Aviation

Aviation Management − Introduction

Aviation industry is the business sector that manufactures, maintains, and operates the aircrafts and the airports. When it comes to aviation, there is a broad range of responsibilities within. It comprises activities at the airport as well as in the aircraft. It involves ground duties that are required to perform before the flight takes off, the activities during the flight, and the activities after it lands.

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 avis that literally means bird. Aviation means all the activities related to flying the aircraft.

What is Aviation Management?

Aviation management involves managing the workflow of airline, airport, or other businesses pertaining to aviation or aerospace industry by carrying out the day-to-day operations of an airport or an airline.

A Brief History of Aviation

The original idea of kite-flying from China was the first attempt of humankind to fly some man-made object high into the air. Chinese used kites to send messages, lift humans, measure distances, and test winds during the 5th Century to the 7th Century AD. They also prepared Hot Air Balloons to scare away enemies in the 3rd Century BC. Later during the period of Renaissance, Leonardo Da Vinci studied the flying principles of birds and anticipated that the equal amount of resistance is offered by an object to the air, just as the resistance air offers to the object.

During the 19th and the 20th centuries, the experts around the world experimented continuously and came up with improved flying machines or aircrafts, which were heavier than air and based on the principles of aerodynamics. Most notable names are the Wright Brothers — Orville and Wilbur Wright. According to the Smithsonian Institution and Federation Aéronautique Internationale (FAI), the Wright brothers made the first sustained, controlled, powered, and heavier-than-air fight at Kill Devil Hills, North Carolina on December 17, 1903. Orville Wright took the first flight at 120ft high for 12 seconds.

Major Regulating Bodies in Indian Aviation Industry

The Ministry of Civil Aviation (MoCA) of Government of India is responsible to formulate policies and programs to develop and regulate civil aviation, and to implement the schemes for expanding civil air transport. It also oversees airport facilities, air traffic services, and air carriage of passengers and goods. An Indian regulatory body for civil aviation named The Directorate General of Civil Aviation (DGCA) is under the MoCA. This directorate investigates aviation accidents and incidents.

Important Factors Driving Civil Aviation:

The following are some most important factors that drive civil aviation:

- The Low-Cost Carriers (LCCs), modern airports
- Emphasis on regional connectivity
- Foreign Direct Investment (FDI) in domestic airlines
- Advanced information technology (IT) interventions.

In May 2016, domestic air passenger traffic rose 21.63 per cent from 7.13 million to 8.67 million as compared to the traffic in May, 2015. In March 2016, total number of flights at all Indian airports are recorded as 160,830; which is 14.9 per cent higher than the flights of March 2015.

According to the reports of the Centre for Asia Pacific Aviation (CAPA), by FY2017, Indian domestic air traffic is expected to cross 100 million passengers compared to 81 million passengers in 2015. According to

CRISIL's reports, the airlines of India are expected to record a collective profit of INR 8,100 crore (US$ 1.29 billion) in year 2016.

IT in Aviation:

Aviation is a field that undergoes frequent changes. This industry works 24x7 hence, there is a change in manpower, resources, and the aircrafts too. The information technology is playing an instrumental role in the success of aviation. Right from the simulation software the trainee pilots use, here are some of the various software used by the staff of the aviation industry:

- **Aircraft Maintenance Software** that keeps tracks of on the floor activities of maintenance.

- **Fuel Management Software** that optimizes fuel procurement and reacts to the fluctuations in fuel price.

- **Network and Route Performance Management Software** that anticipates profitable air routes and enables quick decision-making.

- **Catering Procurement Software** that helps to carry out the entire procure-to pay procedure seamlessly.

- **Catering Production Software** that emphasizes minimum waste and maximum customer satisfaction.

- **Flight Information Display System (FIDS)** at the airports works round the clock in real time to display the detailed flights status such that the travellers can get to know the latest information from any corner of the airport as well as on the Internet.

- **Departure Control System (DCS)** works in conjunction with the reservation system to keep the track of check-in travellers and issues boarding passes.

There are numerous mobile apps the customers use for checking flight times, booking flights, redeeming points against fare, and mobile checking-in. Thus, IT plays an important role in ensuring the smooth functioning of aviation operations.

Airline Management

Airline includes its equipment, routes, operating personnel, and their management. Airline provides a regular service of air transport on various routes. It is responsible for booking the tickets for the prospective passengers, taking care of the passengers and their luggage during transit, and transporting them safely to their destination. As the types of duties required to be done are multifield, the airline business is always working round the clock.

What is an Airline?

An organization that owns and operates many aircrafts, which are used for carrying passengers and cargo to different places. The world's first airline named DELAG established on 16th November, 1909. An airline business can be of various sizes and the ownership also varies. For example, it can be privately owned, jointly owned, or publicly owned. It also can be as small as a Domestic or as large as an international airline.

Major Airlines in India

The following are the major Indian airline players in the aviation industry:

- **Public Sector Units (PSUs):** Air India and Pawan Hans.
- **Airlines listed on stock exchange:** SpiceJet, IndiGo, and Jet Airways.
- **Private Airlines:** GoAir, Air Asia, Vistara. Types of Carriers There are two types of airline carriers:
- Low-Cost Carrier (LCC)
- Full-Service Carrier

Comparison between Low Cost and Full-Service Carriers

The following table lists out the differences and similarities between the two carriers:

Factor	**Low-Cost Carrier**	**Full-Service Carrier**

Operating Model	Same	Same
Fare Rates	Lower	Higher
On Board Services	Minimal. Customers are required to pay for food, drinks, or other consumable stuff.	Full service is given to the customer. Food is not on sale but the ticket price is inclusive of the price for food.

A low-cost carrier is an airline that offers lower fares and fewer comforts. These airlines are budget airlines. They make up for the loss borne in the ticket fare by offering food or priority boarding on sale. All low-cost carriers reduce cost on comforts and services. Their fares are always lesser than the fares offered by their legacy counterparts. LCCs target urgent travellers and Budget travellers who are mostly price-concerned.

Organizational Structure of an Airline

Airline, as any other business calls for teamwork from its personnel. As we see in the diagram given below, there are various responsibilities the airline staff needs to carry out and the structure is indeed like that of a big elephant.

Cockpit Positions in Flight

The personnel working in the cockpit or flight deck are:

- **Pilot:** The highest-ranking member of the aircrew, designated as Pilot-in Command.

- **First Officer:** He is a pilot who is not the chief pilot.
- **Second Officer:** He works as a relief pilot and also performs selected duties.
- **Flight Engineer:** He is responsible for flight systems and fuel. Today, the position is diminished and his position is typically crewed by a dual-licensed Pilot and Flight Engineer.
- **Airborne Sensor Operator:** He gathers information from airborne platforms.

Today, the duties of the Flight Navigator and the Radio Operator are performed by Captain or FO of the flight under dual licensing due to the aid of modern-age navigation and radio systems.

Cabin Positions in Flight

The personnel working in the cabin are

- **In-Flight Service Manager:** This manager is a team lead of the rest of the cabin crew.
- **Flight Attendant:** They are responsible for assisting the passengers and their safety.
- **Flight Medic:** A para-medic officer employed on flying ambulance.
- **Loadmaster:** For cargo aircrafts, he is responsible to load the goods and check the weight and balance before and after the loading.

The Air Transport Industry

Air transport is the fastest means of movement from one place to the other. It has reduced distances by minimising the travel time. Air transport in India made a beginning in 1911 when airmail operation commenced over a little distance of 10 km between Allahabad and Naini. But its real development took place in post-independent period. The Airport Authority of India is responsible for providing safe, efficient air traffic and aeronautical communication services in the Indian Air Space.

Air transport is the fastest means of movement from one place to the other. It has reduced distances by minimising the travel time. It is very essential for a vast country like India, where distances are large and the terrain and climatic conditions are diverse. Air transport in India made a beginning in 1911 when airmail operation commenced over a little distance of 10 km between Allahabad and Naini. But its real development took place in post-independent period. The Airport Authority of India is responsible for providing safe, efficient air traffic and aeronautical communication services in the Indian Air Space. The authority manages 125 airports. The air transport in India is managed by two corporations, Air India and Indian Airlines after nationalisation. Now many private companies have also started passenger services.

Air India

Air India provides International Air Services for both passengers and cargo traffic. It connects all the continents of the world through its services.

History of Indian Airlines

- 1911 – Air transport in India was launched between Allahabad and Naini.
- 1947 – Air transport was provided by four major companies namely Indian National Airways, Tata Sons Limited, Air Services of India and Deccan Airways.
- 1951 – Four more companies joined the services, Bharat Airways, Himalayan Aviation Limited, Airways India and Kalinga Airlines.
- 1953 – Air transport was nationalised and two Corporations, Air India International and Indian Airlines were formed. Now Indian Airlines is known as 'Indian'.

In 2010, domestic movement involved 520.21 lakh passengers and about 23 lakh metric tonnes of cargo. Pawan Hans is the helicopter service operating in hilly areas and is widely used by tourists in north-eastern sector. In addition, Pawan Hans Limited mainly provides helicopter services to petroleum sector and for tourism.

Today, Indian aviation industry is dominated by private airlines and these include low-cost carriers, who have made air travel affordable.

• Registration of civil aircraft;

• Formulation of standards of airworthiness for civil aircraft registered in India and grant of certificates of airworthiness to such aircraft

• Licensing of pilots, aircraft maintenance engineers and flight engineers, and conducting examinations and checks for that purpose;

• Licensing of air traffic controllers

• Certification of aerodromes and CNS/ATM facilities;

• 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;

• Conducting investigation into accidents/incidents and taking accident prevention measures including formulation of implementation of Safety Aviation Management programmes.

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;

• Coordination at national level for flexi-use of air space by civil and military air traffic agencies and interaction with ICAO for provision of more air routes for civil use through Indian air space;

• Keeping a check on aircraft noise and engine emissions in accordance with ICAO Annex 16 and collaborating with the environmental authorities in this matter, if required;

• Promoting indigenous design and manufacture of aircraft and aircraft components by acting as a catalytic agent;

• Approving training programmes of operators for carriage of dangerous goods, issuing authorizations for carriage of dangerous goods, etc.

International Organizations

ICAO in International Air Transportation

International body comprising Governments of various Countries

The International Civil Aviation Organization (ICAO)

The International Civil Aviation Organization (ICAO) is aspecialized agency of the United Nations. It codifies the principles and techniques of international air navigation and fosters the planning and development of international air transport to ensure safe and orderly growth. Its head quarters are located in the Quartier International of Montreal, Quebec, Canada. ICAO is formed on 4^{th} April 1947, but India is a member of ICAO in 1^{st} March 1947. The head of the ICAO is Mr. Raymond Benjamin.

The ICAO council adopts standards and recommended practice concerning air, navigation, it's infrastructure, flight inspection, prevention of unlawful interference and facilitation of border-crossing procedures for international civil aviation. Additionally, it also defines the protocols for air accidents investigation followed by transport safety authority in countries signatory to the convention on International Civil Aviation in respective countries

Aims of ICAO

"The Aim is to develop the principles and techniques of International air navigation and foster the planning and development of International air transport such as Safety, Security, Efficiency, Airworthiness, Registration, Continuity, rule of Law/Aviation Law, Fair Competition, Prevention of economic waste, Standardization"

- Ensure safe and orderly growth of International civil aviation worldwide.
- Encourage the arts of aircrafts design and operation for peaceful purposes.

- Encourage development of Airways, airports and Air navigation facilities.
- Meet the needs of people safe, regular, efficiency and economical airtransport.
- Prevent economic waste caused by reasonable Competition.
- Promote safety of flights and the development of all aspects ofInternational civil aeronautics/air navigation.
- Ensure that the rights of contracting countries are fully respected, avoid discrimination b/w contracting countries and ensure every country hasa fair opportunity to operate international airlines

Functions of ICAO

- Defines the protocols for air accident investigation followed by signatoryagencies of the Convention on International Civil Aviation in respective countries.
- Supervises the standards and practices of air navigation, its infrastructure,Flight inspection, prevention of unlawful interference, and facilitation of border- crossing procedures for international civil aviation.
- To maintain an administrative and expert bureaucracy (the ICAO Secretariat) supporting these diplomatic interactions, and to research new air transportpolicy and standardization innovations as directed and endorsed by governments through the ICAO Assembly, or by the ICAO Council which the assembly elects.
- ICAO also standardizes certain functions for use in the airline industry, such asthe Aeronautical Message Handling System (AMHS). This makes it a standards organization.
- Each country should have an accessible Aeronautical Information Publication (AIP), based on standards defined by ICAO, containing information essential to air navigation. Countries are required to update their AIP manuals every 28 days and so provide definitive regulations, procedures and information for each country about airspace and airports. ICAO's standards also dictate that temporary hazards to aircraft must be regularly published using NOTAMs.
- ICAO defines an International Standard Atmosphere (also known as ICAO Standard Atmosphere), a model of the standard variation of pressure, temperature, density, and viscosity with altitude in the Earth's atmosphere. This is useful in calibrating instruments and designing aircraft. The standardized pressure is also used in calibrating instruments in-flight, particularlyabove the transition altitude.
- ICAO is active in infrastructure management, including communication, navigation and surveillance / air traffic

management (CNS/ATM) systems, which employ digital technologies (like satellite systems with various levels of automation) in order to maintain a seamless global air traffic management system.

Role of ICAO in International Air Transportation

A. International Standards and Recommended Practices

A standard, as defined by the first ICAO Assembly, is "any specification for physical characteristics, configuration, material, performance, personnel, or procedures, the uniform application of which is recognized as *necessary* for the safety or regularity of international air navigation and to which member states *will conform"*.

Standards may thus include specifications for such matters as the length of runways, the materials to be used in aircraft construction, and the qualifications to be required of a pilot flying an international route. A recommendation is any such specification, the uniform application of which is recognized as "*desirable* in the interest of safety, regularity, or efficiency of international air navigation and to which member states will *endeavor to conform."*

The various standards and recommendations that have been adopted by ICAO are grouped into 18 annexes to the Chicago Convention. The aim of most of the annexes is to promote progress in flight safety, particularly by guaranteeing satisfactory minimum standards of training and safety procedures and by ensuring uniform international practices. The 18 annexes are the following:

1. *Personnel Licensing* —licensing of flight crews, air traffic controllers, and aircraft maintenance personnel.
2. *Rules of the Air* —rules relating to the conduct of visual and instrument flights.
3. *Meteorological Services* —provision of meteorological services for international air navigation and reporting of meteorological observations from aircraft.
4. *Aeronautical Charts* —specifications for aeronautical charts for use in international aviation.
5. *Units of Measurement* —dimensional systems to be used in air-ground communications.
6. *Operation of Aircraft* —Part I: International Commercial Air

Transport; Part II: International General Aviation; Part III: International Operations–Helicopters. These specifications will ensure in similar operations throughout the world a level of safety above a prescribed minimum.

7. *Aircraft Nationality and Registration Marks* —requirements for registration and

identification of aircraft.

8. *Airworthiness of Aircraft* —certification and inspection of aircraft according touniform procedures.

9. *Facilitation* —simplification of customs, immigration, and health inspectionregulations at international airports.

10. **Aeronautical Telecommunications** —standardization of communicationsequipment and systems and of communications procedures.

11. **Air Traffic Services** —establishment and operation of air traffic control,flight information, and alerting services.

12. **Search and Rescue** —organization and operation of facilities and servicesnecessary for search and rescue.

13. **Aircraft Accident Investigation** —uniformity in the notification,investigation, and reporting of aircraft accidents.

14. **Aerodromes** —specifications for the design and equipment of aerodromes.

15. **Aeronautical Information Services** —methods for the collection anddissemination of aeronautical information required for flight operations.

16. **Environmental Protection. Vol. I: Aircraft Noise** —specifications for aircraftnoise certification, noise monitoring, and noise exposure units for land-use planning;

Vol. II: Aircraft Engine Emissions—standards relating to vented fuel and emissionscertification requirements.

17. **Security —**specifications for safeguarding international civil aviation againstacts of unlawful interference.

18. **Safe Transport of Dangerous Goods by Air** —specifications for thelabeling, packing, and shipping of dangerous cargo.

B. Air Navigation

It is evident that air navigation covers an extremely broad spectrum of activities,ranging from short take-off and landing airplanes to supersonic transports, fromsecurity questions to the impact of aviation on the environment, from training and operating practices for pilots to the facilities required at airports.

C. Facilitation of International Air Transport

The need to facilitate international air transport—to remove obstacles that would Impede the free passage of aircraft, passengers, crew, baggage, cargo, and mail across international boundaries

D. Regional Planning for Air Navigation

The regional plans specify the air navigation facilities and services that are required, and the locations where they are required, for communications, air traffic control, search and rescue, meteorology, and so on. ICAO's plans for the nine regions are regularly revised or amended to meet the needs of increasing traffic and to take into account technical developments in civil aviation.

It also produces manuals and other documentation to assist states in setting up aviation training programs for flight and ground personnel and offers advice on maintenance and improvement of technical standards.

E. Jointly Operated or Financed Services

Navigational facilities and services must also be provided for air routes traversing the high seas and regions of undetermined sovereignty. The ICAO Council is constitutionally authorized at the request of a member state to "provide, man, maintain, and administer any or all of the airports and other air navigation facilities, including radio and meteorological services, required in its territory for the safe, regular, efficient, and economical operation of the international air services of the other contracting states." The council also may act on its own initiative to resolve a situation that might impair the "safe, regular, efficient, and economical operation" of international air services.

Although ICAO has not yet undertaken the actual supervision of any nation's international air navigation facilities and services, two international agreements are in effect to furnish such services and facilities in parts of the North Atlantic region through so called "joint support" programs.

F. Technical Assistance

In recognition of the importance of the airplane for international and domestic transport in countries where road and railway services are lacking, and as a means of aiding these countries in their social and economic development, ICAO has, from its inception, operated technical assistance programs through UNDP and other UN organs.

Fellowships have been awarded in many fields, including training as pilots, aircraft maintenance technicians, air traffic controllers, radio and radar maintenance technicians, communication officers, airport engineers, electronics engineers, air transport economists, aeronautical information officers, aeronautical

meteorologists, aviation medicine specialists, accident investigation experts, flight operations officers, airport fire officers, and instructors. Major types of equipment provided include air traffic control, radar, and flight simulators; training aircraft; radio communication and radar systems; distance measuring equipment; very high frequency Omni radio ranges; instrument landing systems; non directional beacons; "navaid" flight-test units; airworthiness data-acquisition systems; language laboratories; audiovisual aids; visual approach slope indicator systems; and firefighting vehicles.
Major training institutions assisted by ICAO include civil aviation training centers in Egypt, Ethiopia, Gabon, Indonesia, Kenya, Mexico, Nigeria, Singapore, Thailand, Trinidad and Tobago, and Tunisia.

G. International Conventions Prepared Under ICAO

The increasing number of incidents of unlawful interference with civil aviation, beginning in the 1960s—aircraft hijacking, the placing of bombs on board aircraft, and attacks on aircraft, passengers, and crew members at airports—led to the adoption of three conventions.

- *The Tokyo Convention of 1963.*
- *The Montreal Convention of 1971.*
- *The Warsaw Convention of 1929.*

IATA- International Air Transport Association

IATA is the world organization of Scheduled Airlines of all Countries

History

The **International Air Transport Association** is a trade association of the world's airlines. Consisting of 290 airlines, primarily major carriers, representing 117 countries, the IATA's member airlines account for carrying approximately 82% of total Available Seat Miles air traffic. IATA supports airline activity and helps formulate industry policy and standards. It is headquartered in Montreal, Quebec, Canada with Executive Offices in Geneva, Switzerland.

IATA was formed in 19 April 1945 in Havana, Cuba. It is the successor to the International Air Traffic Association, which was formed in 1919 at The Hague, Netherlands. At its founding, IATA consisted of 57 airlines from 31 countries. Much of IATA's early work was technical and it provided input to the newly created International Civil Aviation Organization (ICAO), which was reflected in the annexes of the Chicago Convention,
Aviation grew rapidly over the following decades and IATA's work duly expanded.

The Aims of IATA

- It promotes safe, regular and cost-effective air transport for the benefit of the global passengers, to promote air traffic and to learn about the problems associated with it.
- To provide means for collaboration among the air transport enterprises engaged directly or indirectly in international air transport service.
- To cooperate with the International Civil Aviation Organization (ICAO) and other global associations/International organizations.
- Helps to maintain cooperation between air travel companies through global air travel services.

Functions of IATA

- It simplifies travel and shipping processes while keeping the costs low.

Passengers can make one-way calls to order tickets. Besides, they can pay in one currency, and use the tickets in multiple countries on several flights.

- IATA assigns three-letter and two-letter codes to airport and airlines respectively, which are commonly used worldwide.
- IATA also runs the billing settlement plan, whish $300 billion-plus financial system that looks after airline money. And it provides a number of business intelligence publications and services.
- IATA regulates the shipping of dangerous goods and publishes the IATA Dangerous goods Regulations manual (DGR)
- Simplifies the Business launched in 2004, Initiative introduces a number of crucial concepts of passenger travel, including the electronic ticket and Bar-coded boarding pass. Many more innovations are being established as part of the fast travel initiative, including a range of self-service baggage options.
- In 2003, the IATA Operational Safety Audit (IOSA) was launched with the aim to serve as a standard and worldwide recognized certificate of airlines operational management.
- It enables the airline to operate safe, effective and efficient under clear guidelines.
- It ensures that all airlines are well-educated about the complexity of the airline industry.
- Acts as an intermediary between the airlines and passengers and cargo agents through applied service standards and centralized financial systems.
- It acts as the global air transport industry that links between the government and the public. Hence, it represents a global organization.
- On behalf of the government, it negotiates the global airfare and maintains the airfare agreement
- It ensures high standards of efficient operation by airlines and their agents everywhere.

- Travel agent accreditation is available for Travel Professionals. Full accreditation allows agents to sell ticket on behalf of all IATA member airlines. Cargo agent accreditation is a similar program IATA/IATAN ID card is globally recognized industry credential for travel professionals.

Role of IATA

IATA is the trade association of the global airline industry.

- IATA has current 290 members account for 82% of global air traffic. Since IATA creation in 1945 and they have supported the development of the commercial standards upon which the global air transport industry is built.
- IATA assists airlines and air travelers by simplifying processes and increasing passenger convenience while reducing costs and improving efficiency. We also accredit travel agents to sell tickets on behalf of our members
- IATA role begins only after the completion of the negotiations on traffic and other rights (air service agreement) by the governments. Once the process of authorization furnishes an airline to perform air services, the activity of the association spreads through most phases of air transport operations.

Safety

Safety is the foremost priority for IATA. The main instrument for safety is the IATA Operational Safety Audit (IOSA). IOSA has also been mandated at the state level by several countries. In 2017, aviation posted its safest year ever, surpassing the previous record set in 2012. The new global Western-built jet accident rate became the equivalent of one accident every 7.36 million flights. Future improvements will be founded on data sharing with a database fed by a multitude of sources and housed by the Global Safety Information Center. In June 2014 the IATA set up a special panel to study measures to track aircraft in flight in real time. The move was in response to the disappearance without trace of Malaysia Airlines Flight 370 on 8 March 2014.

Security

Aircraft are susceptible to hijacking and terrorism incidents. After many types of such cases and the 9/11 attacks in the US, Following a series of uncoordinated rules by different countries, the industry has developed a Checkpoint of the Future, which is based on risk assessment and passenger differentiation techniques.

Simplifying the Business

Simplifying the Business was launched in 2004. This initiative has introduced a number of crucial concepts to passenger travel, including the electronic ticket and the bar-coded boarding pass. Many other innovations are being established as part of the Fast Travel initiative, including a range of self-service baggage options. An innovative program, launched in 2012 is New Distribution Capability This will replace the pre-Internet EDIFACT messaging standard that is still the basis of the global distribution system /travel agent channel and replace it with an XML standard. This will enable the same choices to be offered to high street travel shoppers as are offered to those who book directly through airline websites. A filing with the US Department of Transportation brought over 400 comments

Environment

IATA members and all industry stakeholders have agreed to three sequential environmental goals:

- An average improvement in fuel efficiency of 1.5% per annum from 2009 through 2020.
- A cap on net carbon emissions from aviation from 2020 (carbon-neutral growth).
- A 50% reduction in net aviation carbon emissions by 2050 relative to 2005 levels.

At the 69th IATA annual general meeting in Cape Town, South Africa, members overwhelmingly endorsed a resolution on "Implementation of the Aviation Carbon-Neutral Growth (CNG2020) Strategy."

- The resolution provides governments with a set of principles on how governments could establish procedures for a single market-based measure (MBM) and integrate a single MBM as part of an overall package of measures to achieve CNG2020. IATA member airlines agreed that a single mandatory carbon offsetting scheme would be the simplest and most effective option for an MBM.

Services

IATA provides consulting and training services in many areas crucial to aviation. Travel Agent accreditation is available for travel professionals. Full accreditation allows agents to sell tickets on behalf of all IATA member airlines. Cargo Agent accreditation is a similar program. IATA also runs the Billing and Settlement Plan, which is a $300 billion-plus financial system that looks after airline money and it provides a number of business intelligence publications and services. Training covers all aspects of aviation and ranges from beginner courses through to senior management courses. IATA manages the Ticket Tax Box Service (TTBS), a databaseof taxes for airlines.

Strategic partners

IATA's Strategic Partners are aviation solution providers who, through their workwith various IATA work groups, help build and maintain relationships with key industry stakeholders and work with IATA in serving the air transport industry.

Publications - standards

A number of standards are defined under the umbrella of IATA. One of the most important is the IATA DGR for the transport of dangerous goods (HAZMAT) by air.

Carrier Codes and Names

These are the carriers currently tracked in ASQP:

IATA Code	ICAO Code	Air Carrier Name
ZW	AWI	Air Wisconsin
AS	ASA	Alaska Airlines

G4	AAY	Allegiant Air LLC
AA	AAL	American Airlines
C5	UCA	Champlain Air
CP	CPZ	Compass Airlines
DL	DAL	Delta Air Lines, Inc.
EM	CFS	Empire Airline
9E	EDV	Endeavor Air
MQ	ENY	Envoy Air
EV	ASQ	ExpressJet Airlines
F9	FFT	Frontier Airlines, Inc.
G7	GJS	GoJet Airlines
HA	HAL	Hawaiian Airlines Inc.
QX	QXE	Horizon Air
B6	JBU	Jetblue Airways Corporation

OH	JIA	Jetstream Intl
YV	ASH	Mesa Airlines, Inc.
KS	NLA	Penair
PT	PDT	Piedmont Airlines
YX	RPA	Republic Airlines
OO	SKW	Sky west Airlines
WN	SWA	Southwest Airlines
NK	NKS	Spirit Airlines, Inc.
AX	LOF	Trans State
UA	UAL	United Airlines, Inc.

Evolution of Hub & Spokes

Introduction to a Hub and Spoke cartel

The Hub and Spoke cartel arrangement is gaining prominence in markets. It functions in the disguise of legal arrangement. It consists of three main components:

1. A Hub (facilitator)
2. Spokes (horizontal players/competitors)
3. A Rim (a vertical agreement)

- **Hub**

A hub is the facilitator of indirect coordination between competitors. Each of the competitors has a vertical arrangement with the hub. Therefore, suppliers or retailers usually act as the hub.

- **Spokes**

The spokes are the individual competitors engaged in identical or similar business. The number of spokes in the arrangement makes it impossible for the horizontal players to have coordination with each of the players in the market. Therefore, there is no direct communication between spokes in the cartel.

- **Rim**

All the spokes have an agreement with the hub in a Hub and Spoke cartel which keeps every member of the cartel bound together to the hub. This agreement is the rim of the arrangement. A Hub and Spoke cartel cannot be established without identifying the rim. Individual spokes can be prevented from contravening or exiting the cartel arrangement through the rim. The rim stands as the pillar upon which the collusion of the members of the cartel stands. The spokes will not agree to a Hub and Spoke cartel if all the spokes are not bound by the rim.

Objective and functioning of the arrangement

Essentially, the Hub and Spoke cartel is created to deliver super-normal profits to the members, viz. hub and spokes. It kills the competition on the level of the market whose players are the spokes. In order to solve the problem, we have to understand the conditions in which such arrangements thrive.

At its core, the objective of the arrangement is to get profits without difficulties. Therefore, a market where there is intense competition between market players, and there exists a supplier/retailer market power, then the conditions are conducive to form a Hub and Spoke cartel. If there is no market power in the supplier's side or the distributors side, then formation of a Hub and Spoke cartel is less likely, because in addition to providing super-normal profits, the arrangement must also make other options less profitable. Elimination of other possibilities will further strengthen the possibility to create the cartel.

Primarily, the cartel functions with exchange of vital and confidential information of the competitors through the hub. The competitors pass certain information like prices, sales, customers, margins, etc. to the hub during their market dealings. This information is passed on to the other competitors by the hub during their separate market dealings. The communication happening is between a hub and a spoke, i.e., between a supplier and a distributor, which is completely legal. The hub, then, convinces the competitors to enter into the cartel by taking assurance from other competitors and ensuring cooperation by every competitor in that arrangement. Thus, the competitors agree to enter the Hub and Spoke cartel. The incentive to the hub is the increase in margin post formation of a cartel. The incentive to the spokes is the decrease in competition and increase in margins. Therefore, everyone profits from this arrangement, while efficiency, innovation and competition suffer.

Economic and legal assessment

There can be two types of assessment of the Hub and Spoke arrangement: economic assessment and the legal assessment.

Economic assessment will pertain to factors, namely:

1. Prices;
2. Market structure

Legal assessment will consider the following factors, based on the provisions under Section 3 of the Competition Act:

1. Information exchange;
2. Vertical agreements, for example, Resale Price Maintenance agreement;
3. Uniform price rise or other indicators.

Economic Assessment

- **Prices**

The price of the product/service can be an indicator of collusion between the competitors. For instance, the identical or similar selling price of the product indicated by the competitors, which is abnormally higher than the cost price or manufacturing costs of that product, is a signal that the competitors have jointly decided the price. If the margins obtained by the competitors are big and no one in the market endeavours to sell the product/service at a lower price, then there is a strong likelihood of collusion between the competitors.

- **Market Structure**

Presence of a conducive market structure is necessary to infer the likelihood of presence of a Hub and Spoke cartel. The Hon'ble Supreme Court had held in Rajasthan Cylinders and Containers Ltd. vs Union of India, that parallel pricing alone will not indicate collusion, if the market structure does not support a collusion. Therefore, market structure is essential for the inference of the presence of the cartel. Based upon the market players, a market can be said to be either concentrated or fragmented. If a large part of the market share is handled by a few players, then it is a concentrated market. If the market share is smaller and similarly divided amongst many players, then it is a fragmented market.

If both markets, supplier and retailer markets, are fragmented, then there is less chance of the cartel formation. If at least one of the markets is concentrated, the cartel can be initiated by the competitors in the fragmented market or induced by the market power in the concentrated market. Therefore, there is a requirement of market power to create the cartel.

Therefore, based upon the above observations, the following basic scenarios can be ascertained:

1. A supplier responds to the calls of the distributors/retailers to stabilize or increase the retail prices;
2. The supplier initiates the collusion in order to pass on increase in costs;
3. The suppliers collude through a retailer;
4. A powerful retailer initiates and promotes the collusion on the supplier level.

Further analysis of the existence of a Hub and Spoke cartel can be made through legal assessment.

Legal Assessment

- **Information Exchange**

In many cases, the CCI has considered exchange of confidential information between competitors as a sign of collusion. But, exchange of information between a supplier and a retailer is part of the business, and thus cannot be considered as suspicious. But, if all the spokes share confidential information with the hub, there is a possibility of coordination amongst competitors indirectly.

- **Vertical Agreement**

The next process to set up the arrangement is the signing of vertical agreements. After confidential information is shared, a particular system is agreed between the competitors through the hub and a vertical agreement is signed by each of the spokes individually with the hub. A vertical agreement, in essence, is not held per se anti-competitive. But, such kinds of vertical agreements are held as anticompetitive per se because they indirectly implement a horizontal agreement, which are presumed to be anti-competitive. This vertical agreement forms the rim of the hub and spoke cartel.

If any spoke does not abide by the agreement, then others can coerce him through the hub. Thus, compliance is ensured by the agreement.

- **Uniform and sudden price rise or other indicators**

In course of performing the agreement, a uniform and concerted change is observed in the market, e.g., price rise, decrease in supply etc. This is the last part of the puzzle of the existence of a Hub and Spoke cartel.

Background of Hub and Spoke cartel in India

The Competition Act prohibits anti-competitive agreements of two types: between competitors, and between enterprises situated at different levels of production chain. The Hub and Spoke arrangement are a hybrid of both, and hence can fall in both or none. Horizontal agreements between competitors engaged in identical or similar business can also lead to cartel formation, which is prohibited under Section 3. A Hub and Spoke cartel, on the other hand, is formed when a facilitator, mostly a vertical component in the production chain, creates an arrangement with each of the horizontal competitors. This leads to indirect coordination between competitors, which thus makes it difficult to be identified and proven.

In India, a Hub and Spoke cartel can be punished through indirect application of provisions under Section 3(3) and 3(4), by proving horizontal and vertical arrangements. The jurisprudence of the Hub and Spoke cartel in India has not developed fully, unlike the case in the US and Europe antitrust jurisdictions. Therefore, it is important to analyse the jurisprudence in those antitrust jurisdictions in the matter of Hub and Spoke cartels, to implement them in the Indian cases.

Indian cases for reference

In case no. 37/2018, **Samir Agrawal vs. ANI Technologies Pvt. Ltd. (Ola), Uber India Systems Pvt. Ltd. (Uber) and others** the CCI came across an information where the informant alleged the formation of a Hub and Spoke cartel between the opposite party (hub) and the cab/auto drivers (spokes). The OPs operate as platforms through a mobile application which allows commuters and drivers (two sides of the platform) to interact. The fare is calculated by the algorithm based on many factors, including the expected time and distance. The Informant submitted that due to algorithm pricing, riders are not able to negotiate fares with individual drivers for rides matched through the app nor drivers are able to offer any discounts. Therefore, the Informant alleged the following:

- That the OPs act as Hub where Spokes (competing drivers) collude on prices;
- That the pricing algorithm of the OPs artificially manipulates supply and demand, which guarantees higher fares to drivers who would otherwise compete against one another on price and would not be able to command such high prices;
- That the OPs and the drivers do not share any agency/employee relationship, therefore, they do not function as a single economic entity, and as such the cooperation between the drivers and the OPs constitute 'concerted action' under Section 3(3)(a) read with Section 3(1) of the Competition Act.
- That the OPs and the drivers are in a vertical relationship wherein OPs impose Resale Price Maintenance agreement.

The CCI rejected the allegation of the Informant that there was a Hub and Spoke cartel between OP and drivers. The CCI observed, "The pricing did not appear to be similar to the 'Hub and Spoke' arrangement as understood in the traditional competition parlance. Generally, spokes use a hub for exchange of sensitive information, including information on prices which can facilitate price fixing. For a cartel to operate as a hub and spoke, there needs to be a conspiracy to fix prices, which requires the existence of collusion in the first place. In the present case, the drivers may have acceded to the algorithmically determined prices by the platform, this cannot be said to amount to collusion between the drivers. A hub and spoke cartel would require an agreement between all drivers to set prices through the platform, or an agreement for the platform to coordinate prices between them."

Here it is submitted that the CCI came to a correct conclusion that collusion between the drivers was absent. The drivers did not ensure whether other drivers agreed to the arrangement, before entering the agreement with the OPs. Furthermore, the drivers did not earn super-normal profits nor they suffered losses through this arrangement, i.e. no expense no gain expected in a Hub and Spoke cartel. The prices of the ride had to be minimized by the OPs due to intense competition between them. Hence, certain vital features of a Hub and Spoke cartel were missing in this case.

In another case between **Builders Associations v. Cement manufacturers Association and Or's.** (Case no. 29/2010), wherein the trade association facilitated the cement companies to meet, exchange business information, including prices of other companies, divide their market zones and collusively fix prices. The CCI observed that the cement companies coordinated indirectly through the trade association, and held their practices as anti-competitive.

This cannot be an example Hub and Spoke cartel due to only one reason, viz. the trade association did not form a part of the market. The CCI did not notice and identify such an arrangement as a Hub and Spoke cartel. However, still, the Act does not specify, define and provide for a Hub and Spoke cartel.

Legal Regime in Foreign Jurisdiction

- **US**

The legal regime in the US can be observed through some Hub and Spoke cartel cases:

In the US, Interstate Circuit was one of the largest exhibitors of motion pictures. Amongst the exhibitors there were two types: first-run theatres and second-run theatres. Interstate Circuit operated both of them. Second-run theatres are those which exhibit the movies sometime after release in the first-run theatres. Therefore, the price of a ticket was less in them. The intense competition amongst second-run theatres caused great difference between the prices of a first-run theatre and a second-run theatre. This caused loss in sales of first-run theatres of Interstate Circuit. Therefore, it made an agreement with the distributors that they should require second-run theatres to charge no less than 25 cents for showing their movies, and if the distributors don't comply, Interstate Circuit threatened not to show the distributors' movies in its theatres. The agreement could work if most distributors adhered, as, otherwise, (i) an adhering distributor would lose sales to its non-adhering competitors, and (ii) Interstate Circuit's threat would not be credible, as retaliation against too many distributors would be costly and thus, unrealistic. Interstate Circuit acting as a hub, managed to bring the distributors to agree with the plan to raise the prices of the competing second-run theatres, thus limiting competition, without any direct communication actually having occurred amongst the distributors. The US Supreme Court held in this case:

"Acceptance by competitors [i.e. the upstream distributors], without previous agreement, of an invitation to participate in a plan the necessary consequence of which, if carried out, is restraint of interstate commerce is sufficient to establish an unlawful conspiracy under the Sherman Act."

- **Other jurisdictions (Estonia – the vodka cartel)**

In 2017, the Estonian competition agency had obtained a binding court decision that imposed fines on a hub and spoke cartel of the four major retailers in the country, which accounted for two thirds of the market. One major supplier was the hub through whom the retailers agreed to increase the retail price of the lower priced vodkas to or above a specified minimum price. The hub facilitated all communication between the retailers. According to the findings of the Estonian competition agency, the prices rose by 15.7% and therefore, spill over effects to lower priced vodkas of other suppliers were observed.

In one of the emails of a retailer: "*the parties involved had an opportunity to earn more money by just replacing a number of price tags, which in effect amounts to all of the "expense" of the participation in a cartel.*"

Conclusion

In the current market scenario, with the advent of e-commerce enterprises, newer concepts of price algorithms, price sharing platforms, across platform parity agreements, most favoured nation clauses, etc. are coming forward which can perpetrate Hub and Spoke cartels and thus, all raise anti-competitive concerns. APPAs and MFNs have been held as anti-competitive by US and European jurisdictions. Price algorithms have been held as horizontal price fixing arrangements by Luxembourg's competition authority. In India, as cases will come before the CCI, the jurisprudence will develop in this area. As developments in the market occurs, the law makers must make appropriate amendments to make the laws abreast with the market conditions.

Thus, much development is required in the Indian competition legal regime to tackle menaces like Hub and Spoke cartels efficiently, and it is important to learn from the cases and experiences of the foreign antitrust jurisdictions to develop our own regime.

Facilities to the passengers

1. Providing assistance in clearing airport formalities and to escort check-in and immigration counter (for International Terminal Building)

2. Providing Porterage Services and assistance with baggage

3. Providing assistance for arranging transport, hotel/motel/guest house booking

4. Providing assistance in arranging reservation/purchase of tickets.

5. Baggage wrapping service using state of the art technology is available in the city side as well as the check in area of International Terminals.

6. Duty free shops are located both in the Arrival & Departure of International Terminals.

7. Retiring facility is not available due to ongoing Chennai Airport Modernization Phase II works. Inconvenience is regretted.

8. Simply drop your check in baggage at the baggage drop counter of respective airlines on utilizing the self-check-in facility available in the Departure Hall of Domestic & International Terminals. You can select seats and print your boarding pass using this facility.

9. Free Wi-Fi facility is available for 45 minutes for passengers at Domestic & International Terminal. To connect to free wi-fi service, passengers should provide their mobile numbers as login id's. Once connected, this service enables the passengers to access the net. This service requires a valid Indian Mobile number and after the free time the same can be extended on payment.

10. Passenger can place a request to concerned airline for a wheelchair while booking tickets or can also contact the airline ticketing counter after reaching the airport for the same

At the Airport, AAI has provided,

- Ramps for seamless movement of wheelchairs.
- Braille symbols and auditory signals in the lifts for visually impaired.
- Differently-abled friendly toilets.
- Ambulift services on payment basis.
- Free telephone facility is also available on the cityside of the both the Terminals with the contact numbers of airlines.

10. Smoking lounge facility is available at the Security Hold Area of both International & Domestic Terminals.

11. Prayer room is available in the Security Hold Area at International Terminal for the convenience of passengers.

12. Both passengers & visitors can avail the facility of postal service at the Airport. Counter is conveniently located at Domestic Departure level. The postal services are available 10:00 hrs – 18:00 hrs from Monday to Saturday.

13. Free battery-operated vehicles and courtesy coaches offering shuttle service for the convenience of transit passengers between Domestic & International terminals.

14. Child care rooms are available at Domestic (5nos.) & International (2nos.) Terminals for providing essentials to the child/infant such as feeding, changing diapers etc.

Procedure at airport

1. Arrive in the right spot — and at the right time: Follow the signs at your respective airport to make sure you find the correct terminal building for your flight. Most airlines recommend that you arrive at the airport at least two hours before departure for domestic flights and three hours for international flights. You'll hear all sorts of advice about whether you need to be there that early, but it's a good general rule. There are several reasons why you might need extra time:

- **Are you checking a bag?**
- **Are you parking at the airport?**
- **Do you have TSA Precheck or Global Entry?** These security pre-clearances can make it faster to get through security at the airport. If you don't have one of these, keep in mind that you might have to wait in line longer, and budget ahead of time to accommodate the potentially long queues.

2. Check in: Once you enter the airport, the first thing you should do is check in (if you haven't done so already online).
Many airlines allow you to check in online 24 hours before your flight. If you're not checking a bag, this is a great option because it allows you to download a mobile boarding pass to your phone to bypass check-in and head for security.

3. Go through the security checkpoint: Once you've checked your luggage and gotten your boarding pass, you should go to the TSA checkpoint leading to the proper concourse for your flight.

4. Find your gate: Once you’ve been cleared through security, follow the signs to your gate. It should be listed on your boarding pass, but the most up-to-date information can be found on departure monitors throughout the airport.

5. Wait at the gate: Now, depending on how much time you have before the boarding time listed on your boarding pass (usually 30 minutes to an hour before your departure time), you may have some time to kill. This is the time you can use to grab food or shop at the establishments inside the concourse. Some travellers also use this time to go to the bathroom or refill their water bottle. An airline lounge might be a good place to stop if you have a lot of time before your flight.

6. Board the airplane: The last step is to get on board. Wait for your boarding group to be called, which should be listed on your ticket. Most airlines board by a numbered boarding group, and people with elite status and those flying first class usually board in the earlier groups.

7. Retrieve your luggage: Once your plane arrives at your destination, you’ll want to follow the signs to baggage claim to pick up your checked bags. Each flight is assigned a luggage carousel, so check the monitors near baggage claim to find out which one your bag will arrive on. The time you spend waiting for your luggage to arrive can vary, sometimes up to 30 minutes or more.

8. Exit the airport and enjoy your trip: This can be the trickiest part. Each airport has different rules about where to pick up rideshare services. You might need to figure out which level of the airport is designated for ground transportation — meaning buses, shuttles and cars to catch a ride out of the airport. Sometimes, you might be able to take the metro right from the airport to the heart of the city. Follow the signs and ask for help. Your trip is just getting started.