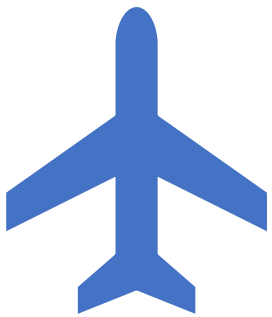
Aerospace & Aviation

'Indian Aviation, flying high'



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Let's Understand **Aviation & Aerospace**

- **Aviation**

1. The aviation industry refers to all aircrafts related within the earth's atmosphere.

2. Aviation is a distinct industry from aerospace industry

3. Key Disciplines include Aircraft operations and management, Commercial or Military Aircraft design, Air Traffic Management

- **Aerospace(Inclusive of Aviation)**

1. While The aerospace industry refers to all aircrafts related in and out of the earth's atmosphere.

2. Whereas aerospace is a much broader industry.

3. Key disciplines include aerodynamics, avionics, materials science, Thermodynamics

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Sector Introduction

Aviation Sector of India

Can be divided into

1. **Civil**
2. **Military**
3. **MRO***
4. **UAV****

Aerospace Sector of India

Can be divided into

1. **Civil**
2. **Military**
3. **Space & Research**
4. **MRO***
5. **Aero sports**
6. **UAV****

*Maintenance, Repair and Overhaul (MRO)
**Unmanned Aerial Vehicle

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Indian Aviation & Aerospace Market

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Aviation

Aviation in India, broadly divided into military and civil aviation, is the fastest-growing aviation market in the world according to the International Air Transport Association **(IATA)**.

The hub of the nation's aviation manufacturing industry is at **Bangalore** which has a **65%** share of this economic sector.

The government's **UDAN** (regional connectivity scheme) is driving the growth of civil aviation and aviation infrastructure in India.

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Aerospace

In India, the aerospace industry is growing significantly with the rising activities from both the defence and civil aviation sector.

With increasing demand for large aircraft from Indian carriers such as SpiceJet and Indigo, and focus on Powered by Hour Contracts (PBH), many of India's aerospace services and manufacturing activities are expected to be carried out.

Similarly, as India's defence capital expenditure spending is continuously growing, there are also many opportunities in defence aerospace.

This offers opportunities for start-ups as well as further expansion for existing players.

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Statistics For Nerds

The Aviation sector in India currently contributes $72 bn to GDP.

In April 2020, the Goods and Services Tax for MRO services rendered locally was reduced from 18% to 5%.

India had the world's third-largest civil aviation market in 2017

Domestic air travel demand continued an upward trend in October 2020, with a 33% increase (over September) to ~52 lakh passengers.

By 2035, India's passenger growth forecast was 442 million, with the aviation industry supporting 19.1 million jobs and contributing $172 billion to its GDP,

India's current **airport infrastructure** consists of 450 airstrips across the country although only 100 are considered fully operational.

Foreign direct investment (FDI) at 100 percent is allowed for civil aviation infrastructure, while any airline stake, greater than 49 percent requires government approval.

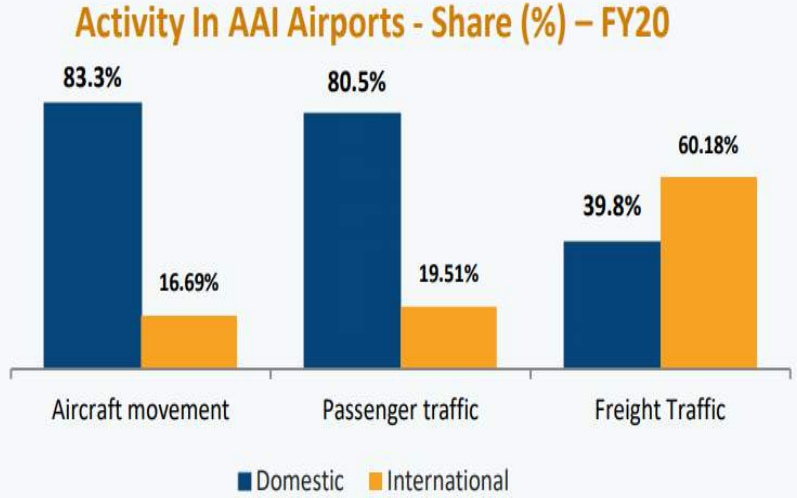
General and business aviation aircraft: India operates fewer than 300 civilian helicopters compared to over 14,000 in the United States.

Indian airlines alone will incur a loss of $4.1 billion loss in the current fiscal (2021-22), with another $3.9 billion losses reported in the last fiscal, according to a June 3, 2021, report by aviation consultancy and research firm, Centre for Asia-Pacific Aviation (CAPA).

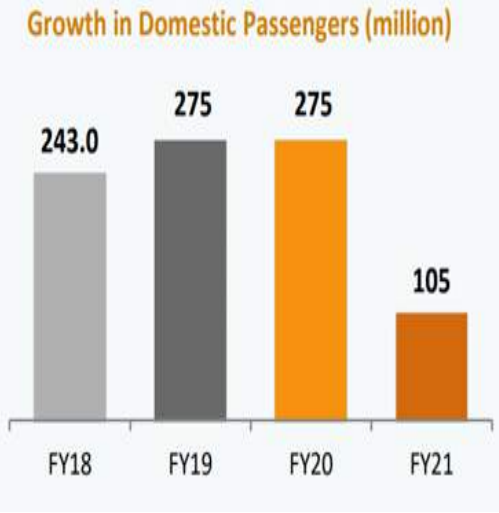
India in total has **651** Aircrafts In 2021, Compared to about **5,882 aircraft** in the U.S. commercial aircraft fleet.

Basic Statistics

SECTOR COMPOSITION



KEY TRENDS



The 'Desi' Market

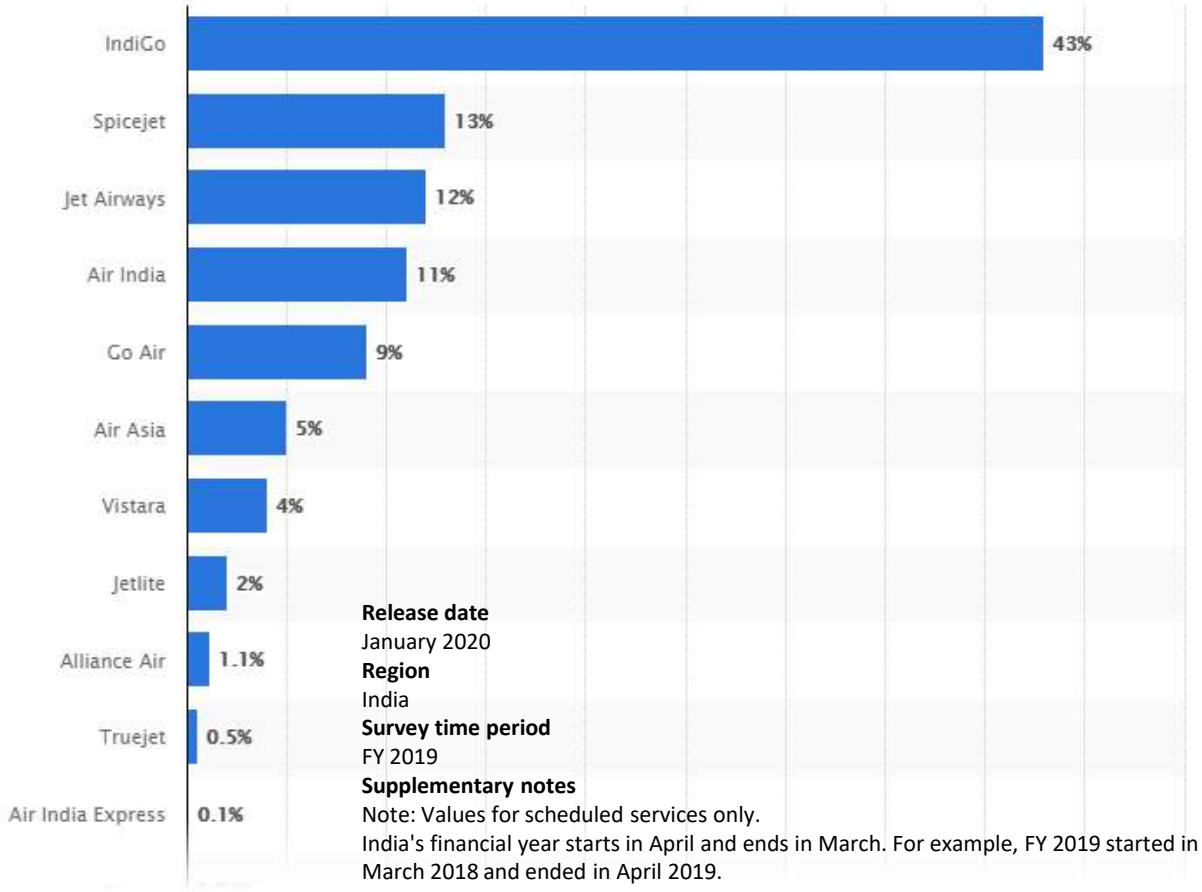
The 'WAR' of Airlines:

The Indian aviation sector Grew by over 18 percent in the first quarter of financial year 2018, while over 300 million passengers were handled at Indian airports. Jet Airways held the largest market share after IndiGo as of 2018. But the former passenger carrier had suspended operations in April 2019 following financial difficulties, leaving the field open for the latter, with little competition from other players in the market.

A flight for the budget airline market:

Indigo airline's **low cost and no-frills approach** to domestic flying had been cited as one of the factors leading to its relative success in India. According to the **Directorate-General of Civil Aviation**, IndiGo airline carried over 43 million passengers during the fiscal year 2017. It was first among the country's most punctual airlines with over 89 percent on-time arrivals. As a carrier that also had the least complaints from the customer, IndiGo's popularity with the domestic base was high, soaring towards growth in the years to come.

IndiGo - the market leader



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Desi & Swadesi Players

Commercial Aviation Players

- **Freighters**
  1. Air India
  2. Vistara
  3. Spice jet
  4. INDIGO
  5. TRUJET
  6. AIR ASIA
  7. ALLIANCE AIR
  8. SPICE SHUTTLE
  9. FLY BIG
  10. AIR INDIA EXPRESS
  11. GO FIRST (GO AIR)
- **Non Freighters**
  1. BLUE DART AVIATIONS
  2. SPICE XPRESS

Defense/Military Players

- **National**
  1. Bharat Dynamics Ltd.
  2. Tata Power Static Engineering Division
  3. Mahindra Aerospace
  4. Kalyani Strategic Systems Ltd
  5. Tata Advanced Systems Ltd.
  6. Reliance Naval and Engineering Limited
  7. L&T Heavy Engineering
  8. Ashok Leyland Defense
  9. Adani Aero Defense Systems & Technologies Ltd
  10. Bharat Electronics Ld
  11. Hindustan Aeronautics Ltd
  12. Defense Research and Development(DRDO)
- **International**
  1. Thales Group
  2. Honeywell International
  3. Northrop Grumman Corporation
  4. Lockheed Martin Corporation
  5. BAE Systems Ltd.
  6. Rafael
  7. Dassault Aviation
  8. Raytheon

Maintenance, Repair and Overhaul (MRO)

*Briefed Up

- **The Indian MRO industry** was worth US$800 million in 2011 and is expected to grow to over US$1.5 billion by 2020

- **The measured steps** that the Indian government has taken in moving towards the open sky policy, increase in military, civil and business aircraft fleet in the country, the growing preference for air travel by India's largely underserved middle class, and the focus by industry to optimize cost of aircraft operations, provides a strong foundation for the Indian MRO industry to strengthen its capability to meet global standards of excellence.

- **Setting up an MRO** is highly capital intensive with a long break-even time.

- **Operating a credible MRO** is highly dependent on investing in the right manpower which is regularly trained and optimally utilized with a strong focus on quality and turnaround time

MRO* Industry Analysis

Commercial aviation

- Airlines in India spend about 13–15 percent of their revenues towards maintenance, the second-highest cost item for airlines after fuel.
- Almost all airline MRO infrastructure in India is captive (largely with Air India) with only one fully operational independent third-party provider MRO, **Air Works**, with an EASA-certified facility in Hosur near Bengaluru.
- Air Works provides heavy maintenance capability for Airbus A320, ATR 42/72 and Boeing 737/NG family of aircraft.
- Having the flexibility to get the aircraft serviced in India, at a local MRO with EASA-approved facilities, results in 30–40% saving in aircraft maintenance costs for an airline, despite the tax regime on import of spares into the country making them 30% more expensive as compared to international MROs.

*Maintenance, Repair and Overhaul (MRO)

Business aviation

- Private operators and NSOP (non-scheduled operators permit) holders are required by DGCA (Directorate General of Civil Aviation) to set up a CAR 145 approved maintenance shop or work with a DGCA approved third-party MRO
- Most private operators and NSOP holders prefer the outsourced model for line maintenance (on-tarmac checks) and use OEM/DGCA approved facilities for engine, heavy maintenance and modifications on their aircraft.
- The Indian business aviation market is complex from a maintenance perspective. Each individual type requires trained technical manpower, tooling, and approvals from regulator as well as the OEM to enable an MRO to offer world-class maintenance services
- Therefore, the industry is highly fragmented, with one of the largest player in the market ***Air Works*** commanding a **30% market share** and ***Indamer Aviation Pvt. Ltd***, commanding **27% of the market share**.

Defence aviation

- Defence MRO in India is largely captive with the Army, Navy and Air Force supported to an extent by HAL (Hindustan Aeronautics Limited).
- The Directorate General of Civil Aviation for Dornier 228 & Avro 748 aircraft MRO for civil operators has recently certified Hindustan Aeronautics Limiteds Transport Division in Kanpur (Central India).
- However, there is growing awareness within the Indian Defence establishment on the value of outsourcing non-core maintenance activities to third party operator

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MRO FASCTS* (Fascinating facts)

- The third-party MRO industry in India has been in the past dominated by small and medium enterprises with limited participation by global players.
- This trend is gradually changing as the market size for MRO is becoming significant and is attracting interest from globally established players such as Boeing and EADS.
- At the same time, established Indian players such as Air Works are taking the necessary steps to acquire or partner with global companies to establish capabilities in specific parts of the MRO value chain.

The table provides a simple comparison of costs of a **C1 check** on a **Boeing 737 NG** aircraft between India and other international locations.

Cost Heads	Middle East/South East Asia	India
Labor rate (USD/hr)	50	5
Labor cost (USD)	64,000	57,000
Parts (USD)	15,000	20,000
Ferry time (hrs)	10	2
Ferry cost (USD)	35,000	7,000
Total cost (USD)	114,000	84,007

UAV

- **The Indian UAV market** witnessed substantial growth on account of accelerating awareness, technological advancement, and growing adoption of business UAV's across verticals such as investigation, monitoring, cinematography & photography and agriculture within the country.
- **The ministry of civil aviation** and board of directors general of civil aviation (DGCA) launched the GARUD portal. The platform provides fast track exemptions to government agencies for using UAVs in their operations against the pandemic.
- According to this research, the Indian UAV Market is projected to grow at a **CAGR of 20.9% during 2020-2026**
- Though, UAVs are widely accepted and implemented across several verticals in **commercial segment, mapping & surveying** holds the majority of revenue share for the year 2019 due to high accuracy and quality provided by such UAVs with relatively less manpower and low cost.
- **The Northern region** recorded the highest UAVs market revenues in 2019.
- The primary reason for the Northern region to hold a dominant share in the overall UAV market is **higher technological adoption** in the region and active participation of the government since, the government is **the biggest consumer** of UAVs presently.

Types, Applications and Range

By Range

- Visual Line of Sight (0-500m)
- Extended Visual Line of Sight (501m-2km)
- Beyond Line of Sight (Beyond 2km)

By Regions

- Northern
- Eastern
- Western
- Southern

By Types

- Commercial UAV
- Fixed Wing UAV
- Hybrid UAV
- Rotary Blade UAV
- Others (Balloon, Single Rotor, etc)
- Military UAV
- Fixed Wing UAV
- Multi Rotor UAV
- Others (Balloon, Single Rotor, etc)

By Applications

- Commercial UAV
- Filming & Photography
- Inspection & Maintenance
- Mapping & Surveying
- Agriculture
- Surveillance & Monitoring
- Others (Environmental Conservation, Search & Rescue, etc.)
- Military UAV
- Surveillance
- Emergency Communications
- Combat and Rescue Operations
- Others (Reconnaissance, Battle Assessment Damage, Weapon Delivery, etc.)

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SPACE

- **India's space industry** is predominantly driven by the national Indian Space Research Organisation (ISRO).
- The industry includes over **500 private suppliers** and other various bodies of the Department of Space in all commercial, research and arbitrary regards.
- There are relatively **few independent private agencies**, though they have been gaining an increased role since the start of the 21st century.
- In 2019, the space industry of India accounted for **$7 billion or 2% of the global space industry** and employed more than 45,000 people
- **Antrix Corporation** expects the industry to grow up to $50 billion by 2024 if provided with appropriate policy support.
- **Private firms** started to emerge later as subcontractors for various rocket and satellite components.
- There were more than 40 startups in India in early 2021 in various stages of developing their own launch vehicles, designing satellites and other allied activities

SPACE Overview

- ISRO and DOS continue to remain dominant in the national space sector, having launched more than 100 domestic and more than 300 foreign satellites for 33 countries, while private firms have gradually been gaining ground..
- In February 2020, there were 35 startups that came up in the space sector, of which three focused on designing rockets, 14 on designing satellites, and the rest on drone-based applications and services sector.
- The number further grew to over 40 in January 2021.
- Two companies, S**kyroot Aerospace and AgniKul Cosmos**, have tested their own engines and are in advanced stages of developing their own launch vehicles, while others have their launchers in the production pipeline and have launched satellites using ISRO rockets.
- A range of initiatives to deregulate the private space sector were introduced by Shri Narendra Modi's cabinet in June 2020, and the Indian National Space Promotion and Authorisation Centre (**INSPACe**) was established for incubating technology into private firms, known as Non-Government Private Entities (**NGPEs**) by DOS.

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Players

Major conglomerates and organisations

Name	Established	Ownership	Services
Antrix Corporation	1992	State-owned	•Satellite systems •Launch vehicles •Technology and consultancy
Godrej Aerospace	1897	Private	•Rocket engines •Spacecraft thrusters
Larsen & Toubro	1938	Private	•Rocket boosters •Spacecraft •Space infrastructure
NewSpace India Limited	2019	State-owned	•Satellite systems •Launch vehicles •Technology and consultancy

Other notable companies and startups

Name	Established	Ownership	Services
AgniKul Cosmos	2017	Private	Launch vehicles
Bellatrix Aerospace	2015	Private	•Satellitesystems •Launch vehicles
Dhruva Space	2012	Private	Satellites
Pixxel	2019	Private	Earth imaging
Satellize	2018	Private	Satellites
Skyroot Aerospace	2018	Private	Launch vehicles

Aerosports(New entrant)

- Aero sport is a popular form of adventure sport and is gaining a lot of attention in India.
- This form of adventure sport lets you experience the thrill of flying high while taking in the view of nature.
- Though at an infancy stage, aero sports are gradually but consistently rising in the country
- ***Types***

Paragliding

Paramotoring

Hang Gliding

Sky Diving

Hot Air Ballooning

Government Schemes/Initiatives

1.Udan: UDAN or (Ude Desh ka Aam Nagrik) is the government's initiative to make air travel to India's tier II and tier-III cities affordable to the common man. Passengers get air connectivity and the ability to fly with fares capped at Rs 2500.

2.FDI: Currently, 100% FDI is allowed through the automatic route in greenfield airport projects while it is 74% in brownfield ones.

3.Open Sky Policy: **The new 'open sky policy' restricts the foreign Non scheduled airlines I.e (Freighters) to just 6 airports, This is done in order to boost indian airline's frieght and cargo flights**

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Colleges/Universities

1. Indian Institute of Aeronautics, New Delhi	2. Indian Institute of Aeronautics Science, Jamshedpur	**3.** Indian Institute for Aeronautical Engineering and information, Pune
4. A.J.Aviation Academy, Bangalore	5. Indian Aviation Academy, Mumbai	6. Rajiv Gandhi Aviation Academy, Hyderabad
7. Aviation Academy, Bangalore	8. Wingss college of aviation technology, Pune	9. Ahmedabad Aviation and Aeronautics-Ahmedabad

Courses Being offered -

- **Certificate in Commercial Pilot's License (CPL)**
- **Diploma in Airline Fares & E-Ticketing**
- **Certificate in Load Control**
- **Certificate in Airline Cabin Crew & in Flight Services**
- **Certificate in Ramp & Cargo Operations**
- **Certificate in Aviation Management**
- **Commercial Pilot License**
- **Pilot License**
- **Aircraft Maintenance Engineering**
- **BSc Aircraft Maintenance**
- **BSc Aeronautical Science**
- **BTech Aerospace Engineering .**
- **Advanced Diploma in Aeronautical Engineering**
- AND MORE!!

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Associations

- Aeronautical Society of India (AeSI)
- Business Aircraft Operators Association (BAOA)
- Federation of Indian Pilots (FIP)
- The Federation of Indian Airlines (FIA)

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Advantage India(Growth)

- **Robust demand**: Rising working group and widening middle class demography is expected to boost demand.
- **Opportunities in MRO**: Expenditure in MRO accounts for 12-15% of the total revenues - it is the second-highest expense after fuel cost. By 2028, the MRO industry is likely to grow over US$ 2.4 billion from US$ 800 million in 2018.
- **Policy support**: Foreign investment up to 49% is allowed under the automatic route. Under Union Budget 2021-22, the government lowered the custom duty from 2.5% to 0% on components or parts, including engines, for manufacturing of aircrafts by public sector units of the Ministry of Defence.
- **Increasing Investments**: Investment to the tune of Rs. 420-450 billion (US$ 5.99-6.41 billion) is expected in India's airport infrastructure between FY18-23.

- **The global space economy**: is pegged at $360 billion of which the Indian space economy is around 2 per cent valued at $7 billion currently.
- **To enhance the country's potential in the space sector**: the government has now allowed the private sector to use ISRO's facilities and other relevant assets to improve their capacities.
- **Indian National Space Promotion & Authorization Centre (IN-SPACe)** offers a level playing field for private companies to use Indian space infrastructure and allow building launch vehicles, satellites, etc.
- **Boost ISRO's engagement**: with startups even as it has worked with multiple young companies like Bellatrix Aerospace, Team Indus, Kawa Space, Dhruva Space, etc.

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Noob's Guide for setting up an LCC*

LCC – Low cost Carrier

All you need is Rs 10 crore (€1,833,840, US$2,168,257) in paid-up capital to start a regional airline with an aircraft of less than 80 seats. A good example is Air Deccan, which started as a regional airline with a single turboprop ATR aircraft before spreading its wings across the country.

Today, an LCC with a pan-India presence would cost you $40-45 million (Rs 180-202 crore). If you can increase it to $65-70 million (Rs 270-315 crore), you could also build in some cushion that can help you to tide over a crisis like an oil price spiral.

You spend Rs 2.5 lakh an hour to fly an Airbus A320. To fly it for 10 hours a day, you need Rs 8 crore. If you have six aircraft — airlines need to bring in six aircraft within year of starting operations — you will burn Rs 90 lakh a day or Rs 27 crore in a month. To recover this, the airline will have to fly at say, 70 per cent load factor (occupancy).

Besides, all expenses are payable upfront or almost immediately. For instance, the oil companies provide credit for only seven days; if you don't pay them, they will stop supplies. The airport charges have to be paid every month.

Before you seek a licence, you need to get a no objection certificate (NoC) from the civil aviation ministry. The ministry studies the promoters background before issuing an NOC, based on which operators can lease an aircraft or place an order with aircraft manufacturers like Airbus or Boeing.

Lease rentals, which is 1 per cent of the cost of the aircraft, for a new Airbus A320, is $350,000/month

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You need 11 pilots (pair of five-and-half) per aircraft.

Assuming annual salaries of Rs 36-40 lakh per pilot, the salary bill for six aircraft will be Rs 18-20 crore a year.

The salaries for engineers, certified by the Director General of Civil Aviation (DGCA) after tests, will be another Rs 5-10 crore a year, cabin crew and ground staff will cost Rs 3 crore a year; more for security.

Each aircraft needs ground handling equipment worth Rs 75 lakh like push back unit, ground power unit, step ladders, conveyors and chocks

When you start flying, you will also have to fork out deposits of Rs 50 lakh per airport.

Besides, you need to pay a deposit of Rs 1 lakh per airport for check-in counters, Rs 2-3 lakh per aircraft as parking fees.

Every airport requires half a dozen computers; 100 -120 computers across airports and offices could cost you another Rs 1 crore.

Implementation of a reservation system could set you back by Rs 3 crore.

Finally, you have pre-operative expenses which could be Rs 10-12 crore.

If you end up hiring a consultant for everything, that could jack up costs by an extra $100,000.

Promotions could eat up Rs 5-8 crore while a 10,000 square feet office space with security deposit and furniture could cost you Rs 3 crore.

Thus, setting up an LCC with a pan-India presence could cost you Rs 200 crore, for starters.

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Continued

Airlines have to provide a month's rental plus three months lease rentals as deposits

→

The lease and deposits for six A320s will cost you $8.4 million /Rs 37.80 crore.

→

Insuring an A320 costs Rs 2 crore a year.

↓

For each aircraft, airlines have to carry initial provisioning and consumables worth $1 million and LRUs of $3.5 million for every three aircraft.

→

It costs Rs 35-40 lakh to train a pilot for A320; training an ATR pilot would cost half.

→

Training 66 pilots for six planes would cost you Rs 23 crore.