



AVIATION MANAGEMENT

IV B. Tech VIII semester (Autonomous IARE R-16)

BY

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CO's

Course outcomes

- | CO's | Course outcomes |
|------|---|
| CO1 | Gain knowledge about Airline industry and Analysis of different market potential. |
| CO2 | Understand Airport planning different types of privatizations. |
| CO3 | Understand the importance and role of private operators. |
| CO4 | Identify the methodology followed by ATC & DGCA. |
| CO5 | Understand the role of air traffic control and the navigational aids. |

UNIT - I

INTRODUCTION

UNIT - I



CLOs	Course Learning Outcome
CLO1	Provide knowledge on history of aviation industry.
CLO2	Understand airport system planning, airport master plan, airport lay out plan.
CLO3	Demonstrate governmental requirements on non-passenger related airport authority functions.

INTRODUCTION



What is aviation?

The term aviation, was coined by a French pioneer named Guillaume Joseph Gabriel de La Landelle in 1863. It originates from the Latin word that literally means bird. Aviation means all the activities related to flying the aircraft.

Major Roles of AAI



- To provide Air Traffic Management (ATM) service in Indian airspace and adjoining oceans.
- To manage all the Indian airports.
- To ensure the safety of the airports and aircrafts.
- To provide calibration of navigational aids in the flights of Indian Air Force, Indian Navy, Indian Coast Guard, and private airfields in India.
- To provide passenger facilities and information system at the passenger terminals at airports.

Genesis of the Indian Airline Industry

Mr. J.R.D.TATA flies a De Havilland Puss Moth from Karachi to Bombay as part of the first Tata Sons Ltd. flight to deliver mail carried by British Imperial Airways 1948: Govt. of India acquires 49% stake in Tata Airlines, designates it a flag carrier and renames it Air India International (“All”) 1953: Jawaharlal Nehru, in friendly transaction, convinces the Tata Group to let the Govt. of India acquire a majority stake in All and nationalizes air transport 1953: Indian Airlines formed by merging eight former independent domestic airlines 1960: India enters the jet age with an Air India B707; USA and India are connected for the first time with an Indian airline 1989: Indian Airlines becomes one of the first airlines to induct the A320 into its fleet 1990: East West Airlines becomes the 1st private airline since 1953.

Strengths

- ⦿ It is the first airline with full new fleet of aircraft.
- ⦿ It provide Quality hospitality to customers
- ⦿ It have already training academy.
- ⦿ Kingfisher have UB group backing for raising financing.
- ⦿ It is well capitalised airline, prepared to take losses.
- ⦿ It have experience to better handling of employees and staff; less centralised style of functioning.

Weaknesses



- Chairman's people skills are better but employees have to work very erratic hours.
- It provide service delivery only in metros and other big cities.
- It is yet not in profit position.
- Kingfisher's ticket pricing is also very high.
- Kingfisher is yet to build itself into an organisation; structures yet to fall in place.

Opportunities



- The non penetrated domestic market. Kingfisher entered into the market at that time when the less competitors are taken place.
- International market.
- Untapped air cargo market.
- Expanding tourism industry.

Political factors

1. Open sky policy.
2. FDI limits: 100% for Greenfield airports.
3. 74% for the existing airports.
4. 100% through special permission.
5. 49% for airlines.

ECONOMICAL FACTORS



- 1) Contribution to the Indian economy-since the industry is operating in Indian economy, the revenue generated by the company adds to economy
- 2) Rising cost of fuel-the fuel price is rising because the subsidies govt is providing are being taken off.
- 3) Investment in the sector of aviation
- 4) The growth of the middle income group family affects the aviation Sector-in todays world with increasing income of middle class, people prefer to go by air because it saves time at is all new a different experience.

SOCIAL FACTORS



- 1) Development of cities leads to better services and airports-metro cities first had airports but with development of the country new airports are being built up.
- 2) Employment opportunities-the aviation sector provided a lot of employment opportunities because the industry is so vast that a lot of people can be employed
- 3) Safety regulations.
- 4) The status symbol attached to a plane travel

TECHNOLOGICAL FACTORS



1. The growth of e-commerce and e-ticketing is now adopted by the airline companies for the facilities and services to the customers.
2. Satellite based navigation system is the most advanced technological factor.
3. Modernisation and privatisation of the airports.
4. Developing green field airports with private sector for example in
5. Bangalore the airport corporation limited.

1. The increase in the global warming due to increase in the number of aeroplanes flying in the air this makes bad effect on our atmosphere.
2. The sudden and unexpected behavior of the atmosphere and the dependency on whether.
3. Shortage of the infrastructural capacity
4. Tourism saturation.

LEGAL FACTORS



1. FDI limits
2. Bilateral treaties
3. Airlines acquisitions and the leasing cost.

Market potential of Airline industry in India



- Indian civil aviation sector has continued to experience high passenger growth (domestic traffic CAGR is 17% from 2009 to 2011), and if the trend continues it could rank among the top three aviation markets in the world by 2020. According to Indian Aviation: Spreading its wings, a strong market growth rate coupled with infrastructure expansion will help the sector back on its feet as the economy recovers.
- The FICCI-PwC report also finds that this would be a good time for global players to enter India and explore the potential of a large underserved market.

New airport development plans



- To plan an airport, the AAI is concerned for three approvals –
- **Technical Approvals**
 - Review and approve Airport Layout Plan (ALP).
 - Review and acceptance of forecast.
 - Airspace and procedure changes.
 - Land acquisition.

Financial Approvals



- Funding for the airport is approved once the project gets clearance for safety, security, capacity, and airport access systems.

Environmental Approvals



- Review and assess environmental issues.
- Find out solutions to address the environmental problems.
- Airport planning is vital to understand problems and potential environmental issues.
- Out of the reactive and proactive planning methods, an appropriate planning method is selected depending upon the requirement.

It includes the development of the land to build the terminals and base, and building the infrastructure for the ancillary facilities. All the infrastructural development is done in accordance with the ICOA standards.

Airport – Terminal Planning

The following criteria need to be considered while planning and designing a terminal –

- Passenger flow and traffic peaking.
- Minimum walking distance.
- Level of service for passengers and sophistication.
- Performance standards.

Airport Development



- Area for Retailers: Duty free shops, food joints, and spas.
- Area for Facility points such as Restrooms, ATM machines, and kiosks.
- Easy access to retail area and facility points.
- Compatibility of facilities with aircraft characteristics.
- Ability to handle changes in technology and automation.
- Expandability for future growth.
- Area and processing time for checking-in, immigration/customs clearance, baggage security screening, and baggage delivery.

INVESTMENTS IN AIRPORT INFRASTRUCTURE



- With the increase in traffic for both passenger & cargo aviation services in India, the government has put in place a program for directing investments in the Airport infrastructure through both internal resource mobilization, as well as through private sector participation in modernizing specific Airports.
- The Committee on Infrastructure has initiated several policy measures that would build world-class airport infrastructure in India. A Model Concession Agreement is also being developed for standardizing & simplifying the PPP transactions for airports. In any future projects for development of existing airports, it has been decided that the length of the runway would be at least 7,500 feet (which is needed for the A 320 and similar aircraft).

Airport – Terminal Configurations



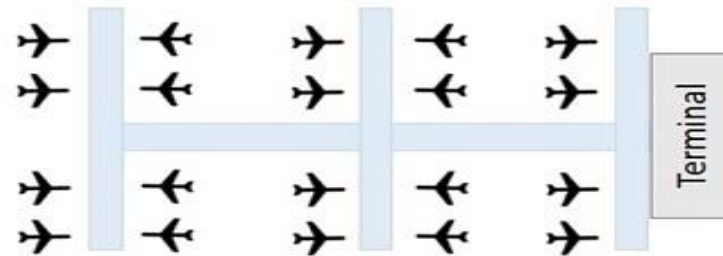
Standard Linear



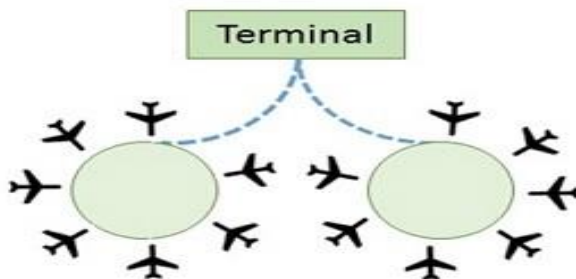
Curvilinear



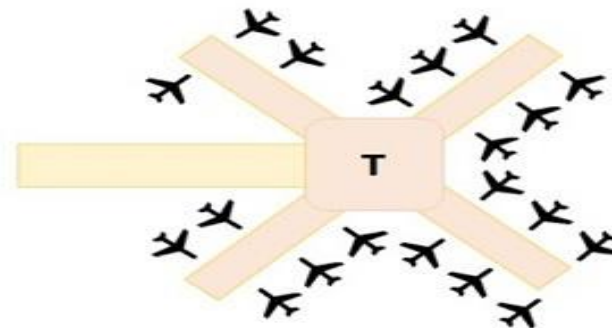
Pier



Concourse



Satellite



Star Pier

Current challenges in airline industry



- ⦿ Though growth is huge, still there are some challenges in the aviation sector that airlines are facing. Let's unravel some of the current challenges or issues in the airline industry.
- ⦿ Security in the sky: Safety and security are the greatest challenges that this industry is facing. This is because global terrorism continues to be predominant and aviation sector can be targeted easily. Airports, governments and airlines need to find out new and innovative ways to so that they can enhance their security, without compromising their service and overall comfort of the passengers.

Current challenges in airline industry



- **Technology:** Advances in technology is another big challenge in the aviation industry. Like any other sector, the aviation industry is being impacted by the move to digitalization. With the advent of new-fangled technologies like block chains, to big data, machine learning and artificial intelligence, the aviation industry is trying to accustom itself with these technologies. Big data is a major area in which every airline is working so that they can improve their product offerings and services and can wipe out their contenders by using those data prudently.

Current challenges in airline industry



- ◎ Big data will help them to get a deeper insight of their customer's behaviour and in which area they need to do improvement. In order to stay competitive, airlines are embracing big data and are improving their services and offerings. Airlines also need to implement chat bots which will understand the needs of the customers through artificial intelligence and point the customer to the right director. This will also allow the airlines to cut down the costs of their call center and they can assist the customers in a better way.

UNIT-II

CLOs	Course Learning Out Come
CLO4	Explain Air Traffic Services and describe the history and development of Air Traffic Services (ATS).
CLO5	Differentiate between private airports and public use airports, commercial service airports and primary commercial service airports.
CLO6	Discuss and Identify the economic, political and social role of airports.

UNIT-II

AIRPORT INFRASTRUCTURE AND MANAGEMENT

Airport planning



- The passenger and cargo terminals have been described as interface points between the air and ground modes, the movement of passengers, baggage, and cargo through the terminals and the turnaround of the aircraft on the apron are achieved with the help of those involved in the ground handling activities at the airport (IATA 2012).
- These activities are carried out by some mix of the airport authority, the airlines, and special handling agencies depending on the size of the airport and the operational philosophy adopted by the airport operating authority.
- For convenience of discussion, ground handling procedures can be classified as either terminal or airside operations.

Passenger Handling



- Passenger handling in the terminal is almost universally entirely an airline function or the function of a handling agent operating on behalf of the airline.
- In most countries of the world, certainly at the major air transport hubs, the airlines are in mutual competition.
- Especially in the terminal area, the airlines wish to project a corporate image, and passenger contact is almost entirely with the airline, with the obvious exceptions of the governmental controls of health, customs, and immigration.

Airport operations



- The term airport operations initially triggers the view of passengers being transported by aircraft. Further thought would give rise activities that directly or affect passenger operations, such as baggage handling systems, aircraft maintenance and passenger security.
- When in fact airport operations consist of numerous aspects; concourses, runways, parking, airlines, cargo terminal operators, fuel depots, retail, cleaning, catering and many interacting people including travellers, service providers and visitors.
- The facilities are distributed and fall under multiple legal jurisdictions in regard to occupational health and safety, customs, quarantine and security. For the airport to function these numerous systems must work together.

AOCC Roles



There are usually five distinct roles within the AOCC:

1. **Flight Dispatch:** Responsible for preparing flight plans and requesting new flight slots from air traffic control entities, like the FAA in North America and EUROCONTROL in Europe'
2. **Aircraft Control:** Responsible for managing aircraft and is the central coordinator in operational controls'
3. **Crew Control:** Manages crew resources, monitors crew check-ins and check-outs and updates crew rosters as needed'
4. **Maintenance Services:** Responsible for short-term maintenance scheduling and unplanned service requirements.
5. **Passenger Services:** Responsible for ensuring that decisions and changes minimize any impact on passengers'

AOCC Organizations



- **Decision Center:** Aircraft controllers work in the same room, while other team members, like crew control and maintenance services, work in different places.
- **Integrated Center:** All team members work in the same physical space, reporting to a supervisor.
- **Hub Control Center:** Most roles are at different airports, where they can work in conjunction with airport operations.

- Airports Authority of India (AAI) was constituted by an Act of Parliament and came into being on 1st April 1995 by merging erstwhile National Airports Authority and International Airports Authority of India.
- The merger brought into existence a single Organization entrusted with the responsibility of creating, upgrading, maintaining and managing civil aviation infrastructure both on the ground and air space in the country.

The functions of AAI are as follows



- Design, Development, Operation and Maintenance of international and domestic airports and civil enclaves.
- Control and Management of the Indian airspace extending beyond the territorial limits of the country, as accepted by ICAO.
- Construction, Modification and Management of passenger terminals.
- Development and Management of cargo terminals at international and domestic airports.

The functions of AAI are as follows



- Provision of passenger facilities and information system at the passenger terminals at airports.
- Expansion and strengthening of operation area, viz. Runways, Aprons, Taxiway etc.
- Provision of visual aids.
- Provision of Communication and Navigation aids, viz. ILS, DVOR, DME, Radar etc.

AIRLINE PRIVATIZATION (gradual)



- ⦿ As part of a series surrounding airline privatization, we have dived into numerous ways airlines opt to join the market, including public issuance of shares and trade sales. This covers a good portion of the industry, but there are still many ways that airlines go from the hands of the government to the investors either in full or in part.
- ⦿ In the third part to this series, we'll discuss gradual privatization. Gradual privatization is as the name says, the gradual privatization of an organization.

AIRLINE PRIVATIZATION (gradual)



- In this situation, the entire company isn't sold to investors, but the controlling government gradually reduces its stake in the company to either a small portion under government ownership or 100% private ownership.
- One common example of this process is none other than Lufthansa.

Partial Privatization



- Throughout this series surrounding airline privatization we have explored numerous ways airlines can join the public markets, such as public issuance of shares, trade sales, and gradual privatization.
- We've gone through a large chunk of the methods many airlines have gone through when going public but there still are a few more things to go through.

Full privatization



- ⦿ Airport privatization Privatization refers to shifting governmental functions and responsibilities, in whole or in part, to the private sector. The most extensive privatizations involve the sale or lease of public assets.
- ⦿ Airport privatization, in particular, typically involves the lease of airport property and/or facilities to a private company to build, operate, and/or manage commercial services offered at the airport. No commercial airport property in the United States has been completely sold to a private entity.

Full privatization



- Long-term operating leases are the standard privatization contract.
- Only in the United Kingdom have outright sales of airport property been completed.

UNIT-III

CLOs	Course Learning out come
CLO7	Describe airport layout incorporating its different features navigation.
CLO8	Explain construction of runway and taxiway and aprons as per geometric design for all parameters.
CLO9	Define the requirements of terminal area as per drawing, design and describe the visual aids for air traffic control system.

UNIT-III

AIR TRANSPORT SERVICES

Various airport services



- Commercial Service Airports – These airports support some level of scheduled commercial airline service and have the infrastructure and services available to support a full range of general aviation activity. These facilities meet most needs of the aviation system and serve as essential transportation and economic centers of the state.
- Enhanced Service Airports – These airports have runways 5,000 feet or greater in length with facilities and services that accommodate a full range of general aviation activity, including most business jets. These airports serve business aviation and are regional transportation centers and economic centers.

Various airport services



- General Service Airports – These airports have runways 4,000 feet or greater in length with facilities and services customized to support most general aviation activity, including small to mid-size business jets. These airports serve as a community economic asset.
- Basic Service Airports – These airports have runways 3,000 feet or greater in length with facilities and services customized to meet local aviation demands.
- Local Service Airports – These airports support local aviation activity with little or no airport services.

INTERNATIONAL AIR TRANSPORT SERVICES



1. Airline or Volaris.- Concesionaria Vuela Compañía de Aviación, S.A.P.I. de C.V.
2. Initial Airline.- On interlineal flights, the airline who has the traffic rights on the first flight leg and transports passengers on that leg.
3. Final Airline.- On interlineal flights, the airline who has the traffic rights on the second or last leg of the flight, receives from the Initial Airline the passengers to transport them on the second or last leg.
4. Selling Airline.- On interlineal flights, the one who sells the Ticket for the air transportation.

For International Flights



- The Passenger can carry checked baggage and carry on baggage who complies with the policies of volume, weight and dimensions established on the Ticket issued by the Selling Airline, also according to policies of the Airlines who gives Interlineal Service and to International Conventions.
- Extra charges on the baggage depends on the final destiny of it, in those cases an extra charge is applicable, the Selling Airline might inform those destinies with extra charges.
- In case the Passenger travels with more baggage than the one he/she paid, or the baggage does not accomplish all the weight, volume and size requirements, he/she must pay for the excess of baggage the applicable rates plus taxes.

For International Flights



- Those rates and taxes are on the Web Site or the Passenger can have information about them on the Call Center or Volaris airport offices.
- Transportation of excess baggage will be subject to aircraft's capacity in all cases.
- All baggage shall be identified on the inside and outside, with the Passenger's name and address.

An overview of Airport in Delhi



- A World-class Airport for Delhi is a few years away. L&T is executing the design and construction of terminal building, runway and associated works of Delhi International Airport valued at about Rs. 54.00 billion to be commissioned by 2010 for Commonwealth Games. Some of the features include.
- The Passenger Terminal Building (T3) will cater to both domestic and international traffic and will handle 25 million passengers per annum, more than twice the present traffic. The total built-up area of the new terminal building (T3) will be 5.2 million sq.ft
- A new code F runway, at 4.43 km, will be one of the longest in Asia and equipped with CAT IIIB – a landing system.
- All airport facilities like baggage handling systems, IT, communication, passenger boarding bridges, flight information and displays etc.

An overview of Airport in Mumbai



A World-class Airport for Mumbai will also be ready in 4 years. L&T has been entrusted with design and construction of terminal works, airside works and ancillary facilities at Chhatrapati Shivaji International Airport (CSIA) to be commissioned by 2012.

The new terminal (Terminal 2) will come up in the existing international terminal amidst various challenges.

- The terminal will handle 40 million passengers per annum and this will be commissioned in a phased manner from 2010 to 2012. The total built-up area of the new terminal building (T2) will measure 4.84 million sq.ft..

An overview of Airport in Mumbai



- Airside works including runway reconstruction, construction of new aprons and additional taxi ways.
- All airport facilities like baggage handling systems, IT, communication, passenger boarding bridges, Flight information and displays etc.

An overview of Airport in Bangalore



- State-of-the-art terminal building having an area of around 1.00 million sq. ft.
- Construction of a 4km runway and other infrastructure.
- The airport will cater to the projected traffic demand of 11.5 million passengers and handling 3 lakh tons of cargo per annum.
- Modular construction adopted to ensure smooth and seamless expansion to cater to future growth.
- Integrated Cargo handling facilities with of a total built up area of 6.00 lakhs sqft

An overview of Airport in Hyderabad



- GMR Hyderabad International Airport Limited (GHIAL) L&T built the Greenfield International airport at Shamshabad involving terminal building and other airside works including taxiways, runways, etc. The airport is functional and is designed to handle 12 million passengers per annum. Some of the features include
- The seven level Passenger Terminal Building with an area of 1.17 million sq ft.
- Airside works involved construction of 4.26 km long runway including developing many other infrastructure.

The Role of Airport Operators



Together with telecommunications, air transport represents the sectors that epitomizes globalization in an economic as well as in a socio-political sense worldwide. Compared to other infrastructure sectors such as roads, water and sanitation, etc. the combination of rapid technological change, falling real unit costs, industry consolidation, the low cost carrier business model (LCC), the existence of adequate pricing mechanisms and consumer willingness-to-pay for safe cost-effective services has provided the opportunities for air transport to develop commercially, with minimal fiscal requirements (indeed potentially a positive fiscal contribution from an expanded economy).

Overview of aviation ticket taxes



Many EU Member States now implement aviation ticket taxes (CE Delft ; SEO, 2018). In the context of international agreements prohibiting the taxation of certain elements of a flight, such as the fuel used and flights themselves being levied a zero VAT rate, aviation ticket taxes are one way of levying a tax on the aviation sector. These taxes have been implemented in a number of countries. This chapter presents a short overview of aviation ticket taxes in the EU and worldwide. First a definition will be given of aviation ticket taxes used in this report (Section 2.1), after which the worldwide use of ticket taxes will be sketched, showing that ticket taxes are not only implemented in the EU (Section 2.2).

Ticket taxes worldwide



- In this report ticket taxes which have undergone legal challenges in the EU will be discussed. Ticket taxes are however implemented in various countries, also outside of the EU.
- In 2009 the International Air Transport Association (IATA) comprehensively listed all the ticket taxes in place in the various jurisdictions of the world.
- CE Delft and SEO (2018, ongoing) have updated this list, which will be published shortly.

Ticket taxes worldwide



- The 514 ticket taxes in total were further subdivided into domestic and international taxes (one country can have more than one ticket tax).
- The IATA definition of ticket taxes is the following: “Taxes which are collected at [the] time of ticket sale and which appear in the tax box of a ticket or which are included in the price of a ticket”.

UNIT-IV

COURSE OUT COMES

CLO10

Explain various elements of Heliports and its planning aspects

CLO11 Understanding the Various Airport services and international air transport services.

CLO12 Understand the role of private operators in Airport development fees, Rates & Tariffs.

UNIT-IV

INSTITUTIONAL

FRAMEWORK

Functions of DGCA



The functions of DGCA include:

- a. Registration of civil aircraft;
- b. Formulation of standards of airworthiness for civil aircraft registered in India and grant of certificates of airworthiness to such aircraft;
- c. Licensing of pilots, aircraft maintenance engineers and flight engineers, and conducting examinations and checks for that purpose;
- d. Licensing of air traffic controllers;
- e. Certification of aerodromes and Communication Navigation Systems (CNS)/Air Traffic Management (ATM) facilities;

Functions of DGCA



- f. Maintaining a check on the proficiency of flight crew, and also of other operational personnel such as flight dispatchers and cabin crew;
- g. Granting of Air Operator's Certificates to Indian carriers and regulation of air transport services operating to/from/within/over India by Indian and foreign operators, including clearance of scheduled and non-scheduled flights of such operators;
- h. Conducting investigation into accidents/incidents and taking accident prevention measures including formulation of implementation of Safety Aviation Management Programmes;

Functions of DGCA



- i. Carrying out amendments to the Aircraft Act, the Aircraft Rules and the Civil Aviation Requirements for complying with the amendments to ICAO Annexes, and initiating proposals for amendment to any other Act or for passing a new Act in order to give effect to an International Convention or amendment to an existing Convention;
- j. Coordination of ICAO matters with all agencies and sending replies to State Letters, and taking all necessary action arising out of the Universal Safety Oversight Audit Programme (USOAP) of ICAO;
- k. Supervision of the institutes/clubs/schools engaged in flying training including simulator training, Aircraft Maintenance Engineering training or any other training related with aviation, with a view to ensuring a high quality of training;

The DGCA performs these functions through the following Directorates



1. Directorate of Regulation & Information
2. Directorate of Air Transport
3. Directorate of Airworthiness
4. Directorate of Air safety
5. Directorate of Training & Licensing
6. Directorate of Aerodrome Standards (vii) Directorate of Flying Training

Methodology followed by ATC



- Tightly controlled simulation procedures and laboratories provide the foundation for a successful system baseline. However, the facilities and equipment associated with ATC system baselines are extremely complex, making tight control over all aspects of the simulation very difficult.
- The Test Director, typically an engineering research psychologist, is responsible for ensuring that consistent conditions are maintained across all baselines that will be directly compared. Re-creating conditions from studies conducted years earlier is impossible without proper documentation and configuration management.

Methodology followed by ATC



- The laboratories at the Technical Center are used constantly by many organizations. Therefore, the precise configuration of a laboratory or facility is difficult to determine after the fact.
- Researchers have a responsibility to document as many procedures, parameter settings, and configurations as possible and to provide this information to future studies.
- This should be done during the baseline. All past baselines have been conducted using only one ATC system at a time.

Methodology followed by ATC



- As such, comparisons between systems were made using data collected from separate simulation activities sometimes conducted years apart.
- This method has some advantages in terms of scheduling, but it makes internal validity and configuration management especially difficult.

Methodology followed by ATC



- We recommend that future baselines collect data for each system that will be compared as part of a single, large baseline.
- For example, the participants could run the same scenarios using both systems and alternate between systems on subsequent runs or days.
- This would reduce or eliminate many internal validity problems and provide much tighter simulation control.

Simulation Realism



- In baseline simulations, researchers should strive for a very high level of simulation realism. The SMEs involved with scenario testing and shakedown are the best source for feedback about realism. We recommend that researchers consult with these individuals after each shakedown run. Researchers should examine the following areas.
- a. Pseudopilots need adequate training during shakedown. In particular, pseudopilots need to learn the fixes associated with the sectors and when and where actions are typically taken. If they do not receive adequate training during shakedown, their communications and pilot actions may not be made in the most realistic or timely fashion.

Simulation Realism



- b. Personnel staffing the ghost sectors also need adequate training during shakedown. In particular, these personnel need to learn when to accept and reject handoffs and point outs. If they do not receive adequate training, they may not provide realistic between sector communications.
- c. Researchers should ensure that the operating procedures and LOAs used in the simulation are accurate with regard to those used at the facility.

Test Plan



As part of the formal preparations for a baseline, the Test Director should develop a formal test plan. The plan should contain the following sections.

- **1. Introduction:** This section should provide a historical context and rationale for the baseline.
- **2. Method:** This section should describe how the baseline will be conducted. It should contain the following subsections.
 - **a. Facilities:** This subsection should describe which laboratories and other Technical Center facilities (e.g., the TGF) are needed during the planning and conduct of the baseline.
 - **b. Equipment:** This subsection should describe what other equipment is needed (e.g., the WAKs).

Test Plan



- c. **Personnel:** This subsection should describe the study participants and the simulation support personnel needed.
 - d. **Procedure:** This subsection should describe the general data collection method including the sectors and scenarios to be used, the data collection tools and techniques, and the simulation schedule.
- 3. Data Reduction and Analysis: This section should describe how the data from the baseline will be reduced and analyzed.

Schedules and Rotation



- Researchers must not develop a schedule that violates the labor agreement between the FAA and the NATCA. That is, bargaining unit controllers must not be required to staff a position for more than 2 consecutive hours without a break.
- The agreement also requires a 30-minute meal break, no more than 8 hours per day (including breaks), and no more than 5 days a week. Other practical considerations set further limits on the schedule. Controllers, pseudopilots, simulation support staff, SME observers, and researchers all should be given short breaks (15-20 minutes each) between simulations and meal breaks (1 hr each). Fewer or shorter breaks will lead to fatigue and poor relations among the research team.

Schedules and Rotation



- Remember that participating in human factors research is voluntary and if participants feel ill-treated or overworked, they are unlikely to volunteer again (and are likely to tell their friends).
- In addition, the laboratory and simulation equipment requires reconfiguration time.
- We recommend scheduling a minimum of 20 minutes between runs. In our experience, 5 hours of actual simulation time a day is about the maximum that can be supported.

Schedules and Rotation



- We also recommend against running scenarios longer than about 100 minutes without a position relief. Some controllers may become fatigued, bored, or unresponsive if required to staff a position longer than this.
- We also strongly recommend using at least two traffic scenarios. If participants work the same scenario multiple times, they quickly learn to “beat” it and to anticipate occurrences.

DGCA METHODOLOGY



- The Directorate General of Civil Aviation (DGCA) is the Regulatory Authority in the field of Civil Aviation in India. It is responsible for regulation of air transport services to/from/within India and for enforcement of Civil Air Regulations, Air Safety and Airworthiness Standards. It also coordinates all regulatory functions with International Civil Aviation Organization. The headquarter is located in New Delhi with regional offices in the various parts of India.

DGCA METHODOLOGY



- Directorate General of Civil Aviation is an attached office of the Ministry of Civil Aviation. There are 4 (four) Regional Air Safety offices located at Delhi, Mumbai, Chennai and Kolkata. One Sub-Regional Air Safety Office is located at Hyderabad. Apart from the Regional Air Safety Offices, there are Regional/ Sub- regional Offices in respect of various other Directorates of DGCA i.e. Airworthiness, Aerodrome Standard, Flight Standard, Training and Licensing and Air Traffic Management located at various cities of India. In addition one office of Aeronautical Engineering Directorate is located at Bangalore and the Gliding Centre at Pune.

STRUCTURE OF DGCA



1. Administration Directorate
2. Aerodrome Standards Directorate
3. Air Safety Directorate
4. Air Transport Directorate
5. Airworthiness Directorate
6. Flight Standard Directorate
7. Information & Regulation Directorate
8. Aeronautical Engineering Division
9. Training & Licensing Directorate

UNIT-V

CLOs	Course Learning Out Come
CLO13	Understanding the role DGCA from the certification
CLO14	Knowledge on the role of air traffic control in airspace & navigational aids with live examples
CLO15	Understanding different cases in airline industry.

UNIT –V
ROLE OF AIR TRAFFIC
CONTROLL

ROLE OF AIR TRAFFIC CONTROLL



- FAA is planning a program of technological improvements intended to enable the National Airspace System to handle a higher volume of traffic with increased efficiency and safety.
- This new technology will replace present equipment some of which has been in use for over 40 years with a modern integrated system that will be more reliable and productive.
- This should allow new or improved forms of service to be offered to airspace users. Operating costs should be lower than with the current generation of ATC equipment, but there would also be major capital cost requirements.
- Many of these improvements can be implemented during the next 10 years, but the full modernization program will not be completed until the late 1990's

ROLE OF AIR TRAFFIC CONTROLL



Two technologies are at the heart of the new generation of ATC:

- 1) advanced computers; and
- 2) a two-way digital data link between aircraft and the ground. Advanced high-speed computers and new software will permit the ATC system to improve the overall management of traffic flow, as well as to formulate tactical measures that will ensure conflict-free, expeditious, and fuel-efficient flight paths for individual aircraft. Replacement computers will be installed first in en route ATC centers, then in terminal areas, and finally in a central flow control facility that will manage air traffic on a national basis.

ROLE OF AIR TRAFFIC CONTROL



In addition to safety and capacity benefits, these computers will permit a level of automation in ATC that will greatly reduce the workforce needed to handle future traffic loads

NAVIGATIONAL AIDS



- Aid to navigation was the first service provided to civil aviation by the Federal Government. At the end of World War I, the Post Office undertook to set up a system of beacons along the original airmail routes to guide aviators at night and in times of poor visibility.
- By 1927, this airway extended from New York to San Francisco, with branches to other major cities.
- In the 1930's, ground beacons for visual guidance were replaced by two types of low-frequency radio navigation aids—nondirectional beacons and four-course radio range stations.

NAVIGATIONAL AIDS



- The non directional beacon emitted a continuous signal that allowed the pilot to navigate, in a manner analogous to using a light ground beacon, by homing on the signal with an airborne direction finder. The radio range station was a further improvement in that it emitted a directional signal, forming four beacons aligned with respect to the compass, each defining a course.
- Pilots listened to a radio receiver and followed these radio beams from station to station along the route. The four-course radio range system was phased out beginning in 1950, after reaching a maximum deployment of 378 stations. Low frequency non directional radio beacons are still in limited use in the United States and widespread use in other parts of the world.

- A guidance system for approach and landing is simply a precise, low-altitude form of navigation aid with the additional accuracy and reliability needed for landing aircraft in conditions of reduced visibility.
- The standard system now in use, the Instrument Landing System (ILS), was first deployed in the early 1940's although a prototype system was first demonstrated by James Doolittle in 1929.
- ILS provides guidance for approach and landing by two radio beams transmitted from equipment located near the runway. One transmitter, known as the localizer, emits a narrow beam aligned with the runway centerline.

Landing Aids

- The other transmitter, the glide slope, provides vertical guidance along a fixed approach angle of about 3° .
- These two beams define a sloping approach path with which the pilot aligns the aircraft, starting at a point 4 to 7 miles from the runway. Because the ILS is generally not accurate or reliable enough to bring the aircraft all the way onto the runway surface by instrument reference alone, the pilot makes a transition to external visual reference before reaching a prescribed minimum altitude on the glide slope (the decision height).

Commercialization/privatization: ANSP



The provision of air navigation services was neither corporatized, privatized nor commercialized. The AAI and other government agencies continue to hold under their responsibility the control functions on security issues, air navigation services, aeronautical regulation and services of communications, meteorology, search and rescue and, in general, the technical aspects of air navigation services. At the airport level, airport operators employ and supervise airport personnel and subcontractors, but they are not responsible for the maintenance and operation of air traffic operations or landing systems, which are handled by the AAI and government agencies.

Commercialization/privatization: ANSP



- Nevertheless, the issue of separating the provision of air navigation services from the provision of airport services has been pending for a long time. It was first proposed in 1976, and the Naresh Chandra Committee, which was appointed in 2002 to examine various corporate issues, recommended to the Ministry of Finance and Company Affairs to set up a separate entity in charge of air navigation services.
- AAI and the Government of India are currently giving full consideration to a new report released in May 2012, which suggests hiving off air navigation services from airport operation.

Case study in airline industry



Indian civil aviation industry is among the top ten in the world, with a size of \$16 billion. Domestic airlines carried 55.06 million passengers in January-October 2014 period as compared to 50.7 million a year ago (IBEF 2014). The air transport has attracted foreign direct investment (FDI) of \$ 456.84 million from April 2000 to July 2013 (Indian Business, 2015). Indian aviation industry handles 121 million domestic and 41 million international passengers. More than 85 international airlines operate to India and five domestic Indian carriers connect to over 40 countries (Indian Business, 2015).

Case study in airline industry



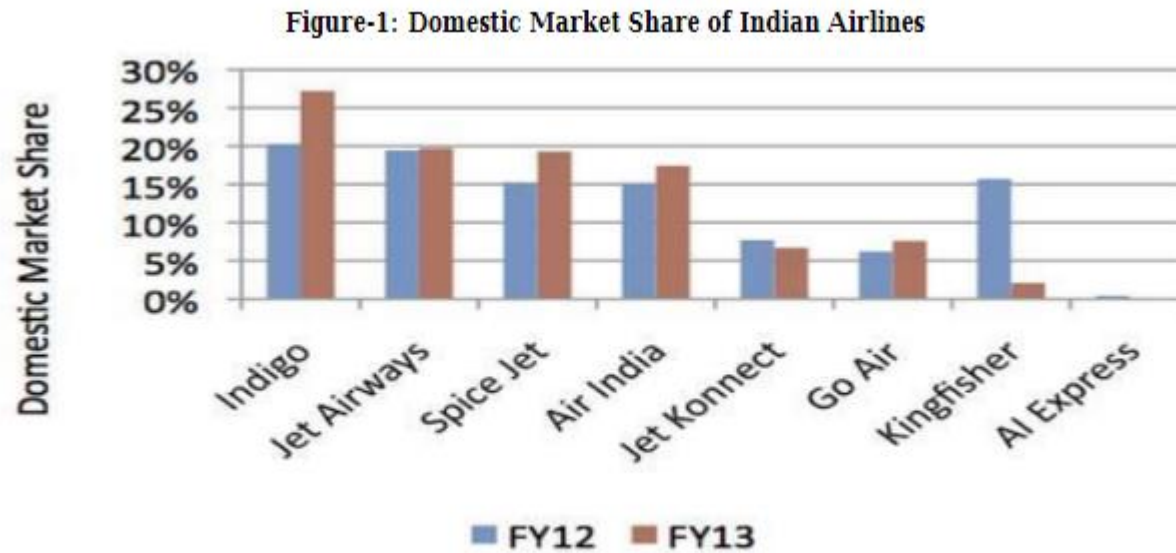
- The first commercial flight in India took-off in, 1911. Nine airlines existed before 1953 including Indian Airlines, and Air India. In 1953, the airlines were nationalized and merged into Indian Airlines. In 1986, private players were allowed to operate as air taxis.
- In 2003, Air Deccan started operation as India first low cost carrier (LCC). In 2007, the industry witnessed consolidation when Jet acquired Sahara and Kingfisher acquired Air Deccan (ICRA, 2012).

Case study in airline industry



The industry has growth potential due to growth-oriented policies of BJP government led by Mr. Narendra Modi. Indian aviation market is expected to be third largest in the world (Indian Business, 2015). The untapped potential presents an opportunity for the industry to enhance passenger traffic. The air traffic density in India is just 72, as compared to 282 in China and 2896 in USA (IBEF, 2014). The government has allowed 49% FDI by foreign airlines in the sector. The government plans to build 17 new airports in 12th five-year plan.

MARKET SHARE IF INDIAN AIRLINES



Sources: CAPA India Aviation Outlook FY14

INDIGO

- Indigo is the only Indian carrier running in profits. The company registered sales of Rs. 11,117 crore for FY 2014, a growth of 11.7% as compared to FY2013. The net profit was Rs. 317 crore. The company has registered profit for sixth consecutive year (Sanjai, 2014).
- Use of single type of aircrafts has reduces maintenance cost. Thus, simple but effective operational focus has been useful for the company for smooth operations and cost savings. The focus on efficiency has allowed company to capture higher market share with lesser number of aircrafts. Indigo has 57 planes as compared to 101 with Jet Airways and 148 with Air India (Prabhakar, 2012).

- The company has debt of Rs 1,738 crore, cash balance of Rs. 5 crore, net worth turned negative at Rs. 1019 crore.
- It was reported in parliament in July that SpiceJet has not paid Rs. 110 crore airport usage charges to the Airport Authority of India (Narasimhan, 2014).
- The financial crisis was reflected in the news reports about failure of the company to deposit the tax deducted from employee's salary and that the employees were not provided form 16.
- It was reported that the promoter Mr. Maran was planning to offload his 53.48% stake in the airline.

- The cash strapped airline-suffered decline of 17.5% in its stock. The company denied any such plan of Mr. Maran to offload his stake. Sanjiv Kapoor, COO of the company wrote to the employees “SpiceJet is no Kingfisher”to contradict such news articles (Narasimhan, 2014).
- The company has dropped at least six destinations since November 2013 to rationalize destinations to improve operational performance.
- The uncertainty about financial feasibility of the airline also affects the employee morale. The company spokesperson informed that their internal survey reveals that 90% of staff believes airline is moving in the right direction.

JET AIRWAYS



- Mr. Naresh Goyal launched Jet Airways in 1993. Jet borrowed \$800 million to finance new aircrafts. The airline started international flights by focusing on nearby destinations in Asia. Later it acquired Air Sahara in 2007 for Rs. 1450 crore. The company has a domestic market share of 22% (Sanjai, 2014).
- After buying Sahara, Jet Airways started facing financial issues. To optimize business operations, Jet Airways sacked 1900 employees in October 2008, after an operational tie-up with Kingfisher.

JET AIRWAYS

- After media outcry and pressure from political establishments, the Chairman Mr. Naresh Goyal has to reinstate the sacked employees, citing the reason that he was not aware of these sackings.
- It also highlighted the lack of possible repercussions by the top management, coordination and communication, poor HR management in the company (Mehra, 2011).

KINGFISHER AIRLINES



- The Airline was grounded in October 2012 and the flying permit was cancelled in December 2012. The court has allowed banks to take possession of property as part of recovery process.
- As part of recovery process, SBI consortium took possession of Kingfisher house, estimated to be worth Rs. 100 crore.
- The banks have outstanding loans of Rs. 6800 crore on Kingfisher Airlines (The Times of India, 2015) The demand of legal representatives before the GRC was turned down by Calcutta High Court.

KINGFISHER AIRLINES



- Mr. Malaya commented “They are making me a bakra (fall guy) because they want to set an example for other defaulters.
- Let them prove me a willful defaulter after hearing me out.
- Then I have recourse to law. What they have done is unsustainable.
- There is natural justice to be followed” (Dhamija, Kurian, 2014)

CHALLENGES FACED BY INDIAN AVIATION INDUSTRY



- Airline industry is suffering from huge debt burden. The industry has a debt of \$15.83 billion (live mint, 2014).
- Airline industry is not able to generate profits and is suffering from losses.
- The industry has lost about \$10.6 billion from 2007-2014 (live mint, 2014). According to the Centre for Asia Pacific Aviation, the industry is expected to record losses of \$1.4 billion in financial year 204-15. High airport charges.

CHALLENGES FACED BY INDIAN AVIATION INDUSTRY



- Airport charges contribute 20% for long distance and 30% for short distance air tickets (Gopinath, 2014). High engineering charges for maintenance.
- The maintenance repair and overhaul (MRO) charges are high, so airlines prefer to go to Abu Dhabi, Jordan, Singapore for MRO.
- The increased MRO charge is passed on to passengers. Policy paralysis.
- The successive governments have failed to frame a policy with a long-term vision for airline industry.

CHALLENGES FACED BY INDIAN AVIATION INDUSTRY



- The airline industry has been left to fend for itself and serve the elite class in select metros.
- The airline industry can be developed to utilize the trained pool of technicians and engineers to create opportunities for manufacturing, MRO, cargo, training and many other allied activities.
- Airline industry should be viewed as a tool of economic growth and job creation.

Privatization of Delhi and Mumbai



Early Steps and Scope

1. Transaction Agreement
2. Pre and Post Bid Events
3. Scoring and Rescoring Criteria/Factors
4. Criterion for GMR's Choice
5. Bid Specific and Other Issues
6. Lessons Learned
7. Post Bid Issues