

Aerospace and Defence Manufacturing in India

Transformation in sight

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About Aviotech

Aviotech is an initiative of the promoters of the Deccan Chronicle Group to address the segments of Corporate Aviation and Defense & Aerospace Advisory and Investments. Its operations are spread across India and UK and has offices in Hyderabad, Delhi and London.

Aviotech aims to provide its clients with information that empowers them to take informed decisions. It aims to support the initiatives of its clients through structured financial advice and guidance.

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Foreword

India remains very much one of the most attractive business destinations in the world. It continues to enjoy the benefits of a growing economy, large domestic demand, young population and stable government policies coupled with a maturing investment structure and a strong legal system.

India's Defense and Aerospace manufacturing opportunity is a function of its ability to emerge as a cost-efficient manufacturing and service destination in this segment.

While the journey towards India emerging as a global Defense and Aerospace manufacturing base has already commenced in the right earnest, it will have to be supported in equal measure by the translation of the requirements of the OEMs by domestic industry as well as by a supportive government policy.

While specific initiatives like offsets that are expected to act as a catalyst to the aforementioned process, the drive will emerge from the unwavering focus on inherent cost and quality parameters that Indian manufacturing has displayed in other industrial sectors.

India - An attractive destination to do business with witnessing increasing global interest in the A&D segment

In times when the world economy is barely recovering from its sternest test, India's \$1.3 trillion economy grew by 8.9 per cent through the first six months of fiscal 2011. This when looked at in the light of sustained performance witnessed in the period between 2006 – 09 of 9.5% lends extreme credibility to the India story.

In the first six months of 2011, The manufacturing sector, which grew at almost 10 per cent. This pace of growth was achieved alongside strong performance in the agricultural sector, strengthening consumer demand and a robust services sector.

India has been a key destination for global defence contractors as a defence market. It is one of the top defence spenders in the world. Global defence spending is dominated by the United States which accounts for more than 40% of global defence spend. India has the **tenth largest defence spend in the world**. In 2011, India's **expanded its defence budget** by 3.98 per cent to Rs. 1,47,377 Crore (1 Crore = INR 10 Million) representing 2.12 per cent of gross domestic product (GDP). Of this, approximately 40 percent finds allocation under capital expenditure and equipment modernisation programmes. Since the **current levels of indenisation are anticipated to be around 40%, a significant outlay is towards global procurement**.

More significantly, India's defence spend as compared to some other countries, has been expanding over time at a reasonable rate. It is anticipated that for the period 2011-2015, Indian military is expected to spend more than \$80 billion on acquisitions with the Indian army having a largest contribution >50% followed by the Indian Airforce and the Indian Navy. Capital expenditure is expected to grow at 10% per annum for the period which is significantly positive as compared to other global economies.

With a growing civil aviation market, Indian companies have been at the forefront of demand generation for aircraft manufacturers. An example is found in the single largest order for Airbus in early 2011 which came from an Indian airline operator.

The Civil Aviation market in India is growing at a compound annual growth rate (CAGR) of 18% and it is anticipated that the Indian aviation sector will become one of the top five civil aviation markets in the world over the next five years. Currently, India ranks ninth in the global civil aviation market. Boeing anticipates a requirement of 1,150 commercial aircraft for India worth US\$ 135 billion in the next 20 years.

All of the above makes India a destination of choice for global defence and aerospace contractors to have a manufacturing and delivery presence in.

Why the interest in Indigenous defence and aerospace manufacturing and service delivery capabilities?

The interest in Indigenous defence and aerospace manufacturing capability stems from both push and pull factors. These factors are a combination of attractiveness of India as a cost-efficient + high-quality manufacturing and service delivery destination, a strong policy push through the introduction of offsets as well as an expressed business opportunity provided by both homeland security projects and large opportunities under the ‘Make’ and ‘Buy and Make – Indian’ category.

Attractiveness of India as a cost efficient, high quality manufacturing and service delivery destination

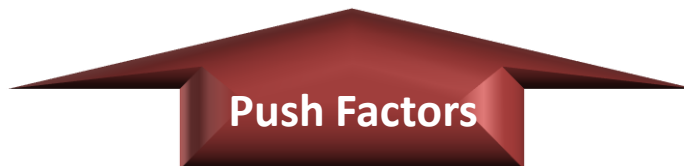
Example : Engineering Design, Sheet metal work, Specialised forgings

Work coming to India due to regulatory constraints in other parts of the world.

Example : Some types of surface treatment



Increasing interest in Indigenous defence and aerospace manufacturing and service delivery



Strong government policy impetus through

Focused offset policy initiative requiring the global defence contractor to invest in the development of indigenous defence and aerospace manufacturing capability

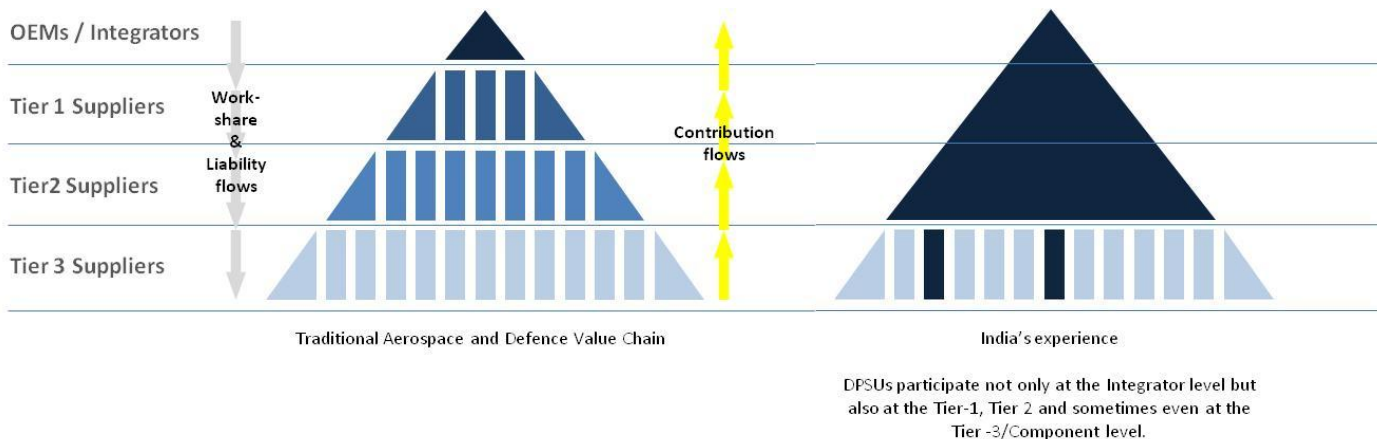
Buy and Make-Indian’ and ‘Make’ Projects which have a minimum stipulation of indigenous content / value add.

A large homeland security opportunity being driven by significant government initiatives

Evolution of the Defence and Aerospace manufacturing industry in India

Indian aerospace and defence manufacturing has **historically been dominated by the government owned and managed Defence Public Sector Undertakings (DPSUs), Public Sector Undertakings (PSUs) and the Ordnance Factory Board.**

The manufacturing segment in India has followed a slightly different path of evolution and market structure from elsewhere in the world. While globally, Defense and Aerospace manufacturing has grown in a tier-ed structure with the OEM at the top of the pyramid, followed by the tier-1 suppliers who do large portions of a programme, who in-turn are supported for smaller portions of their contribution to the programme by Tier-2 and Tier-3 manufacturers and finally the component manufacturers at the bottom of the pyramid. Simplistically represented, this rather neat structure provides clear flows of work-share liability downwards upwards while allowing for contribution to flow downwards



The Indian experience on this particular aspect is slightly different with historically the **DPSUs / PSUs and OFB participating in the entire value chain** – commencing from an integrator level right down to the Tier-3 suppliers / component manufacturer level thereby leaving little room for private sector capabilities to develop.

This has also resulted in a **very dispersed presence of DPSUs across the value chain** which has been a factor for their not being in a position to address all the parts of the value chain in terms of research and technological edge.

It can be argued that such a model of growth has been an outcome of larger national policies and interests, however the end result is that this model did not allow private Indian industry to play a meaningful role in this sector.

With the **increasing cost and technology specialisation related product development pressures, DPSUs and PSUs are now under justifiable pressure to restrict their role to that of an integrator thereby allowing for larger work-share to private sector**, the tier-1 and tier 2 space has emerged as a vacant space that private industry is trying to fulfill.

This entire process is also **supported by the creation of offset driven demand** for the products which will be produced by private sector Tier-1 and Tier-2 manufacturers.

All of this presents a **significant opportunity for Indian manufacturing capability to emerge** in this sector however it has also **resulted in constricted existing capability of the industry to absorb demand** being created by Offsets and the government impetus on 'Buy and Make-Indian' and 'Make' projects.

Defence and Aerospace manufacturing and service delivery capabilities in India : Key themes

India’s existing capabilities in Defense and Aerospace provide for a basic framework for the absorption of work-share.

To assess the framework, we reached out to a large number of companies comprising OEMs, Global Tier-1 and Tier-2 suppliers and Indian manufacturers. The result of these interactions was the emergence of some key themes that govern the manufacturing and service delivery framework for Defense and Aerospace industry in India.

These themes were then collated and grouped together under broad categories of Industrial Capability, Infrastructural Support, Policy Impetus and Human Resources.

We present these key themes and a broad assessment of them below:-

Industrial Capability	Wide spread across a large base, yet limited depth of segments
	Strong capabilities in Engineering Design, Existing pockets of excellence in some other segments
	Limited capabilities in materials sciences
Infrastructural Enablers	Creation of Defense and Aerospace oriented SEZs
	Strong existing legal and Intellectual property (IP) frameworks
	Evolving financial framework to support Industry
Policy Impetus	Articulated and announced Defence Production Policy
	Rapidly evolving Offset policy
	Stated emphasis on ‘Buy and Make-Indian’ and ‘Make’
Human Capital	Limited but expanding Human capital availability

Industrial Capability

The existing supply chains of DPSUs and Ordnance factories comprises thousands of suppliers, most of whom are component level suppliers. The worrying perspective on this front is that most of these suppliers are small enterprises – thereby with limited capacities.

At the same time, it must also be mentioned that the Medium and Small Scale Segment of suppliers also includes suppliers who operate niche technologies and processes, thereby making them valuable.

With limited existing capacities and few suppliers for each specific product/component – the total available Industrial base is rather limited in depth. This creates issues vis-à-vis the ability to absorb relevant work-share either from the Offsets or from large indigenous projects.

However this assessment varies significantly with each service. While the Navy has achieved a significant level of indigenization with the development of local manufacturing sources, the same cannot be said about the Air-force and the Army.

Another pertinent aspect of this assessment is the limited progress Indian industry has made on material sciences. This limitation is seen across speciality metals and alloys, composites and man-made fibres as well as specific reagents for treatment. A case in point is elaborated on the composites business where Indian capability in the private sector has still not evolved in the precursor and fibre segment.

In our interactions with the various OEMs, we got a brief glimpse of what they are currently looking at sourcing from India. A corollary to this can be that these capabilities are present in a limited space in the private sector in India.

Industrial Capability Map – Snapshot

Defence Manufacturing (Land Systems)	Defence Manufacturing (Naval Systems)	Defence Manufacturing (Aerospace)	
<ul style="list-style-type: none"> ■ Platforms ■ Engine Assemblies ■ Gearboxes and Transmissions ■ Chassis Manufacturing ■ Wheels and Tracks ■ Armouring and Protection Solutions ■ Radio Communication ■ Ammunition and fuzes ■ Tyres ■ Rubber Components ■ Hydraulics ■ Heavy Engineering ■ Seats and Interiors ■ Lights ■ Harnesses and Cabling ■ Composite Structures ■ Electrical Busses and Controls ■ Control Electronics ■ Testing ■ Prototyping ■ Simulators 	<ul style="list-style-type: none"> ■ Platforms ■ Galley Equipment ■ Engines ■ Simulators ■ Boilers ■ Gear Boxes and Transmissions ■ Cabling ■ Piping ■ Ropes and Pulleys ■ Communication Systems ■ Pumps ■ Winches ■ Deck Equipment ■ Platform Management Systems ■ Heavy Engineering ■ Navigation Systems ■ Rigid inflatable boats ■ Electricals 	<ul style="list-style-type: none"> ■ Aerostructure Manufacturing (Defence and Civil) ■ Forgings ■ Cables, Connectors and Assemblies ■ Castings ■ Simulators ■ Composite Structures ■ Ground Support / Ground Handling Equipment ■ Precision Engineering ■ Rubber Components ■ PCBs and Electronic Assemblies ■ Fabrication ■ Hydraulics (Control Surfaces) ■ Electrical Motors ■ Fasteners ■ Sheet Metal Work ■ Communication Systems ■ Testing Equipment 	<p>Significant Engineering Design capability across land, systems, naval systems, air systems and C4I applications</p> <p>C4I Applications</p> <ul style="list-style-type: none"> ■ Command and Control electronics ■ Data links ■ Multi-layered PCBs ■ Embedded systems ■ Basic communication suites ■ Avionics components ■ GIS solutions ■ Simulators

The above chart collates from the responses of various OEMs and Indian companies, their impressions on the broad spread of industrial capability in India. The depth of each sub-category may vary significantly and hence the above map provides a rough assessment of the market capability set.

It must however be stressed that across the board, there was sustained and significant appreciation of India’s strengths in Engineering design – a segment where India is recognized as a global player.

Infrastructural Enablers

The government has created dedicated Special Economic Zones dedicated to Defense and Aerospace. With this, a long-term need has come closer to fruition as the Special Economic Zones (SEZs) enable export oriented businesses to leverage significant policy, economic, structural and procedural benefits – all of which enable a more cost effective product / service delivery.

However the complete integration of the Special Economic Zones (SEZs) with the relevant Ministry of Defence policies and procedures has still not been completed. This if completed, can bring significant advantage of Indian aerospace and defence manufacturers vis-à-vis global competition.

India also enjoys a very robust legal regime and this when coupled with India's strong insistence on protection of intellectual property provide comfort to OEMs transferring sensitive know-how and know-why.

A major hurdle towards the development of India as a defence and aerospace manufacturing hub is the lack of financing options for the MSME segment of the Industry. The cyclic nature of this industry and long gestation periods until product stabilization and acceptance put significant financial pressures upon entrepreneurs wanting to leverage the opportunity. It is usually noted that a significant number of Medium and Small Scale Industries in this industry find raising capital from conventional sources extremely difficult. The new Defence Production Policy announced in 2011 does take its first steps in this direction by explicitly referring to the setting up of a fund to support initiatives, however it may not be enough. The industry has also started seeing its first wave of consolidation with larger groups paying a premium for specific niche capabilities in the MSME sector. It is anticipated that this wave of consolidation will strengthen over the near term because of the need of large players to quickly deploy specific capability in segments where large project opportunities are available.

Policy Impetus

The Indian experience with Offsets began in earnest in 2006. The policy finds its genesis in the need to develop a robust industrial base for self-reliance. Offsets are an opportunity for India to integrate with the global Defense and Aerospace supply chain. A significant amount of matter is available on the Offset policy and hence it is not delved-in detail in this paper. The only points to make are that the Defence Procurement Procedures (DPP 2011) by opening up the offsets spectrum to items of civil aerospace (including raw materials and work-in-progress items) and homeland security has enabled Indian industry to create more compelling business cases for OEMs to source from. There are however some issues that require deeper attention – these being the interlinked issues of Transfer of Technology and Multipliers.

In January 2011, the government has also introduced the Defence Production Policy which for the first time outlines the vision and focus of the government towards developing Indigenous manufacturing and service bases. The policy for the first time talks of a Defence Manufacturing Ecosystem and aims to integrate the various players in this frame, including the SME segment of industry.

The policy has extremely forcefully put forth the strong impetus on developing manufacturing sources in India through a combination of targeted procurement from Indian companies, allowing Indian companies preference in the upgrades, Assessing capabilities of Indian companies while drafting SQRs and trying as far as possible, to undertake design and integration of platforms within the country.

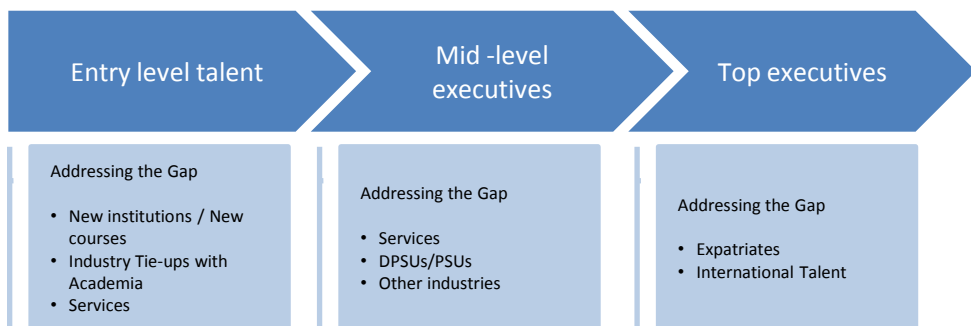
While there is a strong push on policy, its implementation will be watched very carefully especially on the initiatives related to the development of an indigenous manufacturing base – spread over both DPSUs and the private industry.

Human Resources

The human capital base for this industrial segment to expand in the proportion desired and anticipated, requires severe augmentation. Traditionally the sources of engineering talent for Defense and Aerospace in India were few and the skills imparted to students were far from current. Over the past few years, there has been a sudden increase in the number of institutions offering specialised engineering degree programmes in this segment however the demand continues to far outstrip the supply. Aside from volume, the quality of Defense and Aerospace engineering talent from institutions has to be upgraded significantly. A sustained shortfall in quality entry-level engineering talent has the potential to derail the growth of this segment. To overcome this possible scenario, some OEMs have established linkages with Institutions and are actively contributing in making their curriculum relevant as also assuring themselves of a steady supply of human capital.

Another risk to the industry emanates from the lack of mid-to-senior level managerial talent which can oversee the significant expansion anticipated in the Industry. Conventional sources of talent have been the DPSUs. While there is no ready solution to this problem, the issue is being tackled by OEMs and Indian companies looking at both expatriate Indian populace as well as foreign nationals to come and fill this gap.

An issue that has sensitivities associates with it and which is faced by the industry and the Services is the exodus of talent in the Armed forces to the industry which is providing a viable solution to the talent gap.



Some key issues before the industry

Limitation of liability on the OEM :

The OEM stands behind the design and quality of its products and services by the express warranty provisions of the contract. However, the current Defence Procurement Procedures are silent regarding the allocation of risk between the buyer and the seller in the area of 1) Post-delivery product loss and 2) special damages (also referred to as consequential and incidental damages). Limitation of liability for post-delivery product loss and special damages is a common feature in commercial and military contracts in most nations across the world.

As the OEM does not hold title to the platform or manage the use of the platform after delivery to the Government of India or the Armed forces, the current policy forces the OEM to obtain prohibitive insurance to cover the risk of post delivery loss which is passed back to the government as a component of the price bid. Special damages also referred to as consequential and incidental damages, are liabilities typically not borne by the OEM. It is impossible to assess exposure to such loss and damage as special damages by their nature are remote, unquantifiable and uninsurable. The potential liability for special damages can be astronomical and grossly disproportionate to the economic benefit received by the OEM from the sale. Without the appropriate allocation of risk in a contract, the OEM could be entering into a contract, which threatens the financial health of its OEM far beyond the benefit obtained in a single contract action. In short, when the OEM offers goods and services to a Customer on a “best value for money basis” its offer is calculated on the basis that it will not be exposed to loss of use, loss of profit or other special damages.

It is critical for the solution of the above issue by incorporation of appropriate liability limitations that places the risk on the party that best controls the elements of risk and is best able to manage it.

Licensing, Manufacture and Export of Defence products.

A key issue with the current environment for Defense and Aerospace manufacturing concerns the definition of Defence Product. Currently the DIPP defines Defence products in a different manner as is defined in the DPP for offset purposes. The DPP 2008 and subsequently DPP 2011 did take a step forward from the DPP 2006 with a definition of the Defence Products for the purpose of Offset. It is important to have a standard understanding of what constitutes a Defence Product (especially when dealing with dual-use items) from the DIPP perspective as well. It is imperative at this juncture to look at some western countries like the US which have harmonised their systems and work on a standardised Munitions List.

This problem also manifests itself with the requirement of an Industrial Licence for defence products when the latter itself is not clearly specified. The issue is further complicated by lack of a clear definition of Defence and Aerospace products in the Indian Trade Classification- Harmonised System (ITS-HS). This issue assumes criticality as only after that the current export procedure for Defence Products (a significant part of which are governed by SCOMET guidelines) has been rationalised with the population of category 6 of the SCOMET list and the ITC-HS, can a true assessment of Industry be made and transparency in policies ensured.

FDI

Manufacturing of defence equipment in India is subject to a 26% cap on FDI. A 26% cap on FDI discourages original equipment manufacturers (OEMs) from bringing in proprietary technology. Another fallout of the low FDI cap is that this could possibly result in limiting the foreign capital inflows into the sector and thereby increases the corresponding fund requirements of the Indian partners. The argument against raising the FDI cap to more than 26% stems from the fear of Indian companies ceding control and thereby resulting in units that can be closed in situations of operational need of the armed forces rendering a disruption in the supply chain. The FDI issue is a key determinant to the interest of Foreign OEMs in developing India as a manufacturing base.

Outlook

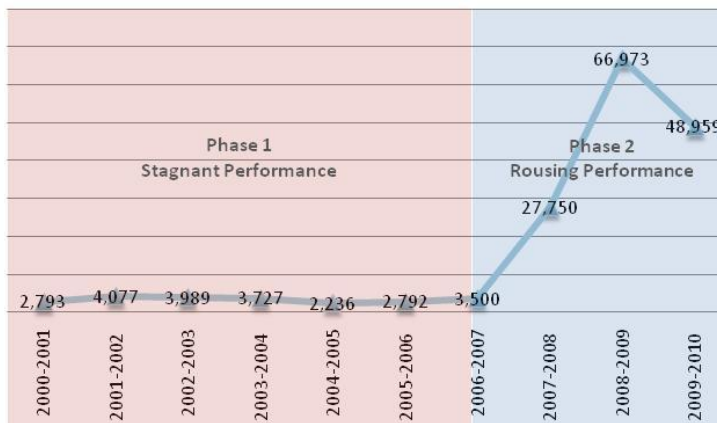
The various issues do create a complex situation to assess Indian Defense and Aerospace manufacturing and service delivery capability. However the response of the industry segment to all the industry forces and policy initiatives is best reflected in tangible performance shown.

Indian industry over the past few years has shown the ability to respond effectively to the market opportunity, especially in the global market. There can be no better indicator of this than an assessment of Aerospace exports as a testimony to this fact.

Indian Aerospace Exports over the last ten years can be very neatly summarised into two phases – A first phase until 2006-07 and a second phase of the subsequent period. The first phase of 2001 until 2006 which saw stagnant, lacklustre performance with exports virtually stagnant and ranging between INR 223.57 Cr. (Crore) in FY 2004-05 and INR 407.73 Cr. in FY 2001-02. The Aerospace Exports were also not displaying any significant growth indicating a less than healthy state of the industry. The export performance witnessed in this period was largely driven by export actions of DPSUs like HAL and BEL. The period from 2006-07 onwards sees a rapid expansion in this activity indicating a strong focused industrial expansion of the sector. The levels of exports rose significantly from INR 350.02 Cr. in FY2006-07 to INR 2775.01 Cr. in FY 2007-08 indicating a jump of 692% on a YoY basis further to INR 6697.32 Cr. in FY 2008-09 indicating a jump of 141% on a YoY basis

The significant increase in both the quantum and rates of growth of Aerospace exports from 2006-07 onwards can be ascribed to two specific reasons. The first reason is an increasing number of global OEMs establishing dedicated centres for manufacture and supply in India. Examples include Goodrich for landing gear and Thales and Rolls Royce for engine components. The second significant reason is widely believed to be the introduction of Defence Offsets which have resulted in a large number of OEMs intently looking at India as a destination for development of long term supply bases.

Exports of Aircraft, Spacecraft and parts thereof
Chapter 88 of ITC-HS



The aforementioned example only proves that India has the potential to emerge as a preferred Defense and Aerospace Manufacturing and service delivery destination.

For the Indian industry, its journey towards being an integral part of the global supply chain has only commenced. The path ahead is tough, however the intent appears well-set.

Glossary of terms

DPP	Defence Procurement Procedures
DIPP	Department of Industrial Policy and Promotion
DOFA	Department for Offset Facilitation
DPSUs	Defence Public Sector Undertaking
FDI	Foreign Direct Investment
INR	Indian Rupees
MoD	Ministry of Defence
OEMs	Original Equipment Manufacturers
OFB	Ordnance Factories Board
PSUs	Public Sector Undertakings
SEZ	Special Economic Zone
ToT	Transfer of Technology

Key Metrics

1 Crore	10 Million (1,000,000) ~ USD 222,222.22 (Assumed Exchange Rate 1USD = 45 INR)
1 Lakh	100 Thousand (100,000) ~ USD 2222.22 (Assumed Exchange Rate 1USD = 45 INR)

Notes

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