UNLOCKING INSIGHTS INTO THE GLOBAL AIR TRANSPORTATION NETWORK WITH TABLEAU

1.INTRODUCTION:

1.1 Overview:

In our project, **"Unlocking Insights into the Global Air Transportation Network with Tableau"** we embark on a journey to demystify the complexities of worldwide air travel using straightforward language and powerful data analytics. Think of it as unraveling the threads that connect airports, routes, airplanes, and airlines around the globe. With the help of Tableau, a user-friendly data visualization tool, we're delving deep into the data to uncover fascinating details.
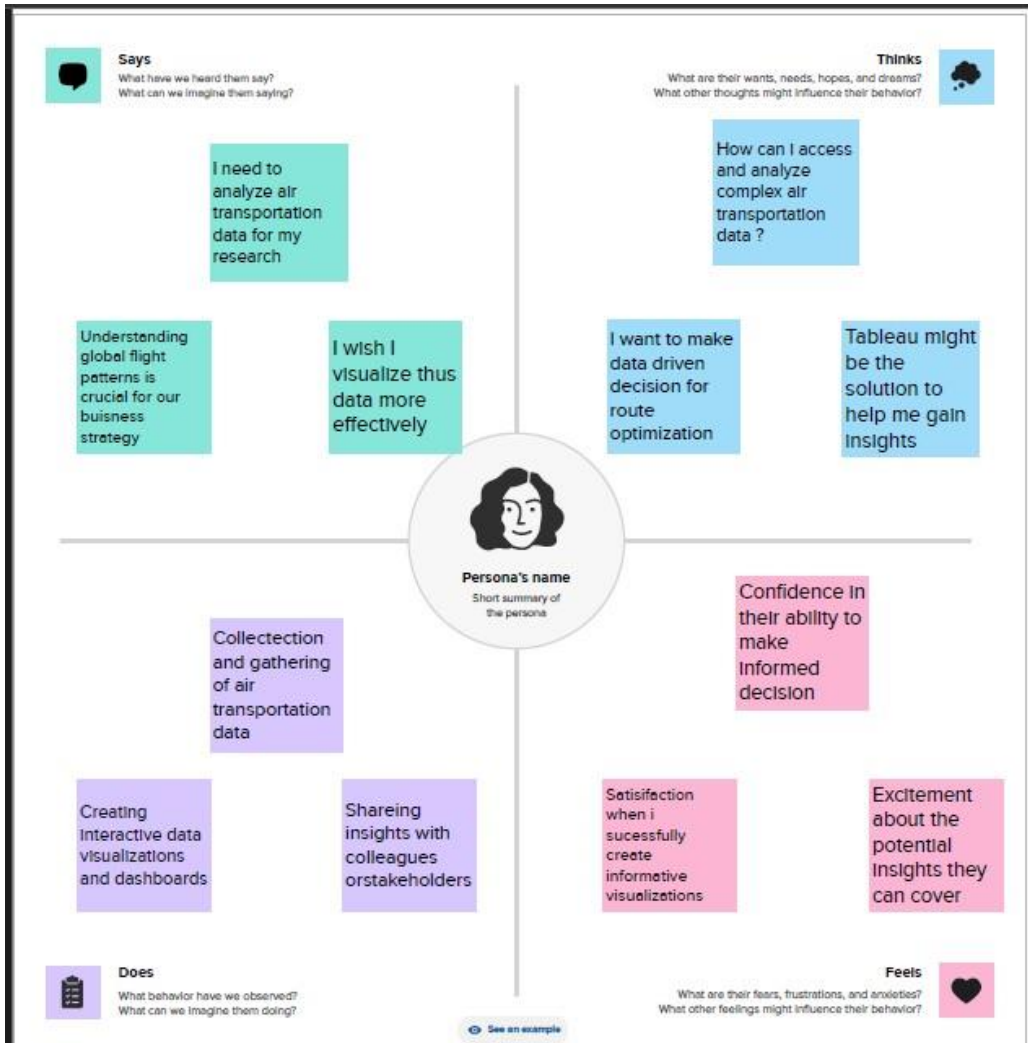
Imagine you're piecing together a massive puzzle. Each airport, airplane, route, and airline is a unique puzzle piece, and by understanding how they fit together, we gain valuable insights into the global air transportation network. We're not just crunching numbers; we're deciphering the stories behind flights, destinations, and connections. By finding patterns and trends within this vast sea of data, we aim to make air travel more efficient, seamless, and enjoyable for passengers and airlines alike.
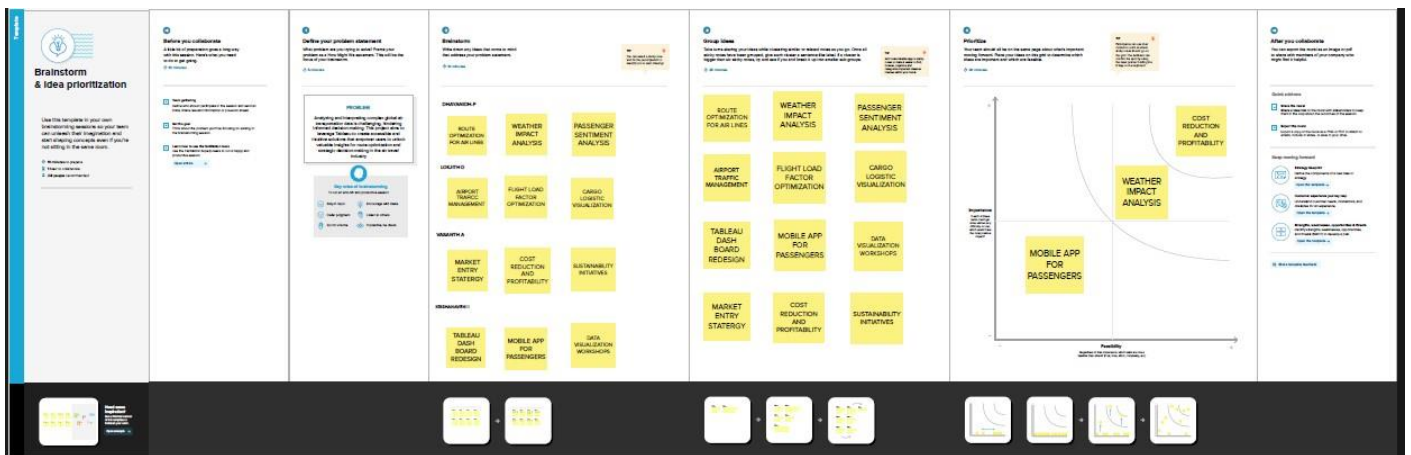
1.2 Purpose:

i. **Visualize Global Airports:** Create a comprehensive world map showcasing details of airports within each country. This visualization helps in understanding the geographical distribution of airports worldwide.

ii. **Country-wise Airport Statistics:** Analyze and present the number of airports within each country. This provides insights into the scale of air infrastructure in different nations.

iii. **Higher Altitude Airports:** Identify and map airports situated at higher altitudes within specific countries and globally. Understanding their locations is crucial for aviation planning and operational considerations in mountainous regions.

iv. **Airlines within Countries:** Analyze and quantify the number of airlines operating within each country. This offers insights into the competitive landscape and diversity of aviation services within nations.

v. **Flight Frequency Analysis:** Evaluate the number of flights originating from individual airports. This analysis helps in understanding airport traffic, flight demand, and potentially identifies high-demand routes.

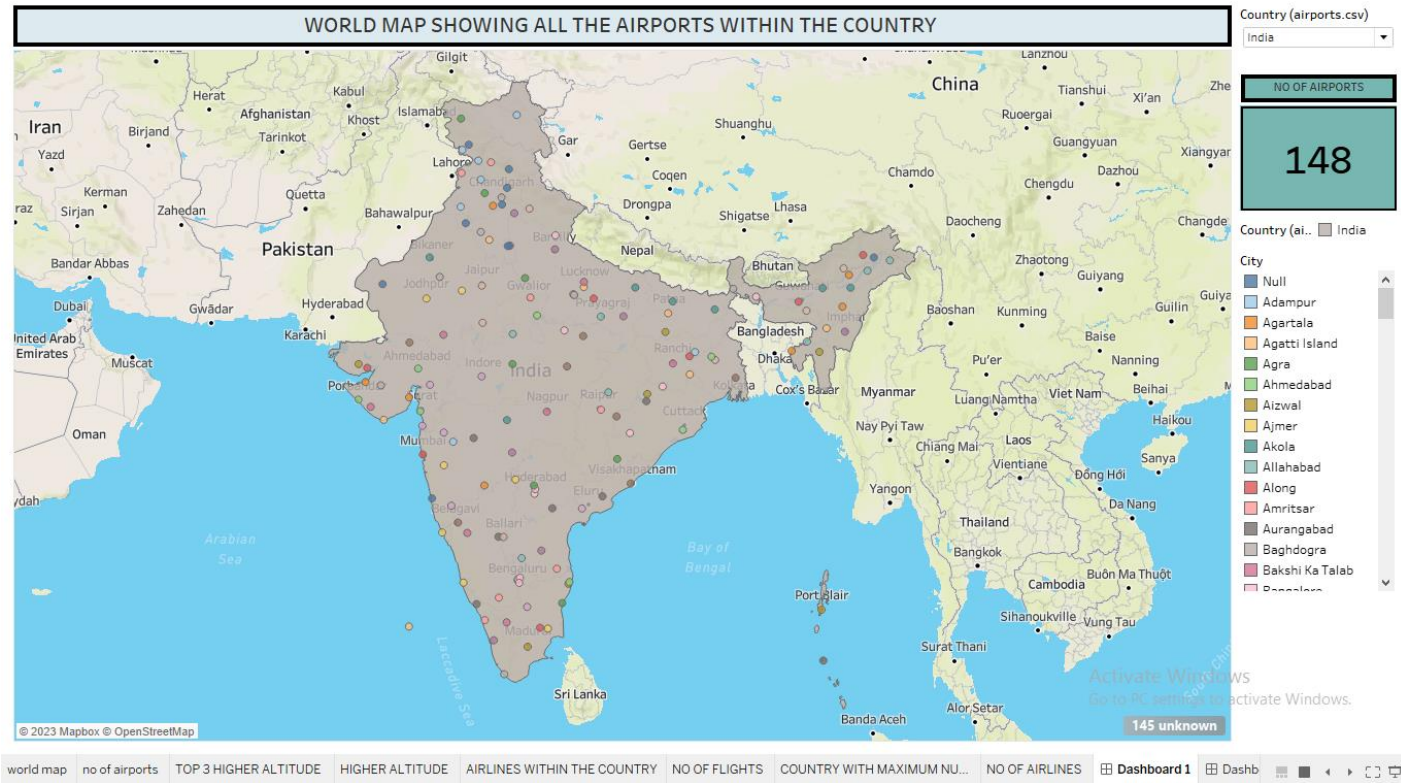## 2.PROBLEM DEFINITION AND DESIGN THINKING:
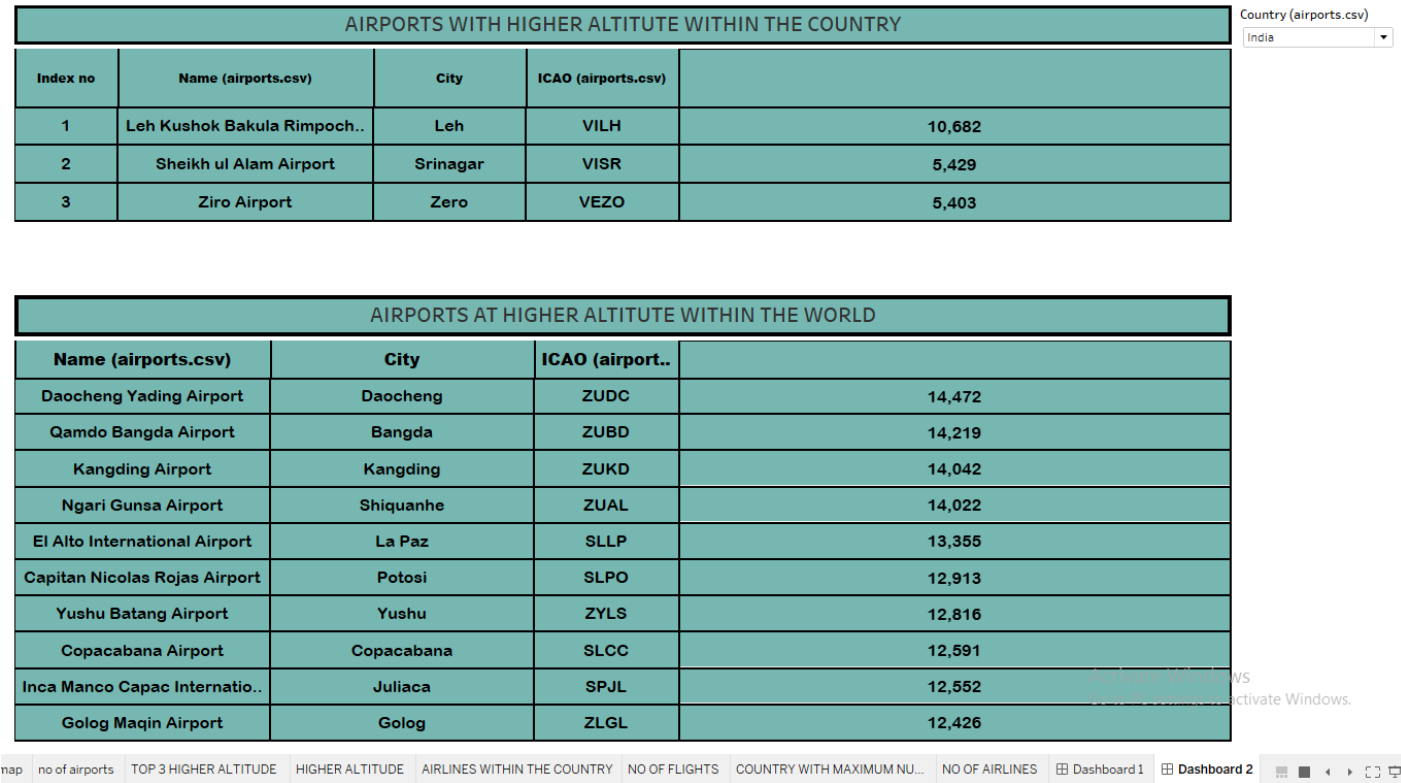
2.1 Empathy map:

2.2 Ideation and brainstorming map:

3.RESULT:

Dashboard 1:

WORLD MAP SHOWING ALL THE AIRPORTS WITHIN THE COUNTRY

Dashboard 2:

AIRPORTS WITH HIGHER ALTITUTE WITHIN THE COUNTRY

Index no	Name (airports.csv)	City	ICAO (airports.csv)	
1	Leh Kushok Bakula Rimpoch..	Leh	VILH	10,682
2	Sheikh ul Alam Airport	Srinagar	VISR	5,429
3	Ziro Airport	Zero	VEZO	5,403

AIRPORTS AT HIGHER ALTITUTE WITHIN THE WORLD

Name (airports.csv)	City	ICAO (airport..	
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 Internatio..	Juliaca	SPJL	12,552
Golog Maqin Airport	Golog	ZLGL	12,426

Dashboard 3:

AIRLINES WITHIN THE COUNTRY

Country: India

Airline ID	Name	Icao	Callsign	
218	Air India Limited	AIC	AIRINDIA	■ (Y)
241	Air Sahara	RSH	SAHARA	■ (Y)
569	Air India Express	AXB	EXPRESS INDIA	■ (Y)
1026	Alliance Air	LLR	ALLIED	■ (N)
1370	Blue Dart Aviation	BDA	BLUE DART	■ (N)
2001	Deccan Aviation	DKN	DECCAN	■ (N)
2575	Go Air	GOW	GOAIR	■ (Y)
2634	Gujarat Airways	GUJ	GUJARATAIR	■ (N)
2850	IndiGo Airlines	IGO	IFLY	■ (Y)
2851	India International Ai..	IIL	INDIA INTER	■ (N)
2852	Indian Air Force	IFC	INDIAN AIRFORCE	■ (N)
2853	Indian Airlines	IAC	INDAIR	■ (Y)
3000	Jet Airways	JAI	JET AIRWAYS	■ (Y)
3142	Kingfisher Airlines	KFR	KINGFISHER	■ (Y)
3907	Paramount Airways	PMW	PARAWAY	■ (Y)
3918	Pawan Hans	PHE	PAWAN HANS	■ (N)
4375	Spicejet	SEJ	SPICEJET	■ (Y)
13105	Air India Regional	\N	ALLIED	■ (Y)
13106	MDLR Airlines	\N	MDLR	■ (Y)
13107	Jagson Airlines	JGN	JAGSON	■ (Y)

Active
- ☐ (All)
- ☐ n
- ☑ N
- ☑ Y

Active
- ■ N
- ■ Y

NO OF AIRLINES

29

Tabs: TOP 3 HIGHER ALTITUDE | HIGHER ALTITUDE | AIRLINES WITHIN THE COUNTRY | NO OF FLIGHTS | COUNTRY WITH MAXIMUM NU... | NO OF AIRLINES | Dashboard 1 | Dashboard 2 | **Dashboard 3**

Dashboard 4:

COUNTRY WITH MAXIMUM NUMBER OF AIRPORTS

Country (airpo.. ＝

Country	Count of airports.csv
United States	1,512
Canada	430
Australia	334
Russia	264
Brazil	264
Germany	249
China	241
France	217
United Kingdom	167
India	148
Indonesia	145
Japan	123
South Africa	99
Argentina	96
Mexico	84
Italy	83
Iran	82
Sweden	77
Turkey	76
Colombia	75
Philippines	71
Spain	64
Norway	63
New Zealand	60
Venezuela	57
Greenland	56
Greece	55
Pakistan	54
Finland	51
Thailand	50

NUMBER OF FLIGHTS FROM AIRPORT

Sou.. ＝

Source	No of records
ATL	915
ORD	558
PEK	535
LHR	527
CDG	524
FRA	497
LAX	492
DFW	469
JFK	456
AMS	453
PVG	411
SIN	408
BCN	391
ICN	370
MUC	368
MIA	368
DEN	361
IST	358
LGW	356
DXB	356
HKG	355
CAN	338
FCO	331
MAD	330
BKK	326
DME	324
CTU	324
YYZ	319
MAN	316

Next Sheet [→]

Tabs: ALTITUDE | HIGHER ALTITUDE | AIRLINES WITHIN THE COUNTRY | NO OF FLIGHTS | COUNTRY WITH MAXIMUM NU... | NO OF AIRLINES | Dashboard 1 | Dashboard 2 | Dashboard 3 | **Dashboard 4**
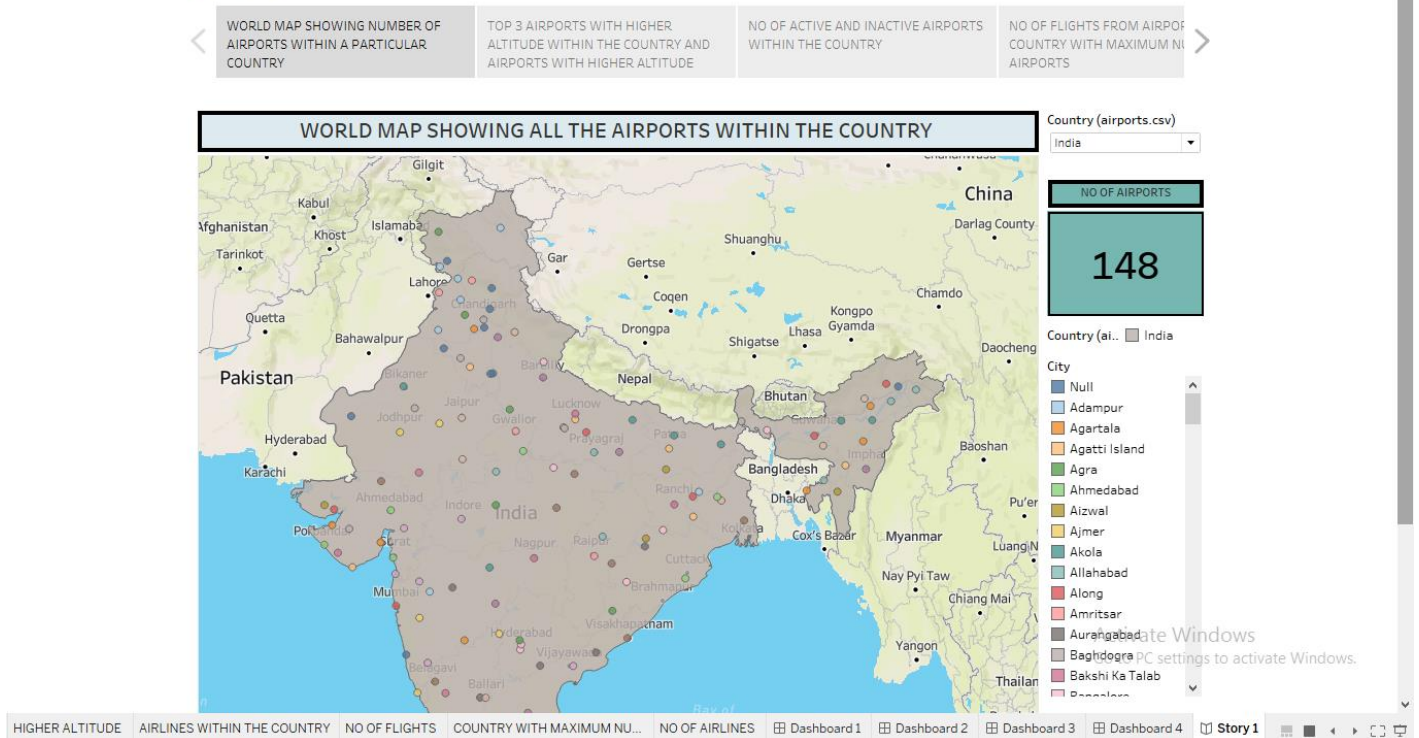
Story:

4.ADVANTAGES AND DISADVANTAGES:

Advantages:

i.   **Strategic Planning:** Access to data on airports and airlines within countries enables strategic planning for aviation authorities and airlines. It helps in identifying growth opportunities and areas where infrastructure development is needed.

ii. **Optimized Route Planning:** Understanding the altitude-specific data allows airlines to optimize flight routes, especially in mountainous regions, ensuring safer and more fuel-efficient journeys.

iii. **Market Analysis:** Analyzing the number of airlines and flights provides valuable market insights. Airlines can assess competition, passenger demand, and route profitability, aiding in market expansion strategies.

iv. **Improved Connectivity:** Visualizing airport locations on a world map promotes global connectivity. It helps identify regions with limited airport access, encouraging the development of new air routes and increasing connectivity.

v.   **Enhanced Safety Measures:** Detailed data on airports at higher altitudes facilitates the implementation of specific safety protocols and measures for both pilots and passengers, ensuring secure air travel experiences.

Disadvantages:

i. **Data Accuracy:** The accuracy of the data sources is crucial. Inaccurate or outdated information can lead to flawed analyses, impacting the reliability of strategic decisions made based on the data.

ii. **Limited Context:** The questions focus on specific aspects of air transportation. This limited scope might miss broader context, such as economic factors, regulatory challenges, or environmental concerns, which are also crucial for comprehensive decision-making.

iii. **Data Privacy:** Handling data about specific airports, airlines, and flight frequencies requires careful consideration of data privacy regulations. Ensuring compliance with data protection laws is essential to avoid legal issues.

iv. **Overlooking Regional Factors:** While analyzing global data, regional disparities and unique challenges faced by specific countries or regions might be overlooked. Tailoring strategies based on regional nuances is essential for effective implementation.

v. **Dependency on Technology:** Relying heavily on data analysis tools like Tableau can create a dependency. Understanding the data processing methods and ensuring the results align with real-world scenarios is vital to avoid over-reliance on technology-driven insights.

APPLICATIONS:

The solutions derived from analyzing global air transportation data can be applied in various areas within the aviation industry and beyond. Here are some key areas where these solutions can be beneficial:

i. **Aviation Industry Planning:** Airlines and aviation authorities can use the insights to plan new routes, optimize existing ones, and strategically allocate resources based on airport and flight data analysis.

ii. **Infrastructure Development:** Airport authorities can make informed decisions about building new airports or expanding existing ones in regions with high flight frequencies or areas lacking airport facilities.

iii. **Airline Operations:** Airlines can optimize their operations by understanding market demand, identifying potential partners for codeshare agreements, and improving fleet management based on routes analysis.

iv. **Passenger Experience:** Travelers can benefit from improved flight scheduling, enhanced connectivity, and increased accessibility to airports, leading to a better overall travel experience.

v. **Tourism and Economic Development:** Regions with well-connected airports can boost tourism, leading to economic growth. Local economies can benefit from increased business and tourism activities facilitated by efficient air transportation networks.

vi. **Environmental Impact:** By optimizing flight routes and reducing unnecessary flights, the environmental impact of air travel, such as carbon emissions, can be minimized, contributing to sustainable aviation practices.

vii. **Emergency Response and Disaster Management:** During emergencies or natural disasters, understanding airport locations and their operational statuses can aid in efficient deployment of aid and relief efforts.

viii. **Market Research:** Companies in the aviation industry can conduct market research and competitive analysis based on airline and flight data to make strategic business decisions.

ix. **Government Policies:** Governments can formulate aviation policies, regulations, and subsidies based on comprehensive data analysis, ensuring the growth and safety of the aviation sector.

x. **Academic and Research Purposes:** Researchers and academics can utilize the data to study global aviation patterns, conduct trend analyses, and contribute to the academic understanding of air transportation networks.

6.CONCLUSION:

Throughout this project, We have delved deep into the world of global air transportation. Creating detailed dashboards and stories opened my eyes to the vast interconnections between airports, airlines, and flights worldwide. I learned that data is a powerful tool for strategic decision-making in the aviation industry. By analyzing this data, I understood how airlines, airports, and even governments can make decisions to enhance travel experiences. From optimizing flight routes to improving environmental sustainability by reducing unnecessary flights, the impact of this data is immense. The project also honed my skills in interpreting complex information, turning raw data into meaningful insights.

I realized the direct benefits for passengers, such as better flight schedules and increased accessibility. Moreover, the project showed me the broader applications, from emergency response planning to market analysis, demonstrating the real-world significance of data analytics. Overall, this project not only enhanced my technical abilities but also deepened my understanding of how data shapes the aviation industry and influences the lives of people globally. It's clear that data-driven insights have the power to transform industries and create positive impacts on a large scale.

7.FUTURE SCOPE:

There are exciting avenues to explore for taking our analysis of global air transportation data to the next level:

i.   **Predictive Analytics:** Utilize historical flight data to predict future trends in air travel, enabling airlines and airports to anticipate demand, optimize routes, and enhance operational efficiency proactively.

ii.   **Machine Learning Algorithms:** Implement machine learning algorithms to analyze patterns in flight delays, passenger preferences, and route optimization. This can lead to predictive maintenance strategies and personalized passenger services.

iii.   **Route Optimization with Constraints:** Integrate constraints like weather conditions and geopolitical factors into route optimization algorithms. This dynamic approach ensures adaptive decision-making, especially in complex or changing environments.

iv.   **Collaboration with IoT Devices:** Integrate data from IoT devices within airplanes and airports to gather real-time information. This can improve safety protocols, optimize fuel consumption, and enhance overall operational efficiency.

v.   **Geospatial Analysis:** Utilize advanced geospatial analysis techniques to study airport locations in relation to urban development, transportation networks, and economic hubs, providing insights for urban planning and development.