



**GOVERNMENT ARTS AND SCIENCE COLLEGE-  
PAPPIREDDIPATTI**

**DEPARTMENT OF MATHETICS**

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**PROJECT NAME**

**Unlocking Insights Into The Global Air Transportation Network**

**FACULTY NAME**

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# **1 INTRODUCTION**

## **1.1 Overview**

The air transportation network is a complex network which has the properties of small-world networks and scale-free networks. The degree distribution of the nodes displays a heavy-tailed distribution.

The air transportation system generally includes airports, ATS (air traffic control) system, and airlines. The airports represent the ground part of the system's infrastructure handling the aircraft operated by different airlines transporting passengers and freight/cargo shipments.

## **1.2 Purpose**

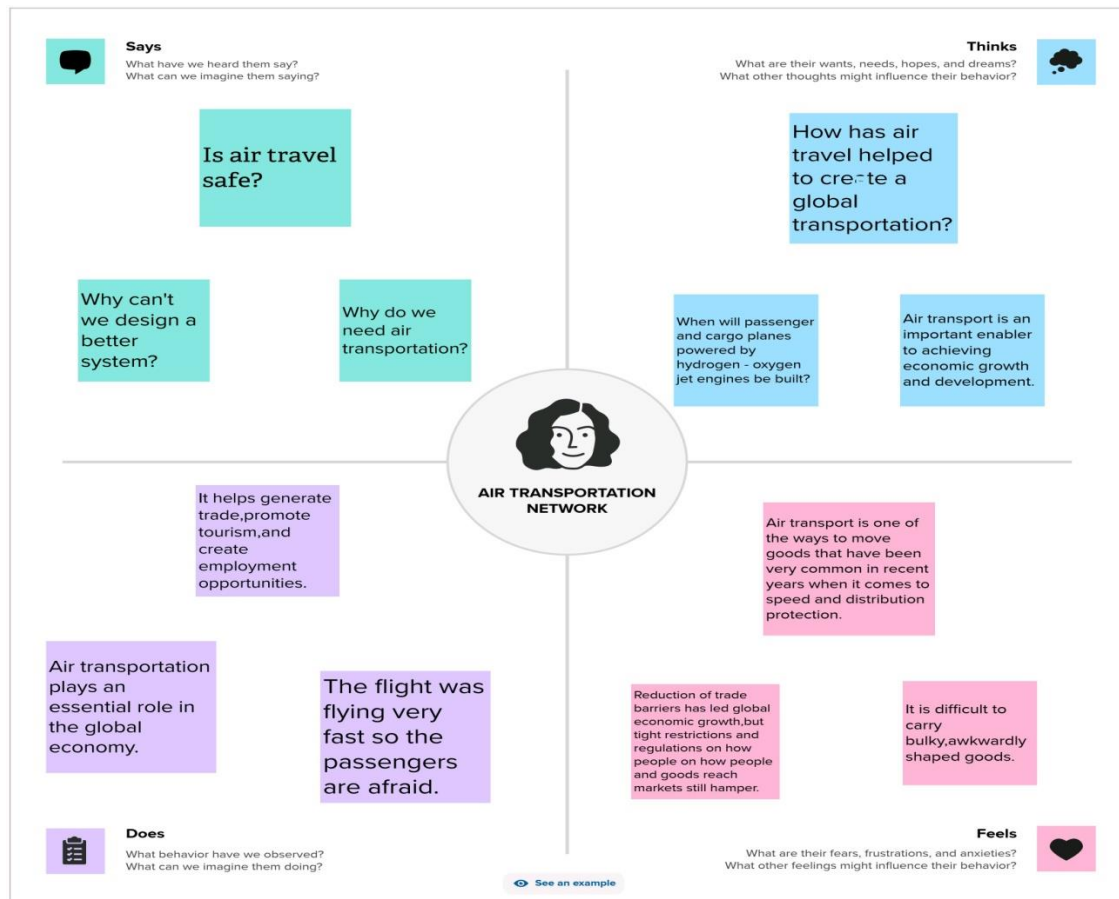
The worldwide air transportation network is responsible for the mobility of millions of people every day. Air transport allows people from different countries to cross

international boundaries and travel other countries for personal, business, medical, and tourism purposes.

## **2. PROBLEM DEFINITION & DESIGN THINKING**

### **2.1 Empathy Map**

The airline could integrate empathy into its dealings with employees and customers by providing additional training and support to its staff to help them better understand and respond to customer needs.



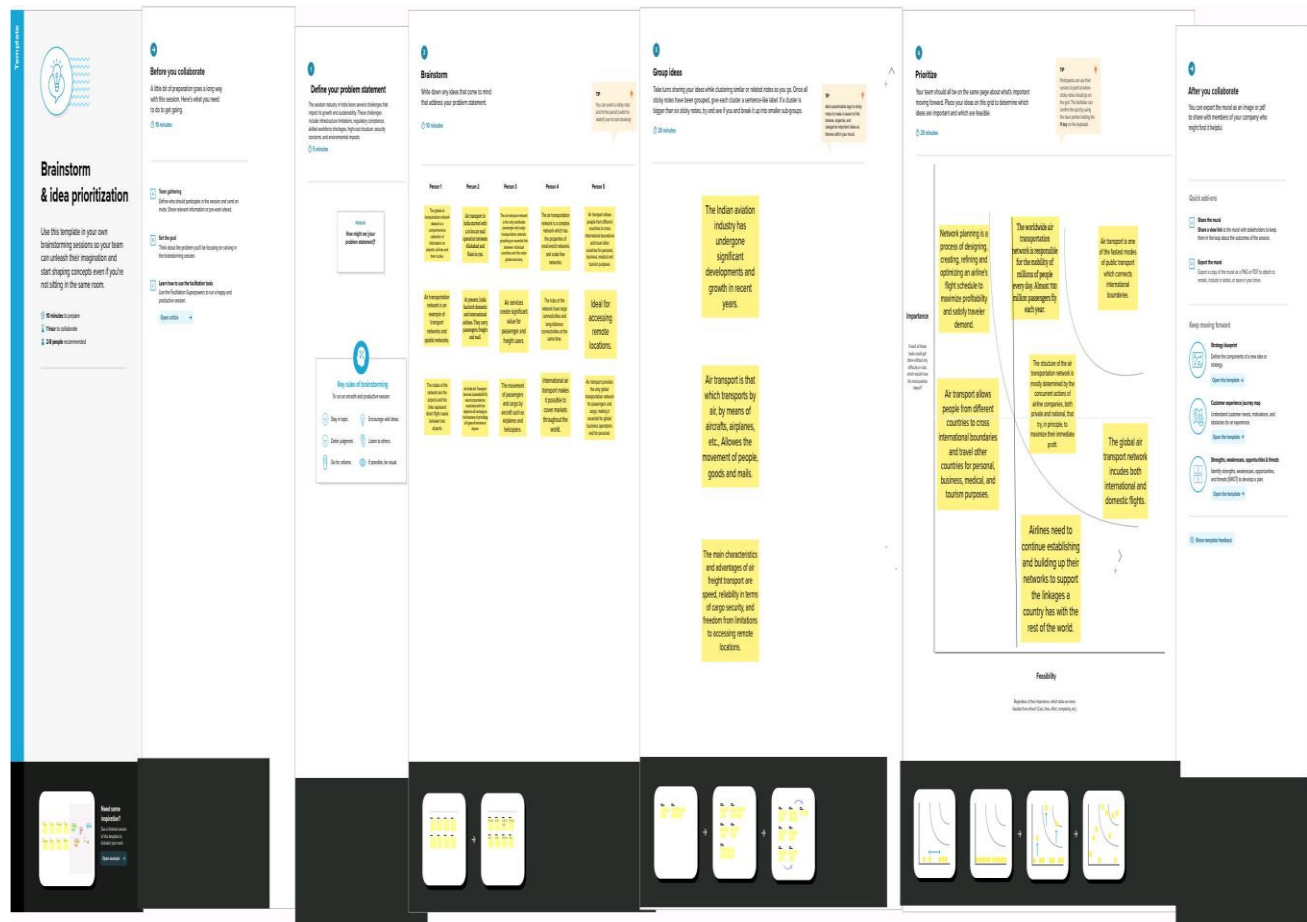
## 2.2 Ideation & Brainstorming Map

Brainstorming is the most common and the most popular ideation technique in almost every industry. The intention of brainstorming is to leverage the collective thinking of the group, by engaging with each other, listening, and building on other ideas.

The importance of air transport lies in its ability as an economic engine to generate and support

jobs, strengthen trade and connectivity between people and countries, promote tourism, and connect remote communities.

It highlights the significant difference in emissions between air travel and ground transportation. The environmental impact of using AI systems, like any technology, depends on various factors, including the energy source used, the efficiency of the hardware, and the benefits derived from their use.



### 3. Results

A word class reputation developed through supporting clients with the acquisition, disposal or refinancing of aviation related assets. Air transport is one of the fastest modes of travel. Aeroplanes can carry people, mail and lightweight goods to distant places in the shortest time possible.

Airports in world map



Country

Gambia

City

Barqu

Country

Gambia

Number of Airports

46

Country

Chile

Airlines within a Country

Airline ID	Name	Icao	Callsign	
891	Atique Chartair	FRQ	CHARTER AFRIQUE	
951	Air Inter Cameroun	ICM	INTER-CAMEROUN	
1611	Cameroun Airlines	UYC	CAM-AIR	
3600	National Airways Cameroon	Null	Null	

Country

Cameroun

Active

N

Number of Airports

46

Country

Chile

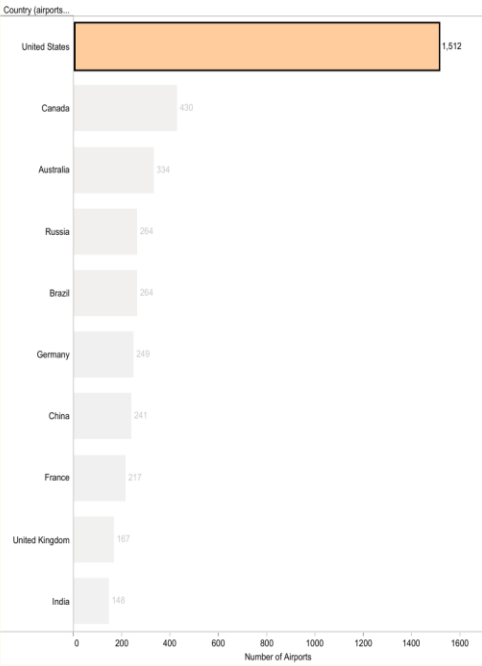


Airport at highest altitude				
Index no.	Airport Name	City	ICAO Code	
1	Karlovy Vary International Airport	Karlovy Vary	LKKV	1,989
	Náměšť Air Base	Namest	LKNA	1,548
	Příbram Airport	Příbram	LKPM	1,529

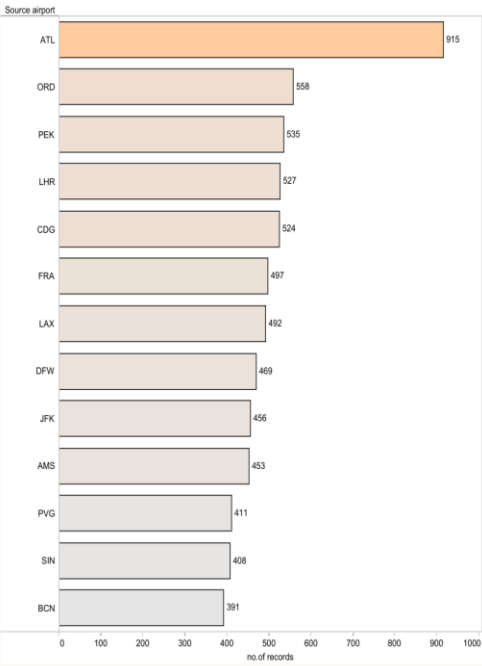
Country
Czech Republic

Airport at Highest Altitude in world				
Airport Name	City	ICAO Code		
Daocheng Yading Airport	Daocheng	ZUDC		14,472
Qamdo Bangda Airport	Bangda	ZUBD		14,219
Kangding Airport	Kangding	ZUKD		14,042
Ngari Gunsa Airport	Shiquanhe	ZUAL		14,022
El Alto International Airport	La Paz	SLLP		13,355
Capitan Nicolas Rojas Airport	Potosi	SLPO		12,913
Yushu Batang Airport	Yushu	ZYLS		12,816
Copacabana Airport	Copacabana	SLCC		12,591
Inca Manco Capac International Airport	Juliaca	SPJL		12,552
Golog Maqin Airport	Golog	ZLGL		12,426

### Country with Maximum number of Airports



### Number of Flights form airport



no. of records  
386 to 915

no. of records  
391 to 915

Number of Airports  
148 to 1,512

## 4. ADVANTAGES & DISADVANTAGES

### Advantages:

**1. High Speed:** Air is the type of freight capable of travelling long distances in short periods of time. This makes this model an optimum choice if the client has an urgent need to ship a product or if their freight demands special standards of protection or acclimation. It is the quickest transport mode and is therefore ideal for long-distance transport of goods. It takes less time.

**2. Fast Service:** Air transportation offers convenient, reliable and fast services of transport. It is considered the cheapest way to ship peregrinated goods. It offers a standard, convenient, reliable and fast service.

**3. There is less need for heavy packaging:** Air exports, in general, entail less hard packaging than ocean shipments. This ensures you save both time and money by not having to provide extra packaging services.

**4. Send almost everywhere your freight:** In regions that are not readily accessible to other modes of transport, air transport is considered to be the only means of transport. Open to all regions, irrespective of land interference. A vast network of airlines covering nearly the whole globe is available for many airlines. This ensures that the package can be sent almost anywhere.

**5. High Standard of Security:** High standard of protection with a low risk of robbery and injury. Shipping by air has a high degree of security since airport safety restrictions on cargo are strictly enforced. Tightly controlled airport controls also minimize cargo theft and loss.

**6. Natural Route:** An aircraft can fly to any location without seeing any natural obstacles or barriers. Since customs formalities are easily complied. It eliminates the need for more time to seek clearance. Air travel is used for relief operations during earthquakes, floods, accidents, and famines.

**Disadvantages:**

1. **Risky:** Air travel is the riskiest mode of transport, since there can be considerable losses to goods, customers and crews as a result of a minor crash. Compared to other means of travel, the risks of collisions are higher.
2. **Cost:** Air travel is considered to be the most expensive means of transportation. The cost of maintaining aircraft is higher and the costs for the building of aerodromes and avions are much higher. That's why air travel is so expensive that it gets beyond ordinary people's grasp.
3. **Some Product Limitation:** There is a whole variety of materials not suitable for such products, from explosive, gases, batteries, fired solids and liquids, which cannot be shipped by air to name but a few.
4. **Capacity for Small Carriage:** The aircraft have no room and therefore are not ideal for carriage of voluminous and cheaper materials. As is seen for rails, the load volume cannot be raised.
5. **Enormous Investment:** Air travel calls for enormous spending in aerodrome building and

servicing. It also calls for professional, qualified and qualified staff that needs a significant investment.

## 5. APPLICATIONS

- The air transport network is a global system of flight operations, connecting thousands of different destinations through both direct services and services via major hub airports. Air transport provides benefits by allowing people and goods to travel from A to B.
- Air transport allows people from different countries to cross international boundaries and travel other countries for personal, business, medical, and tourism purposes.
- By facilitating tourism and trade, it generates economic growth, provides jobs, increases

revenues from taxes, and fosters the conservation of protected areas.

- Air transport is an important enabler to achieving economic growth and development. Air transport facilitates integration into the global economy and provides vital connectivity on a national, regional, and international scale. It helps generate trade, promote tourism, and create employment opportunities.
  
- Airways are one of the most comfortable and fastest modes of transportation. High mountains, deserts, and dense forests are made accessible by air transport. Air transport was nationalized in 1953.
  
- Aviation is the safest and fastest means of transportation, overcoming oceans and borders to connect people and support economic growth. It facilitates tourism, trade, provides jobs, provides a lifeline for remote

communities and enables a rapid response when disasters occur.

## 6. CONCLUSION

The air transport industry is not only a vital engine of global socio-economic growth but is also of vital importance as a catalyst for economic development in most countries and for many regions within each country. Air freight is a fast, flexible, and efficient shipping method that provides business with numerous benefits, including speed, flexibility, efficiency, and reduced risk of damage or loss.

In conclusion, the Indian aviation industry has undergone significant developments and growth in recent years. The expansion of regional connectivity, emergence of low-cost carriers, increased investment in infrastructure, and adoption of technological advancements have all contributed to the growth of the industry. In conclusion, considering the dangers associated with negligence of flight security measures, all

crewmembers must ensure they strictly adhere to the set safety rules, it being the only primary way of minimizing accidents.

## **7. FUTURE SCOPE**

The most recent estimates suggest that demand for air transport will increase by an average of 4.3% per annum over the next 20 years. If this growth path is achieved by 2036 the air transport industry will then contribute 15.5 million in direct jobs and \$1.5 trillion of GDP to the world economy.

The roadmap outlined significant benchmarks to achieve the goal of making India the best-performing centre for aviation by 2040, in addition to expanding the country's aviation industry. The aviation market is anticipated to expand quickly between 2022 and 2029 throughout the anticipated time period.



The forecasts of the vision 2040 document are: The document estimates that India will need 200 airports and an investment of \$40-50 billion to handle at least 1.1 billion passengers flying to, from and within the country.

In the next 5 years, the Indian aviation industry is projected to see Rs 1 lakh crore (\$ 15.52 billion) worth of investments, according to data published by the Department of Industrial Policy and Propaganda (DIPP), by the Government of India.

## 8. APPENDIX

[https://drive.google.com/drive/folders/1RJnbcGxvIVulM3fkZH1Wz3\\_IbLDP2RjY?usp=share\\_link](https://drive.google.com/drive/folders/1RJnbcGxvIVulM3fkZH1Wz3_IbLDP2RjY?usp=share_link)