

Unlocking Insights into The Global Air Transportation Network with Tableau

1. Introduction

1.1 Overview of the project

The global air transportation network is a complex system with numerous interconnected routes, airlines, airports, and passenger flows. Unlocking insights into this network is crucial for understanding travel patterns, optimizing operations, and making informed decisions in the aviation industry. Tableau, a powerful data visualization and analytics platform, provides a valuable tool for exploring and analysing data related to the global air transportation network.

1.2 Purpose of the project

By leveraging Tableau, analysts and industry professionals can gather and analyse a wide range of data points, including flight routes, airline performance, passenger volumes, aircraft types, and airport operations. This data-driven approach allows for a comprehensive understanding of the global air transportation landscape and the factors that influence it.

Tableau's visual analytics capabilities enable users to create interactive dashboards, maps, and charts that provide a clear and intuitive representation of the air transportation network. This visualization not only helps in identifying trends and patterns but also enables the exploration of complex relationships and the detection of outliers or anomalies.

2. Literature Survey

This literature survey aims to provide a comprehensive analysis of the Global air transportation exploring the factors that influence compensation in the field of Aviation. The Air transportation has witnessed significant growth and transformation in recent years, making it crucial to understand the dynamics of routes, airports, airlines and equipment used. This survey will review relevant studies, reports, and articles to explore various factors such as routes, airplanes and active airlines which impact the sector. By analysing existing literature, this survey will contribute to an enhanced understanding of Aviation sector organizations, and policymakers in making informed decisions.

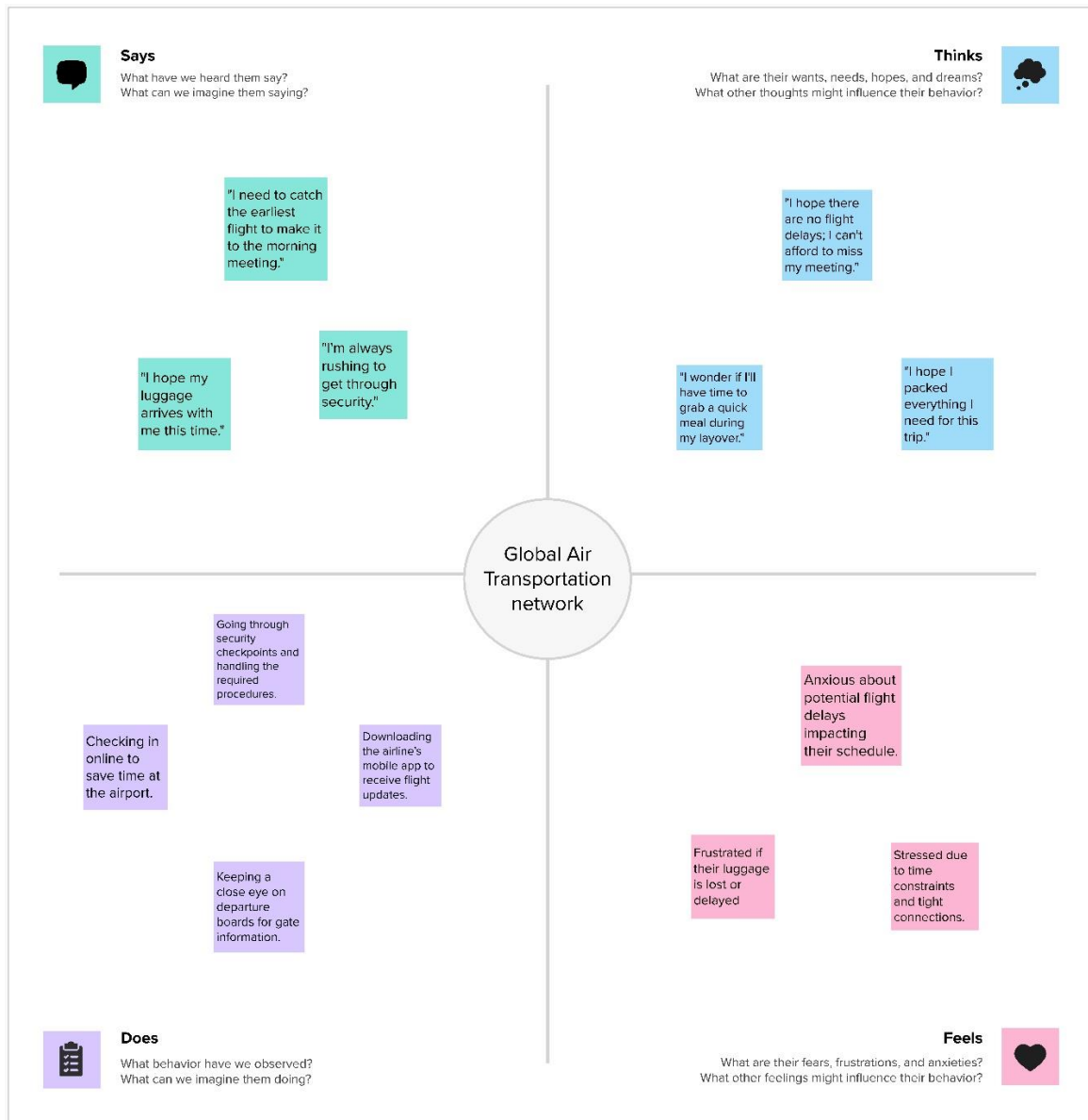
Existing problems and solutions

- Increased connectedness

- Trade and commerce boost economic development and job creation
- Tourism and Travel
- Air travel causes greenhouse gas emissions, noise pollution, and land utilisation
- Accessibility and Inequality
- Public Health and Safety
- Technological Advancements: Aircraft design, artificial intelligence, and automation may affect the global air transportation network.
- GDP growth, currency rates, and fuel costs might affect air travel demand. Airline passenger counts may drop during economic downturns due to lower travel costs.
- Technology may benefit or hurt the aviation sector. Open skies agreements and new safety standards
- Competitiveness, route allocations, and industry costs

3. Project definition & Design thinking

3.1 Empathy Map

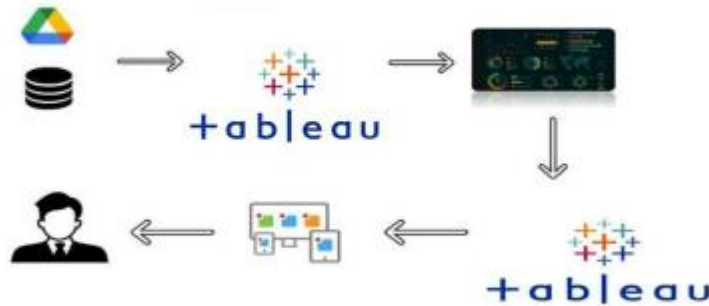


3.2 Ideation and Brainstorming Map



4. Theoretical analysis

4.1 Block Diagram



4.2 Hardware/software requirements

- Windows 7,8,10,11
- Tableau Desktop 2023

4.3.Data Collection & Extraction from Database

- Dataset was collected through google drive link.
- Dataset has 4 sub data sets i.e.airport.csv, routes.csv, airlines.csv, airplanes.csv
- Then dataset was exported to MySQL Database.

5. Result

The results of unlocking insights into the global air transportation network with Tableau can vary based on the specific research objectives and analyses conducted.

1. From the airlines story it is evident that most of airlines which were present in the past were shutdown and not active now ,these happens when airlines cant manage the financial challenges ,market dynamics and high operating costs
2. From the airports story we have seen that mostly the developed countries like us,uk are having maximum number of airports compared to other countries this is

due to Infrastructure and Capacity, Security and Safety, Technological Advancements and Regulatory Compliance

3. With the routes story and dashboard we can see the trends in Usage of equipment by different companies and also codeshare can be detected, airports with most airlines operation can be found

4. From the Airplanes story it is noticeable that most of the planes are in United States than any other country given. And also there are no planes with different count, where all are similar in number.

Dashboard

A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide realtime monitoring and analysis of data, and are typically designed for a specific purpose or use case.

Dashboard 1 : World map showing details of all Airports within a Country.

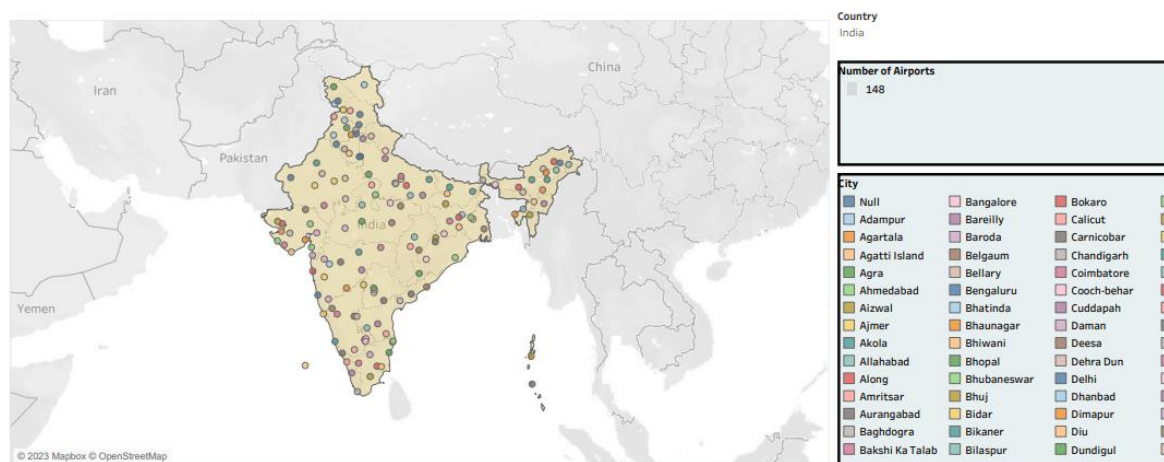


Fig Dashboard 1 : World map showing details of all Airports within a Country.

Dashboard 2 : Airports at Higher altitude within a country & World.

Airport at higher altitude within a country

Name	City	ICAO (airports.csv)		Country
Leh Kushok Bakula R...	Leh	VILH	10,682	India
Sheikh ul Alam Airpo...	Srinagar	VISR	5,429	
Ziro Airport	Zero	VEZO	5,403	

Airports at highest altitude in world

Name	City	ICAO (airports.csv)	
Capitan Nicolas Rojas Airport	Potosi	SLPO	
El Alto International Airport	La Paz	SLLP	
Ngari Gunsa Airport	Shiquanhe	ZUAL	
Kangding Airport	Kangding	ZUKD	
Qamdo Bangda Airport	Bangda	ZUBD	
Daocheng Yading Airport	Daocheng	ZUDC	

Fig Dashboard 2 : Airports at Higher altitude within a country & World.

Dashboard 3 :

Country With Maximum Number of Airports & Number of Flights From Airport

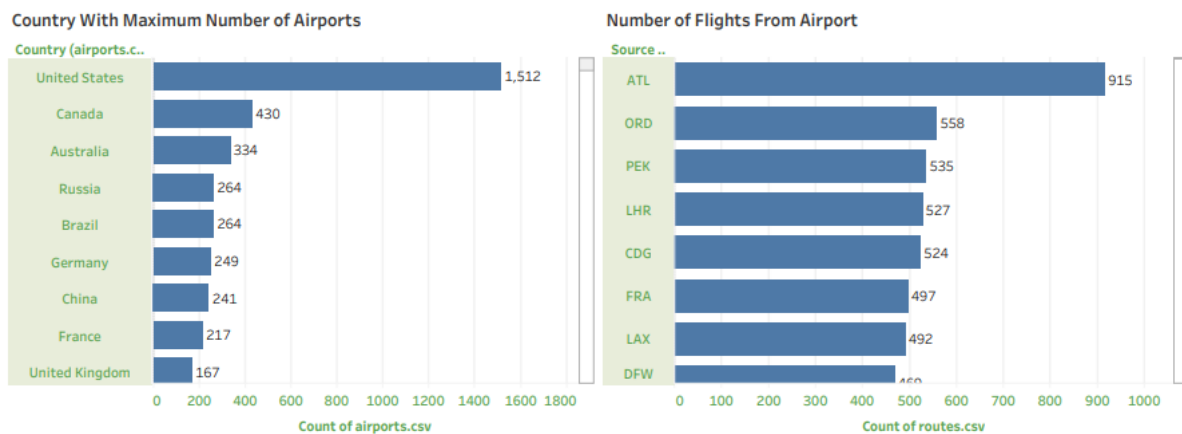


Fig Dashboard 3: Country With Maximum Number of Airports & Number of Flights From Airport

Dashboard 4 : Airlines within a country.

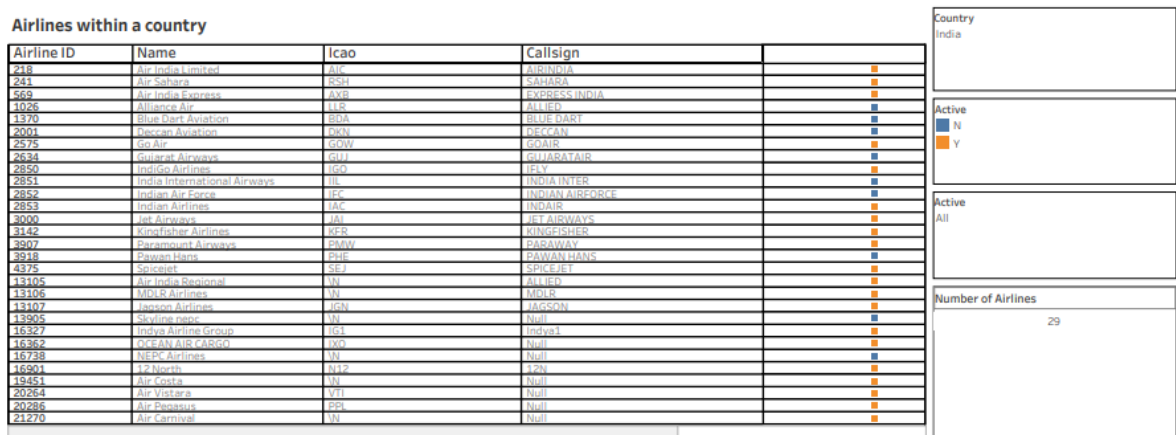
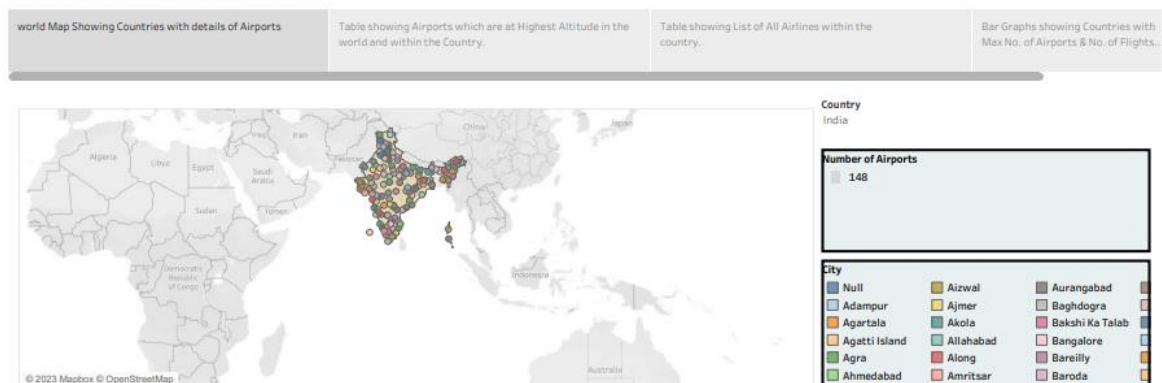


Fig Dashboard 4 : Airlines within a country.

Story

A data story is a way of presenting data and analysis in a narrative format, with the goal of making the information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage and explains the context for the data, a body that presents the data and analysis in a logical and systematic way, and a conclusion that summarizes the key findings and highlights their implications. Data stories can be told using a variety of mediums, such as reports, presentations, interactive visualizations, and videos.

Global air transportation network



Global air transportation network

World Map Showing Countries with details of Airports Table showing Airports which are at Highest Altitude in the world and within the Country. Table showing List of All Airlines within the country. Bar Graphs showing Countries with Max No. of Airports & No. of Flights.

Airport at higher altitude within a country

Name	City	ICAO (airports.csv)	
Sardar airport	Sardar	ICAO	125
Shah Mokhammad Airp	Dacca	ICAO	61
Osman International	Southern Dacca	ICAO	61

Airports at highest altitude in world

Name	City	ICAO (airports.csv)	
Capitan Nicolas Rojas Airport	Rotasi	SLOP	
El Alto International Airport	La Paz	SILP	
Ngeri Gunsu Airport	Shiquanhe	ZUAL	
Kangding Airport	Kangding	ZUKD	
Qamdo Bangda Airport	Bangda	ZUBD	
Daocheng Yading Airport	Daocheng	ZUDC	

Global air transportation network

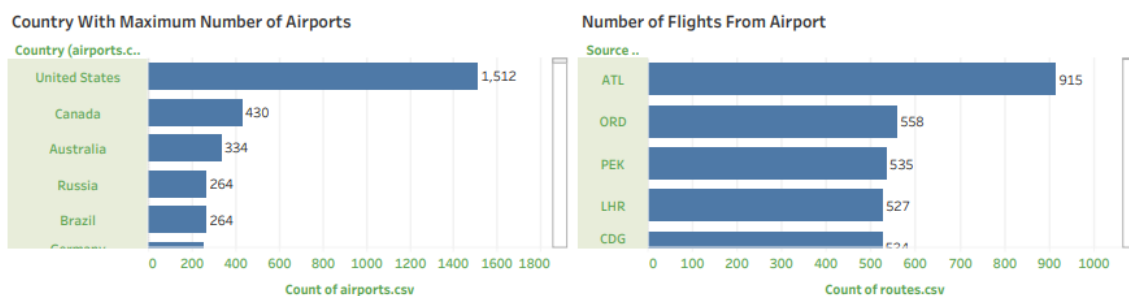
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Airlines within a country

Airline ID	Name	Icao	Callsign	
019	Air India Limited	AI	INDIA	
020	Air Sahara	SV	SAHARA	
026	Air India Express	IXG	EXPRESS INDIA	
029	Simlipar Air	SI	SI	
030	Blue Bird Aviation	BLU	BLUE BIRD	
034	Angkor Aviation	AVK	ANGKOR	
052	Jet Air	JA	JET AIR	
054	Indo Air	IND	INDO AIR	
055	Indo Air Limited	IND	INDO	
056	Indo Air International Airways	INL	INDIA INTER	
058	Indian Air Force	IN	INDIAN AIR FORCE	
060	Indian Airlines	AI	INDIA AIRWAYS	
064	Indo Air Express	IXG	EXPRESS INDIA	
067	Indo Air Express	IXG	EXPRESS INDIA	
068	Indo Air Express	IXG	EXPRESS INDIA	
069	Indo Air Express	IXG	EXPRESS INDIA	
070	Indo Air Express	IXG	EXPRESS INDIA	
071	Indo Air Express	IXG	EXPRESS INDIA	
072	Indo Air Express	IXG	EXPRESS INDIA	
073	Indo Air Express	IXG	EXPRESS INDIA	
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098	Indo Air Express	IXG	EXPRESS INDIA	
099	Indo Air Express	IXG	EXPRESS INDIA	
100	Indo Air Express	IXG	EXPRESS INDIA	

Global air transportation network

World Map Showing Countries with details of Airports	Table showing Airports which are at Highest Altitude in the world and within the Country.	Table showing List of All Airlines within the country.	Bar Graphs showing Countries with Max No. of Airports & No. of Flights from Airports.
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6. Advantages & Disadvantages

6.1 Advantages

- **Powerful Data Visualization:** Tableau offers a wide range of visualization options, enabling the creation of interactive and visually appealing dashboards. This helps in effectively conveying complex information and insights to stakeholders.

- **Ease of Use:** Tableau has a user-friendly interface that makes it accessible to users with varying levels of technical expertise. It provides a drag-and-drop functionality, allowing users to quickly create visualizations without extensive programming knowledge

6.2 Disadvantages

- **Data Size and Performance:** Large datasets with millions of records may slow down Tableau's performance or require additional hardware resources. Processing and visualizing such massive data can be challenging without proper optimization.

- **Data Integration:** Integrating multiple data sources and formats in Tableau may require additional preprocessing and cleansing. Handling data inconsistencies or merging data from different sources can be time-consuming.

- **Licensing Costs:** Tableau is a commercial software, and depending on the edition and deployment model chosen, it may involve licensing costs. Small-scale or budget-constrained projects may find it challenging to allocate resources for Tableau licenses.

7. Applications

- **Airline Operations Optimization:** Insights gained from Tableau can help optimize flight scheduling, route planning, crew management, and resource allocation, leading to increased efficiency and cost savings.

- **Airport Planning and Management:** Tableau can aid in analyzing airport data, including passenger traffic, runway utilization, and terminal capacity.

- **Network Planning and Expansion:** Analyzing flight patterns, connectivity, and passenger demographics using Tableau can assist in network planning and expansion strategies. Airlines and airport authorities can identify potential new routes, target specific markets, and make informed decisions about route optimization and fleet allocation.

- **Customer Experience and Engagement:** By analyzing customer feedback, satisfaction ratings, and demographic data, Tableau can help airlines and airports understand customer preferences, identify pain points, and improve the overall customer experience. Insights can inform targeted marketing campaigns, personalized services, and loyalty programs.

8. Conclusion

- In conclusion, Tableau unlocks insights into the worldwide air transportation network, providing aviation sector advantages and prospects. Stakeholders may better comprehend the air transportation network's complex dynamics with Tableau's data visualisation and analysis.

- Interactive visualisations in Tableau let users discover patterns, trends, and connections in large datasets. Airlines, airports, and industry experts may use this data to optimise operations.

- Aviation uses Tableau extensively. It optimises airline operations, airport management, network growth, customer experience, revenue management, regulatory compliance, market analysis, and research.

- Stakeholders may use Tableau to analyse flight, airline performance, passenger demographics, weather, and air traffic control data. These insights improve efficiency, safety, resource allocation, and growth potential.

9. Future Scope

- Tableau may be used for sophisticated predictive analytics as data collection and processing improve. Stakeholders may predict trends, passenger demand, flight delays, and operational planning using machine learning and predictive modelling.

- Tableau may develop to give real-time monitoring and alerting. Stakeholders may actively analyse important performance metrics, spot abnormalities, and get early information regarding crucial occurrences like extreme weather, security threats, and air transportation network interruptions.

- Improved Collaboration and Data Sharing: Tableau can help aviation stakeholders collaborate better. Cloud-based platforms and secure data sharing allow many organisations to interact and share information, improving air transportation network decision-making.