participation of private players. However, fair implementation of this concept on the ground level is yet to be seen. Once put in practice, the nomination of a private player as a 'Production Agency' in the contract stage will provide a true fillip in creation of new system integrators.

The recent invitation of interest by the MoD for the development of Future Industry Combat Vehicles (FICVs) in India under the 'Make' category is seen as a welcome step by the industry. It would also upscale the existing capability of the auto segment into developing niche military combat vehicles. This bid involves four Indian companies – three private and one public. Even if the public company wins the contract it is likely to create an ecosystem of suppliers because certain items are earmarked for private sub component suppliers. Such projects can boost the defence industry in R&D and in developing suppliers from the small and medium industries.

PPP focus in India initially should be on building non-core war-fighting capabilities. Possible projects on PPP basis could be:

1. Staff accommodation for families and single persons, barracks, garrison development, new bases
2. Estate rationalisation, disposal of properties to provide finance for new investment
3. Training equipment, simulators to support existing and new air force, naval and army equipment, training services paid for on the output of trained personnel
4. Equipment, white fleet vehicles, other non-fighting support equipment, and communications services.



B. Technical capability

Technical capability forms the core requirement of any manufacturing related industry. It comprises manufacturing capability at its centre surrounded by capability in Information Technology/Information Technology Enabled Services (IT/ITeS) industry, R&D capability and Quality standards. This subsection gives an analysis of India's technical capability for the aerospace and defence sector.

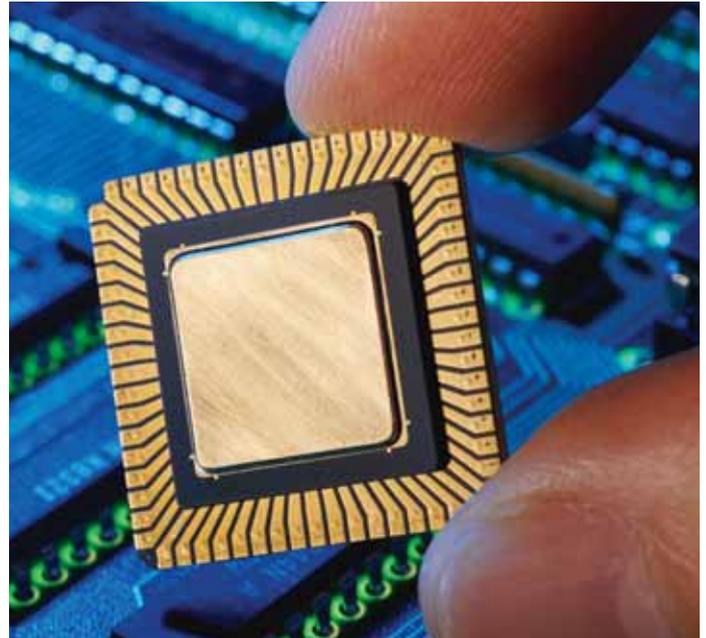
Manufacturing

The Aerospace and Defence industry is closely tied up with manufacturing industry. For any aerospace or defence equipment multiple electronic/mechanical/electro-mechanical sub-components are required as raw materials. Hence, a strong supporting manufacturing/engineering industry is essential for a successful aerospace and defence industry.

India has a strong presence in the manufacturing sector. For example, in the Automobile industry, India is home to production plants of some of the global majors like General Motors, Tata, Ford, Suzuki, Hyundai, Honda and Fiat. In the electronics and semi-conductor industry, India has over 120-130¹⁵ top chip-designing firms working with leading edge technology to support the industry. In Telecommunications, global mobile handset manufacturers like Nokia and LG have established their production units in India. There is also some presence of heavy engineering equipment production like commercial shipbuilding (especially vessels like Tankers and Containers) in India and there are plans to upscale indigenous production.

Aerospace manufacturing has traditionally not been able to mature as a stronghold in India. However, with India geared up as a manufacturing destination, funds being allocated, India is on the verge of starting contributions in this sector as well. Traditionally, PSUs like HAL and BEL have been the leaders in this sector. HAL has manufactured 12 types of aircraft with in-house R&D and 14 under licence. It has manufactured over 3550 aircraft, 3600 engines and overhauled over 8150 aircraft and 27300 engines. Some of the private entrants in this sector include Dynamics Aerospace, Taneja Aerospace & Aviation Limited (TAAL) and Tata Advanced Systems Ltd (TASL). Dynamics Aerospace has one of the largest infrastructures in the Indian private sector for manufacture of exacting Air Frame Structures and Precision Aerospace Components. TAAL manufactures small civilian aircraft, aero-structures and aircraft parts, provides aircraft maintenance services and represents Cessna Aircraft Company, USA, for the sale of its aircraft in India. TASL has launched the first Sikorsky S-92 Helicopter Cabin made in India at its facility at the aerospace and precision engineering special economic zone on the outskirts of Hyderabad¹⁶.

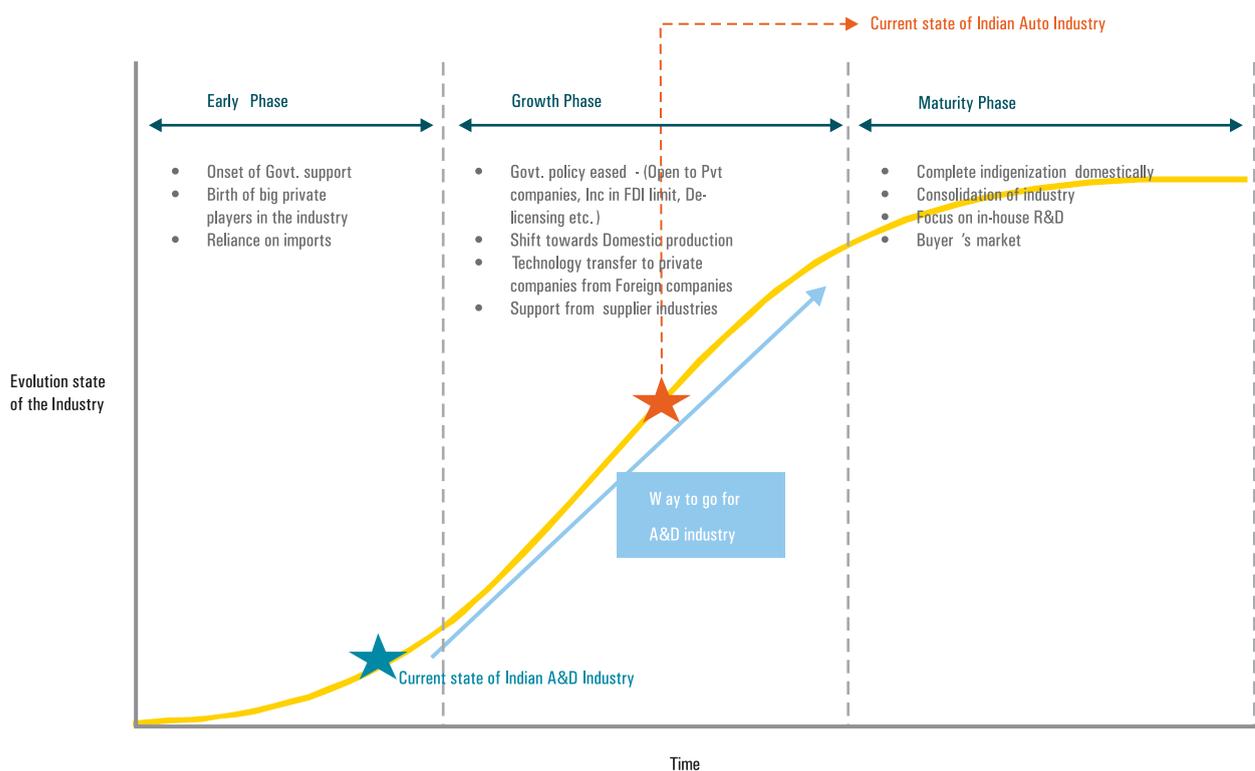
If we try to map industries on stages of evolution (see Fig 1), Indian Auto industry for example is currently in consolidation phase marked by a rapidly changing market scenario. The government is actively supporting the industry with private and foreign participation increasing. There is a shift towards complete domestic production with support from large number of small SMEs. Comparatively, Indian Aerospace and Defence industry is in a nascent stage. Complete government support in this sector is yet to be seen, though some measures have been taken in this direction.



¹⁵ Secondary research. Retrieved from <http://www.business-standard.com/india/storypage.php?autono=232836>

¹⁶ Company websites, KPMG analysis

Illustrative stages of evolution of Industry



Source: KPMG analysis

There exists a large gap in India's technical capability for catering to demands of indigenous production in Aerospace and Defence sector. Indian manufacturing needs to upgrade capabilities in precision engineering, micro engineering to take a big leap into the Aerospace and Defence sector.

IT/ITeS

The prowess of the Indian IT industry does not require an introduction and now reserves a secure spot on the top tier of the global capability map. According to research reports published by National Association of Software & Services Companies (NASSCOM), IT-BPO (Business Process Outsourcing) sector of India: Strategic Review 2010, 'the ITO-BPO industry is estimated to revenues of USD 73.1 Billion in FY 2010 with IT software and services accounting for USD 63.7 Billion of revenues'. With this maturity and enhanced capability, Indian IT industry could well serve as a launch pad in the development of the technical abilities of Aerospace and Defence sector in India. Best practices for quality, project management, innovation and organisational maturity can all effortlessly be translated to provide Indian Aerospace and Defence the technological edge which will complement its growth.

Indian software majors such as Mahindra Satyam, Wipro Technologies, Tata Consultancy Services (TCS) and HCL have been active in the aerospace industry for several years. IT applications have been developed for flight data management systems, power distribution inside the aircraft,

software for crew signalling, cabin illumination and Global Positioning System (GPS), etc. We have also seen successful implementation of advanced technology by Indian private sector companies for producing global quality products and designs for the aviation sector. Their proven capabilities have now enabled them successful partnerships with global primes for technology transfers as well as suppliers in their global value chains. The capability to leverage is present and so is a strong market, but the question that remains to be answered is: are we doing enough to explore how technology could be developed and nurtured for Indian Aerospace and Defence?

Research & Development (R&D)

In Aerospace and Defence, the R&D focus has remained largely in the public domain with government institutions like Hindustan Aeronautics Limited (HAL), National Aerospace Laboratories (NAL), Defence and Research & Development Organisation (DRDO), Indian Space Research Organisation (ISRO) and Council of Scientific and Industrial Research (CSIR). Some of the success examples of Indian R&D efforts in aerospace and defence is indigenous development of range of missiles (from short range to intercontinental ballistic) by DRDO, LCA (Light Combat Aircraft) and Dhruv-ALH (Advanced Light Helicopter) by HAL, and SARAS (multi-role aircraft) and HANSA (two-seater trainer turboprop aircraft) by NAL. Opening up of MoD funded, National Institute for Research & Development in Defence Shipbuilding (NIRDESH) is a positive step towards self reliance by the government in this area.

India is an attractive destination for R&D due to its inherent advantages of a large number of highly qualified low cost engineers and scientists. Over 100¹⁷ foreign organisations (mainly MNCs) have opened R&D centres in India over the last decade. Broadly, two types of foreign interests have established their R&D units in India. Some are involved in incremental innovations and their main aim is to support the existing products introduced in India. Few examples of foreign firms having R&D centres in India are DuPont, Erickson, General Electric, Hewlett Packard, Lucent, Toyota, Texas Instruments and IBM. Some R&D centres such as Texas Instruments, General Electric, and IBM are engaged in developing new products¹⁸.

India has had good quality of education system producing high quality scientists and engineers. Research in academia has always been present, but lack of funds for development of R&D centres in industry has slowed the flow of academia research into industry research.

Indian R&D capability is currently limited and does not have expertise in designing critical equipment in advanced technology.

Going forward, the industry would do well by investing in developing R&D in India. Government could play a role here by incentivising companies which invest in developing R&D strength of the country. Introduction of offset multipliers for global companies intending to invest in R&D could be a positive impetus to enhance development. Additionally, Indian companies need to ensure that intellectual property is protected by following the global best practices. This issue needs to be addressed effectively by the Indian government by robust measures and policies. The following steps could minimise the risk of losing intellectual property in conducting Aerospace and Defence business in India.

- **Clear understanding of Intellectual Property (IP) rights on the part of Indian companies and creation of in-house teams to monitor properties, violations, etc.**
- **Clear definition of IP violation clause**
- **Periodic IP audit**
- **Develop deep awareness with concerned employees of the company.**

Quality standards

Indian manufacturing sector is increasingly adopting international quality standards by operating with better efficiency and manufacturing facilities. In sectors like Auto where indigenous production has been practiced for a long time, India has achieved significant quality certifications by using practices like 5S, Total Productive Maintenance (TPM), Total Quality Management (TQM) and Just in Time (JIT). India has the largest number 'Deming Award' winning companies, outside Japan (11), in the auto component sphere¹⁹. In the IT/ITeS industry, of the 80 software companies worldwide with a Capability Maturity Model (CMM) Level 5 rating in 2003, 60 are in India²⁰ (Level 5 is the highest rating that a software company can attain). The quality is also proved in the R&D sector with most of the major Pharmaceutical companies opening their research centre in India.

In the Aerospace industry, all the production divisions of HAL have ISO 9001-2000 accreditation and 16 divisions have ISO-14001-2004 Environment Management System (EMS) certification. Six divisions have also implemented the aerospace sector quality management system requirements stated in AS 9100 standard and obtained certification. Four of these divisions have also obtained NADCAP (National Aerospace Defence Contractors Accreditation programme –USA) certification for special processes such as Non Destructive Testing (NDT), heat treatment, welding, etc.²¹

In the Aerospace & Defence industry in India, the Joint Service Guide (JSG) certification for Land and marine systems is the key standard, however Airborne system manufacturers look at AS²² certification (see Figure below).

Quality System requirements in the Aerospace & Defence industry

System	QS as per Indian defence	Additional requirement	Remark
Land systems	• JSG: 015: 03:2007	• Product specific technical requirements	• All suppliers need to conform to JSG specification
Marine systems	• JSG: 015: 03:2007	• Product specific technical requirements	• Most foreign firms see the JSG specification of the Indian defence QAE's of Naval, vehicle, weapons etc. as sufficient as long as product specific requirements are met.
Aerospace systems	• JSG: 015: 03:2007	• Product specific technical requirements • AS 9100 is a must	• For aerospace products the international standard of AS is necessary to become a supplier to global primes

17 TIFAC, FDI in the R&D Sector: Study for the pattern in 1998-2003, Report prepared by Academy of Business Studies, New Delhi, 2005.

18 Company websites and KPMG analysis

19 Working paper 428 from CDS- "Flight paper from defence to civilian space", Sunil Maini

20 Deutsche Bank report

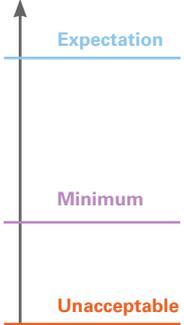
21 Retrieved from (<http://www.defense-aerospace.com/article-view/feature/102287/quick-overview-of-india%E2%80%99s-aerospace-industry.html>) on 22nd Jan 2011

22 Released by Society of Automotive Engineers and European Association of Aerospace Industries

Aerospace and defence suppliers have additional quality and commitment requirements compared to other manufacturing industries. Here, the key expectation is zero tolerance norms i.e. 100 percent product reliability and 100 percent on-time delivery (see Figure below).

Supplier quality performance rating in the Aerospace and Defence industry

Performance level	6 month average
Gold	• 100% acceptance rate
Silver	• 99% acceptance rate
Bronze	• 98% acceptance rate
Yellow	• 95% acceptance rate
Red	• Below 95% acceptance rate



Most of the major aircraft engine manufacturers, such as General Electric's Aircraft Engine division (GEAE), Boeing, Rolls-Royce Allison and Pratt & Whitney, require all their suppliers to be certified to AS9100.

In addition OEMs have their own quality standards. For example –

- Boeing has laid down requirement of 100 percent acceptance rate (minimum 98 percent) and 100 percent on time delivery
- BAE Systems requires Zero DPMO/ Zero defect occurrence and 100 percent OnTime delivery
- Raytheon requires minimum 98 percent for exceptional rating
- General Dynamics looks for minimum quality rating of 98 percent and at least six full lot acceptance in the past one year for automatic approval.

While Indian companies have demonstrated high quality standards in IT/ITeS and manufacturing industries, there is a need to prove that they are capable of quality production for the Aerospace and Defence industry. Indian companies supplying any component/service for Defence would need the necessary quality certifications. Additionally, Indian vendors to OEMs will have to meet OEMs criteria.

Improvement in quality production in India can only be achieved by disciplined investment by companies for improving current production facilities, hiring highly-skilled manpower and R&D capability.



C: Supporting industry framework

Presence of Tier-1 to Tier-3 suppliers as well as maintenance service providers will be key enablers for a robust Aerospace and Defence industry.

SMEs

According to the Indian Ministry of Micro, Small and Medium Enterprises (MSME), there are well over 13 million MSMEs in the country today providing employment to about 33 million people. These MSMEs contribute about 40 percent of gross industrial manufacturing value of the country, 35 percent to India’s exports directly, and 8 percent of India’s GDP.²³

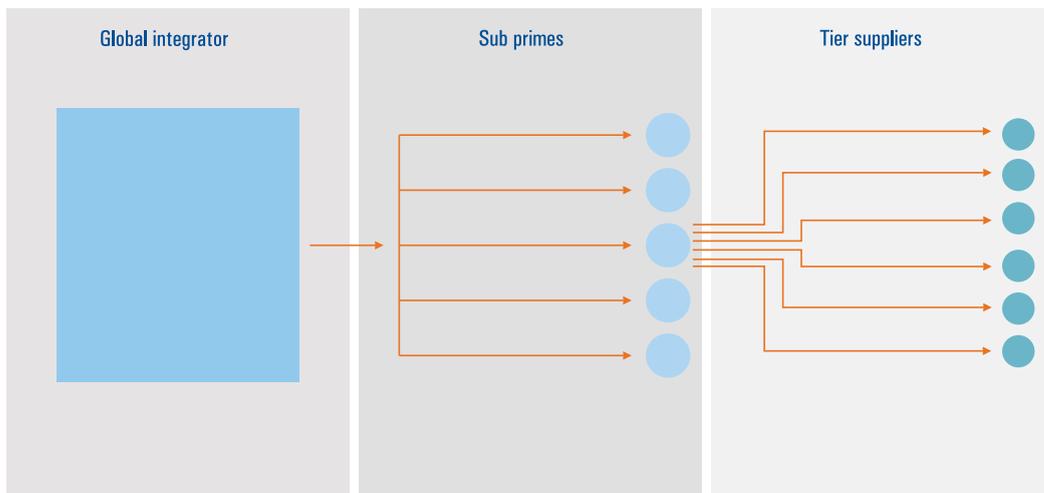
The SME supply chain consists of three major players, Global players, sub primes and systems partners, and lower tier suppliers. Sub primes and lower tier suppliers usually perform 60-75 percent of the work content. The Confederation of Indian Industry (CII) estimates²⁴ that over 6000 SMEs operate in the Indian defence sector supplying 20-25 percent of components and sub assemblies to the DPSUs, ordinance factories and DRDO. Being lean and less lethargic than the bigger enterprises, they have the capability of higher innovation in niche manufacturing, ability to absorb technology and lower labour costs. The offset requirements have pushed the global OEMs to work in close coordination with SMEs. This coupled with the fact that these enterprises have high manufacturing expertise and a non-proliferation record, makes SMEs a catalyst in augmenting the role of India as an outsourcing destination. SMEs have the potential of becoming the backbone of not only India’s Aerospace and Defence sector but also making India a global outsourcing hub for small manufacturing needs. These SMEs have the potential to serve multiple industries such as automotive and heavy equipment which helps them navigate market fluctuations in individual market segments.

However, SMEs do face certain challenges from the Indian government and the global market which could hinder their development. After the recent global economic slowdown, only those SMEs which can innovate, adapt cutting edge technologies, deliver customised solutions, develop and maintain a global standard in manufacturing qualities and specifications while still maintaining cost advantage will be successful in becoming an integral part of the global supply chain. Currently, the technology capability in terms of both skills and funding for coming up the curve is not at par with that of the OEMs. The Indian Machine Tool Manufacturers’ Association (IMTMA) is still in the process of urging the government to provide funds for the adoption of superior technologies.

For SMEs, supply chain integration is another problem due to high costs and technology constraints. SMEs can gain a competitive advantage by integrating their systems not only with the trading partners but also with customers. Supply chain integration brings major changes in the way companies communicate with each other, from planning to purchase.

There has been a recent example in this area of integration of an SME/sub-system manufacturer with an OEM in India. Astra Microwave, an erstwhile SME, has entered into a joint venture (JV) to design and produce RF/microwave components and sub-systems with Bharat Electronics Ltd. (BEL). This partnership with BEL will strengthen Astra’s delivery capabilities and market reach. This has been a step in the right direction. More such examples will be the key to development of both aerospace and defence sector by developing the small Indian suppliers to big OEMs²⁵.

Aerospace and defence supply chain



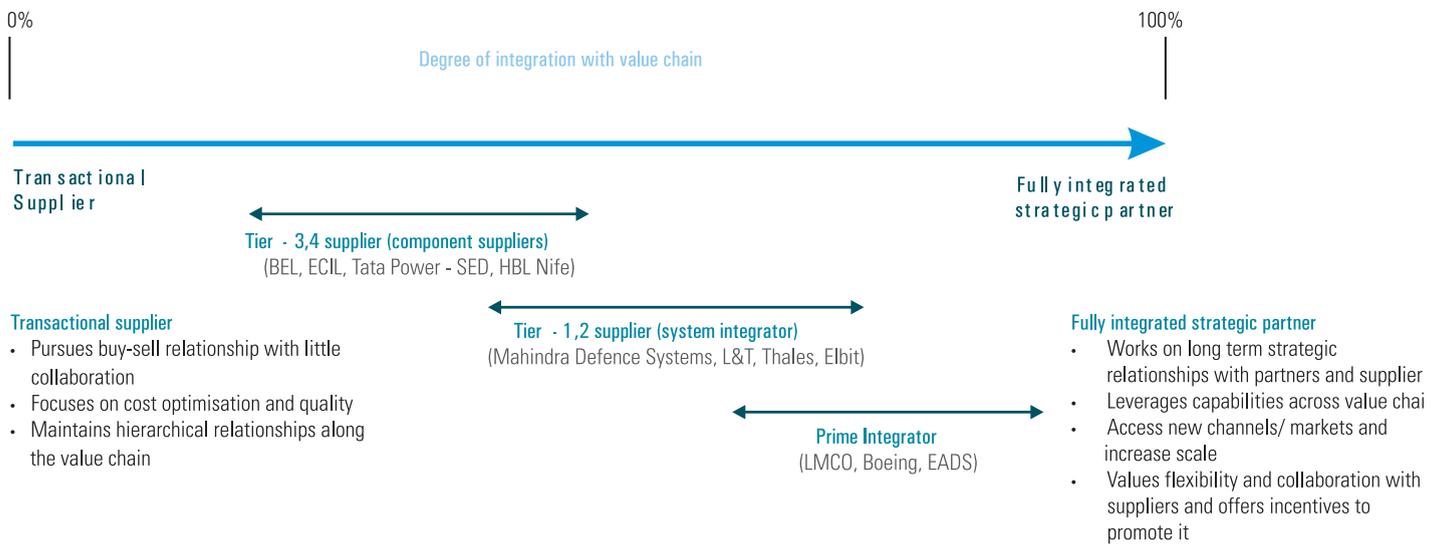
Typically 60% to 75% of work content is performed by sub primes and tier suppliers

23 Ministry of Micro, Small and Medium Enterprises

24 www.ciidefence.com/events/MSME_DEFENCE/SME_Flyer.pdf

25 http://www.astramp.com/astra_newsroom_more.php?id=10&PHPSESSID=bb4c289abc25f9a5f90680325049b068

For the success of supply chain integration, organisations must be willing to share specific data with its suppliers and customers. Information, production schedules, forecasts and promotion plans could be shared on a need-to-know basis.



MRO

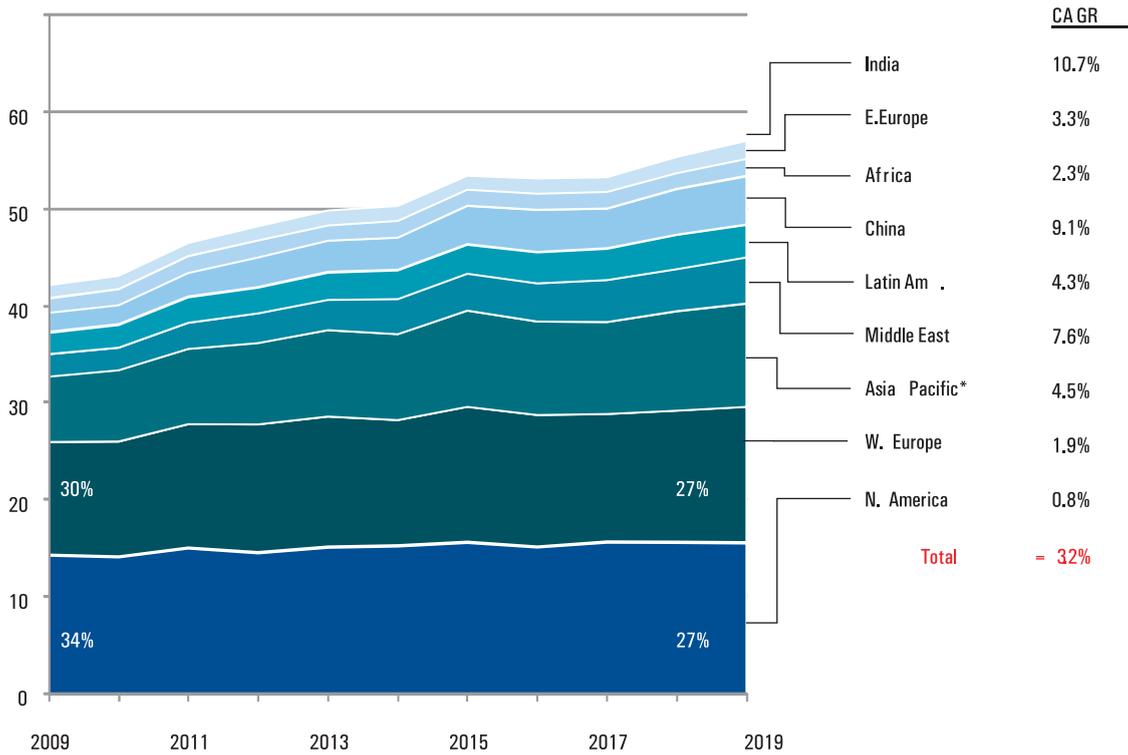
The MRO sector goes hand-in-hand with aerospace and defence sector. India, with its geographical advantage of being strategically located between Europe and the rest of the Asia-Pacific region, has the potential of becoming the international hub for MRO needs. This allows India to avail a faster turnaround time which can make the sector a lot more efficient and cost effective. Another factor which adds to the effectiveness of India as an MRO hub is the low cost of manpower in the country, which is almost 60 percent cheaper than that in the US and slightly lower than the manpower costs in other Asian countries²⁶. This, clubbed with an abundance of unprecedented skilled workforce, is the biggest strength of the Indian MRO sector²⁷.



²⁶ Aviation maintenance magazine "Emerging MRO Markets", Apr 2009
²⁷ MRO Market - India, July 2009 (research on India publication)

The opportunities and scales for MRO activities depend on the demand for defence and civil aircrafts in a particular area. Since the fleet size in India of civil and military aircrafts is expected to double in the next five years, there are tremendous growth opportunities in this sector. Moreover, the Indian MRO sector has the ability to absorb technology transfer at depot level for aircrafts as well as components given the large resource base and the technical abilities of the skilled workforce. India has one of the fastest growing air transport MRO market, post 2009 (see fig below).

Fig: Air transport MRO market (USD B)



Source: AeroStrategy OAG Aviation

One of the major problems with the Indian MRO sector today is the shortage of land near airports. Since the MRO facility needs to be located near an airport, currently available locations cause supply chain location problems. This leads to inefficiency, wastage of resources and delays in execution. Another problem with the sector is the complex and multi-structured tax scheme. The tax structure in India hinders the growth of the sector when compared to the world. This makes the sector uncompetitive. Moreover, there is a lack of recognised bodies to provide internationally-accepted quality certifications. This also hinders global competition since it lowers the confidence other countries have in Indian products and services.

The government should increasingly plan to allocate land (near major airports) at fair lease rentals to encourage the creation of MRO hubs in the country. A strong supportive MRO sector will give a fillip to the aerospace and defence sector.



D: Availability of skilled manpower

An important enabler for any successful industry is enriched manpower base. It becomes even more indispensable in Aerospace and Defence owing to its dependence on highly skilled human resources. India has the largest pool of English speaking scientists and engineers in the world. With over 380 universities, 11,200 colleges and 1,500 research institutions, India has the second largest pool of scientists and engineers in the world. Every year, over 2.5 million graduates are added to the workforce, including 300,000 engineers and 150,000 IT professionals.²⁸ India is ranked third globally, after USA and China, in terms of absolute number of students enrolled in higher education institutions at 11.2 million students.²⁹ Mastery over quantitative concepts coupled with English proficiency has resulted in a skill set that has enabled India to reap the benefits of the current international demand for IT.

According to industry feedback, the research and training institutes in India are insufficient as compared to the number of students. Moreover, the training provided in these institutes is not uniform across the country. The government needs to invest more into the sector for the development of professionals so as to leverage the potential of the human resources in an effective manner.

The government does focus on the development of primary skills but product specific/ relevant skills demand an enhanced focused approach. The development of skills in the defence industry needs a guided and wholesome approach between the government, industry and academic institutions to integrate their objectives together. There have been global instances where the private sector has taken the lead on working independently or in partnership with the government on setting up infrastructure for providing the necessary skills for the Aerospace and Defence sector. There are a few Indian examples which also come to mind, however, some serious effort still needs to be made by the respective stakeholders to develop an organised framework.

28 www.investmentcommission.in/human_capital.htm

29 UGC and Press Information Bureau



The way forward

The Indian Aerospace and Defence industry today is clearly an effective interplay of three key stakeholders – the government, foreign OEMs and the Indian industry, each having a defined role and a clear set of aspirations and expectations. Whilst it is clear that there is a host of critical success factors that drive the formation and sustainable growth of this industry, there is also little doubt about the indispensable role that these stakeholders perform in their implementation.

Indian Aerospace and Defence may seem to be in infancy stage on most of these critical parameters such as advanced technology and specialised skills when compared to its global counterparts. On the other hand, whether it is our developed manufacturing ability or our large pool of scientists and engineers, there is a clear ahead of the curve advantage waiting for Indian aerospace and defence. However, it is clear that India has achieved a lot more through its experiences in other industries which can be seamlessly transitioned provided there is a clear understanding of stakeholder expectation.

The table enumerates some of these broad expectations:

Stakeholder	Industry and other stakeholders' expectation
Government	<ul style="list-style-type: none"> • 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
Global Industry	<ul style="list-style-type: none"> • 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
Indian Industry	<p>Private Sector</p> <ul style="list-style-type: none"> • 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 <p>DPSUs</p> <ul style="list-style-type: none"> • Establishment of a strategy for sourcing versus outsourcing • Increase in PPP • Simplification of operational procedures • Crystallisation of their long term strategy.

List of abbreviations

3D	3 Dimensional	JSG	Joint Service Guide
A&D	Aerospace and defence	JV	Joint Venture
ADDC	Aeronautical Design and Development Centre	LCA	Light Combat Aircraft
ALH	Advanced Light Helicopter	MMCRA	medium multi-role combat aircraft
AS	Ancillary Services	MNC	Multi National Company
ATVP	Advance Technology Vessels Programme	MoD	Ministry of Defence
BAES	British Aerospace Engineering Systems	MoU	Memorandum of Understanding
BEL	Bharat Electronics Ltd	MRO	Maintenance Repair and Overhaul
Bn	Billion	MSME	Ministry of Micro, Small and Medium Enterprises
CAGR	Compound Annual Growth Rate	NADCAP	National Aerospace Defence Contractors Accreditation programme –USA
CENVAT	Central Value Added Tax	NAL	National Aerospace Laboratories
CII	Confederation of Indian Industries	NCW	Network Centric Warfare
CMM	Capability Maturity Model	NDT	Non Destructive Testing
CSIR	Council of Scientific and Industrial Research	NIRDESH	National Institute for Research & Development in Defence Shipbuilding
CST	Central Sales Tax	OEM	Original Equipment Manufacturer
DIPP	Department of Industrial Policy and Promotion	PPP	Public Private Partnership
DPP	Defence Procurement Policy	PSU	Public sector Units
DPSU	Defence Public Sector Unit	QS	Quality Standards
DRDO	Defence and Research & Development Organisation	R&D	Research and Development
EMS	environment management system	RF	Radio Frequency
ENAC	Ecole Nationale del'Aviation Civile	RFP	Request for Proposal
ENSMA	Ecole Nationale Superieure de Mecnique et d'Aerotechnique	RUR	Raksha Udyog Ratnas
FDI	Foreign Direct Investment	SME	Small and Medium Enterprises
FY	Financial Year	TAAL	Taneja Aerospace and Aviation Limited
GDP	Gross Domestic Product	TASL	Tata Advanced Systems Limited
GEAE	General Electric's Aircraft Engine	TCS	Tata Consultancy Services
GIFAS	Groupement des Industries Francaises Aeronautiques et Spatiales	ToT	Transfer of Technology
GPS	Global Positioning System	TPM	Total Productive Maintenance
HAL	Hindustan Aeronautics Limited	TQM	Total Quality Management
IGMDP	Integrated Guided Missile Development Program	US	United States of America
IMTMA	Indian Machine Tool Manufacturers' Association	USD	United states dollar
IP	Intellectual Property	VAT	Value Added Tax
ISAE	Institut Superier de l'Aeronautique et de l'Espace		
ISRO	Indian Space Research Organisation		
IT	Information Technology		
ITes	Information Technology Enabled Services		
JAXA	Japan Aerospace Exploration Agency		
JIT	Just in Time		

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