UNLOCKING INSIGHTS INTO THE GLOBAL AIR TRANSPORTATION NETWORK WITH TABLEAU

1.INTRODUCTON

1.1 OVERVIEW

- Data Collection:

Gather relevant data from various sources, including airlines, airports, flight schedules, and passenger statistics. This data can be structured in tables or obtained in formats like CSV, Excel, or databases.

- Data Preparation:

Clean and preprocess the data to remove inconsistencies, missing values, and errors. This step ensures that the data is ready for analysis.

- Data Integration:

Combine data from different sources if necessary. For example, merge flight data with airport information to create a comprehensive dataset.

- Data Analysis:

Use Tableau to create interactive dashboards and reports. Explore the data to uncover trends, patterns, and insights related to air transportation, such as busiest airports, popular flight routes, seasonal variations, and more.

- Visualizations:

Create various types of visualizations, including bar charts, line graphs, maps, and heatmaps, to represent the data effectively. Tableau offers a wide range of visualization options.

- Interactivity:

Make the dashboards interactive by adding filters, parameters, and actions. This allows users to explore the data and gain insights dynamically.

- ## Geospatial Analysis:

Utilize Tableau's geospatial capabilities to visualize flight routes on maps, plot airport locations, and analyze regional trends in air travel.

- ## Performance Metrics:

Calculate and display key performance metrics, such as on-time performance, flight delays, passenger load factors, and revenue analysis.

- ## Trend Identification:

Identify trends and anomalies in the air transportation network. For example, you could discover which airlines dominate specific routes or how flight patterns change over time.

- ## Storytelling:

Use Tableau's storytelling features to create a narrative around your insights. Explain the significance of the findings and their implications for the global air transportation industry.

- ## Sharing and Collaboration:

Share the Tableau dashboards with stakeholders, colleagues, or the public through Tableau Server or Tableau Online. Collaboration and feedback are crucial in refining insights.

- ## Continuous Monitoring:

Set up data refresh schedules to ensure that your visualizations stay up to date. Air transportation data is dynamic and subject to change.

By leveraging Tableau's capabilities for data visualization and analysis, you can unlock valuable insights into the global air transportation network, aiding decision-makers in the industry and researchers in understanding trends and optimizing operations.

1.2 PURPOSE

- Optimizing Operations:

By analyzing data using Tableau, airlines and aviation authorities can optimize flight routes, schedules, and resource allocation to improve efficiency and reduce costs.

- Safety and Security:

Identifying patterns and anomalies in data can enhance safety and security measures by detecting potential risks and vulnerabilities in the network.

- Customer Experience:

Understanding passenger behavior and preferences can help airlines enhance the customer experience by tailoring services and improving in-flight amenities.

- Environmental Impact:

Analyzing data can also help assess the environmental impact of air transportation and develop strategies to reduce carbon emissions and promote sustainability.

- Market Insights:

Airlines can gain valuable market insights by analyzing data on passenger demographics, demand trends, and competitive landscapes to make informed business decisions.

- Regulatory Compliance:

Ensuring compliance with aviation regulations is critical. Tableau can help monitor and report on various compliance metrics and key performance indicators.

- Predictive Maintenance:

By analyzing maintenance data, airlines can implement predictive maintenance models to reduce downtime and improve aircraft reliability.

- Revenue Management:

Optimizing pricing strategies and seat allocation based on demand patterns can maximize revenue for airlines.

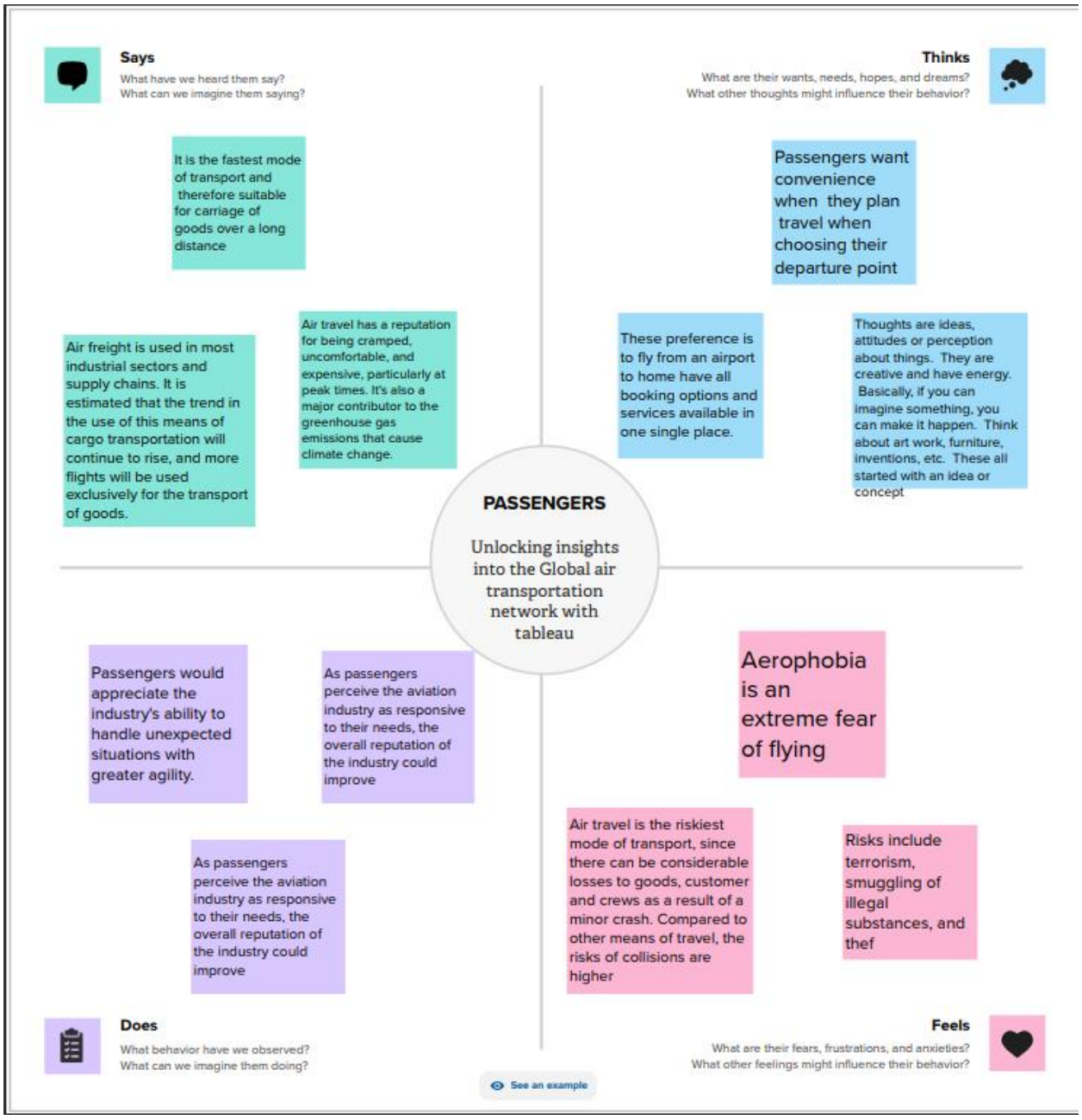
- Network Expansion:

Analyzing data can aid in identifying potential new routes and markets for expansion.

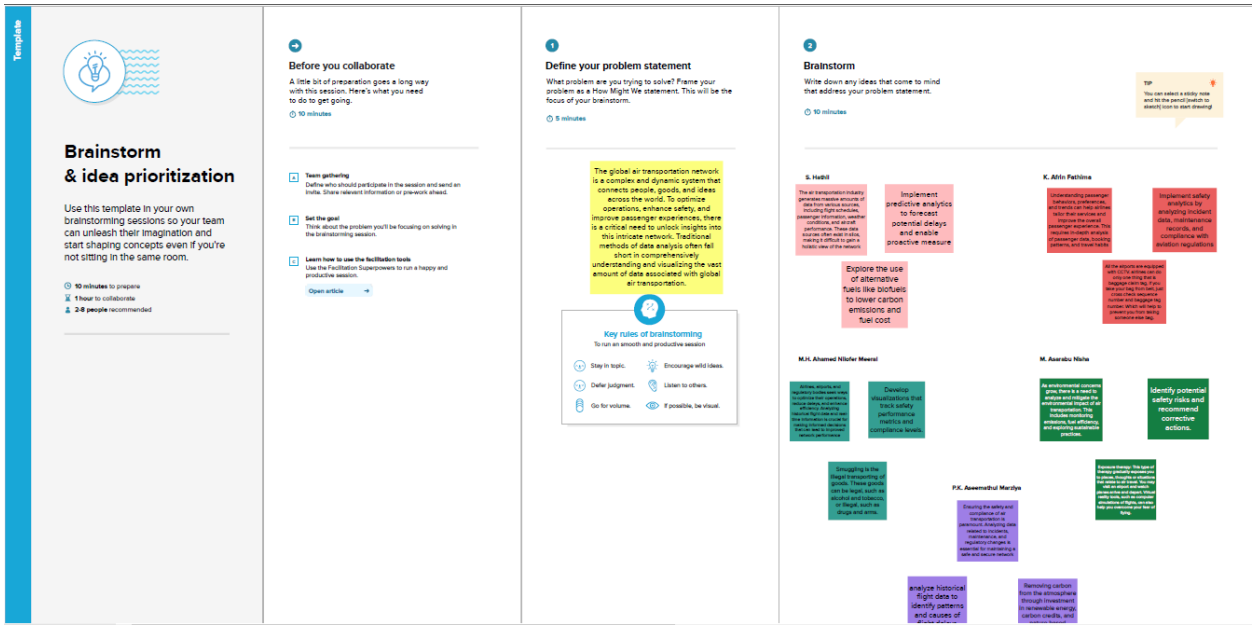
In summary, Tableau can be a powerful tool for unlocking insights into the global air transportation network, enabling stakeholders to make data-driven decisions that benefit operations, safety, customer experience, and overall business performance.

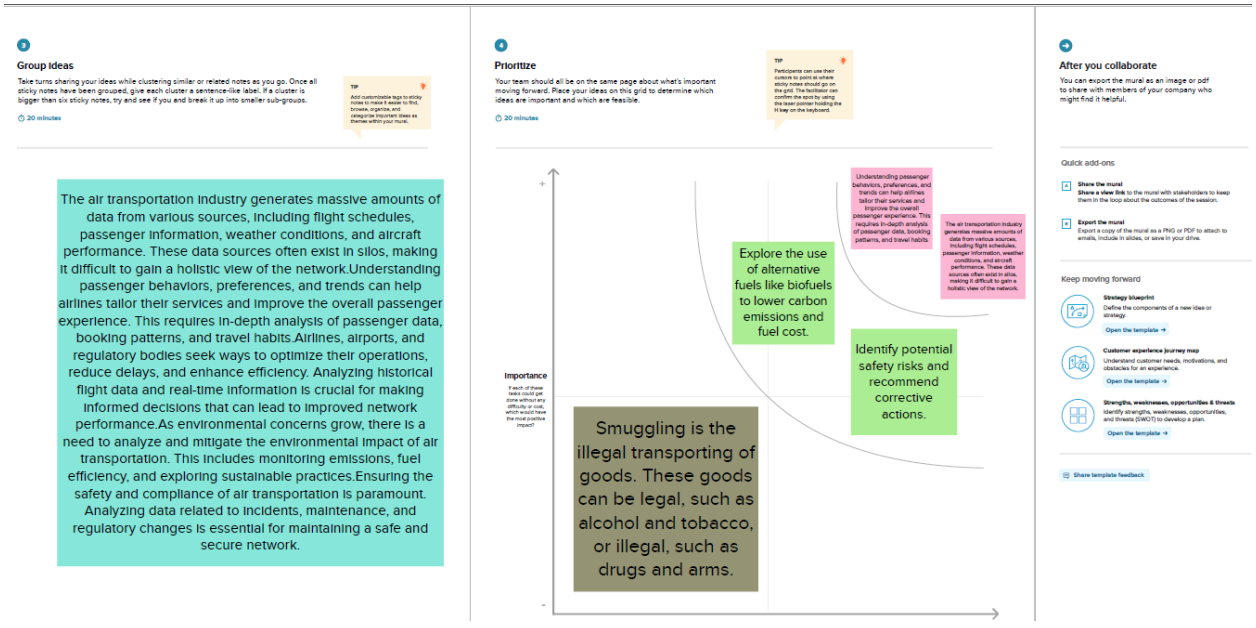
2.Problem Definition & Design Thinking

2.1 EMPATHY MAP



2.2 IDEATION & BRAINSTROMING MAP



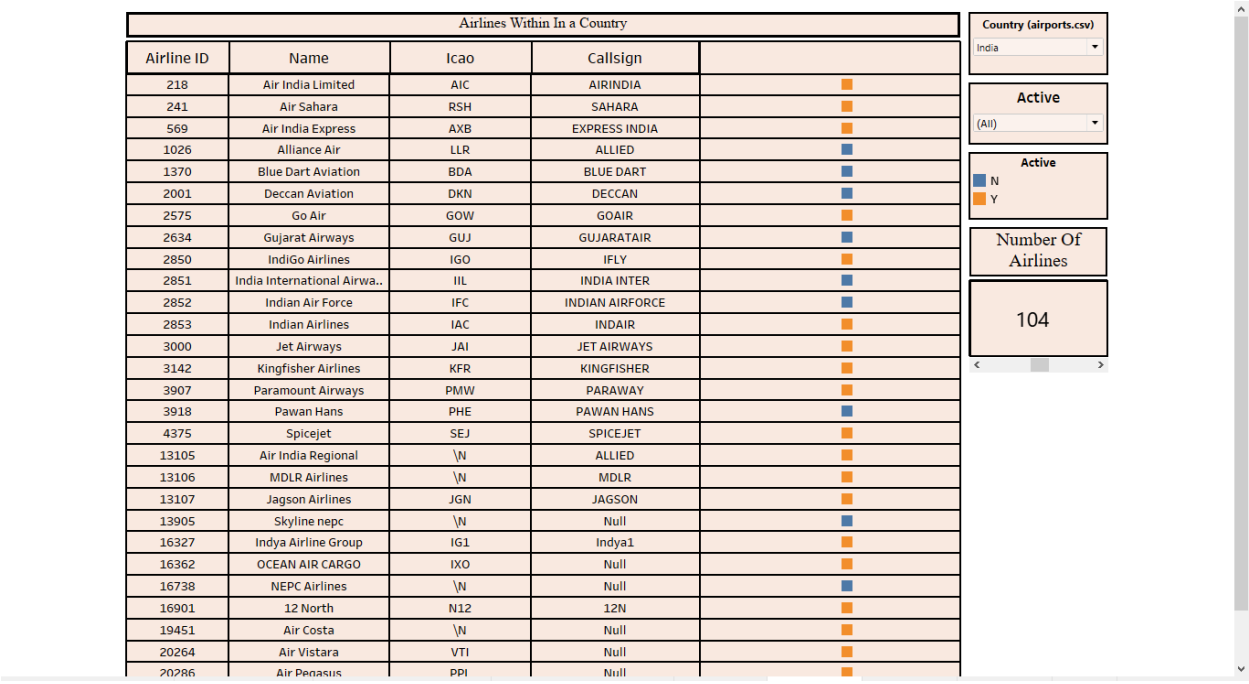


3.RESULT

Final findings (Output) of the project along with screenshots.

Dashboard 1

Dashboard 2



Airlines Within In a Country

Airline ID	Name	Icao	Callsign	
218	Air India Limited	AIC	AIRINDIA	
241	Air Sahara	RSH	SAHARA	
569	Air India Express	AXB	EXPRESS INDIA	
1026	Alliance Air	LLR	ALLIED	
1370	Blue Dart Aviation	BDA	BLUE DART	
2001	Deccan Aviation	DKN	DECCAN	
2575	Go Air	GOW	GOAIR	
2634	Gujarat Airways	GUJ	GUJARATAIR	
2850	IndiGo Airlines	IGO	IFLY	
2851	India International Airwa..	IIL	INDIA INTER	
2852	Indian Air Force	IFC	INDIAN AIRFORCE	
2853	Indian Airlines	IAC	INDAIR	
3000	Jet Airways	JAI	JET AIRWAYS	
3142	Kingfisher Airlines	KFR	KINGFISHER	
3907	Paramount Airways	PMW	PARAWAY	
3918	Pawan Hans	PHE	PAWAN HANS	
4375	Spicejet	SEJ	SPICEJET	
13105	Air India Regional	\N	ALLIED	
13106	MDLR Airlines	\N	MDLR	
13107	Jagson Airlines	JGN	JAGSON	
13905	Skyline nepc	\N	Null	
16327	Indya Airline Group	IG1	Indya1	
16362	OCEAN AIR CARGO	IXO	Null	
16738	NEPC Airlines	\N	Null	
16901	12 North	N12	12N	
19451	Air Costa	\N	Null	
20264	Air Vistara	VTI	Null	
20286	Air Pegasus	PPI	Null	

Dashboard 3

Airports at Higher Altitude within a Country

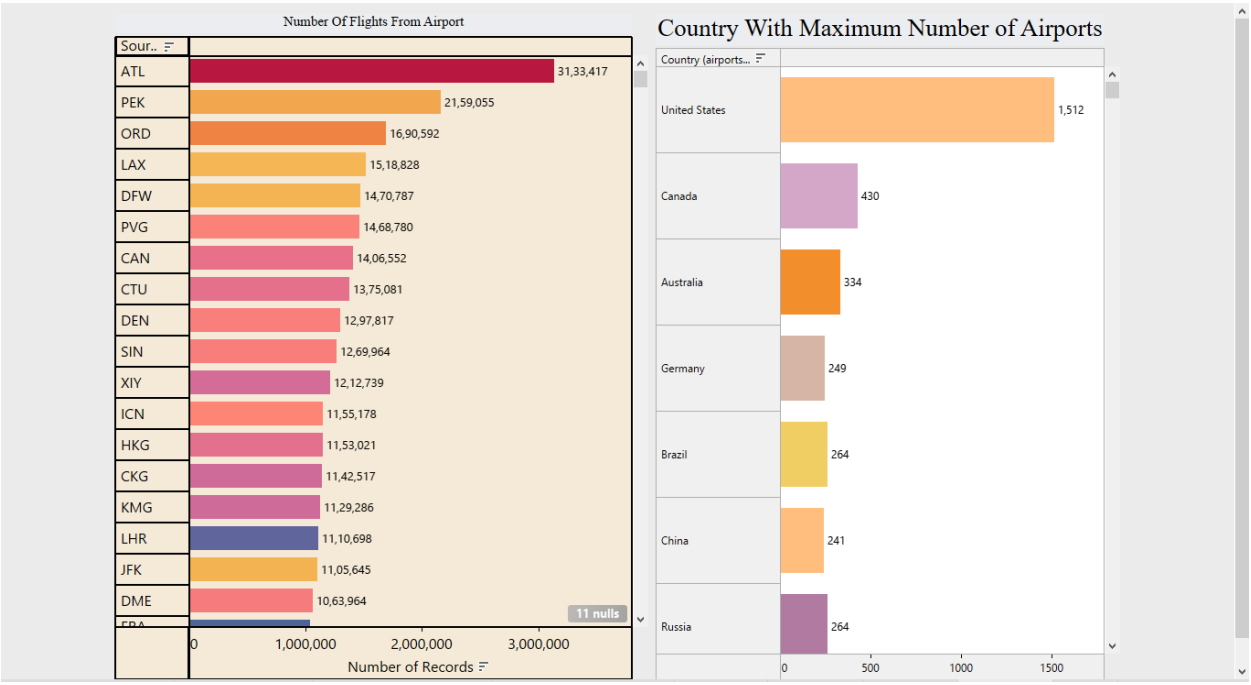
index no.	Name (airports.csv)	City	ICAO (airports.csv)	
1	Ziro Airport	Zero	VEZO	5,403
	Vishakhapatnam Airport	Vishakhapatnam	VEVZ	15
	Vir Savarkar International Airport	Port Blair	VOPB	14

Country (airport..
India

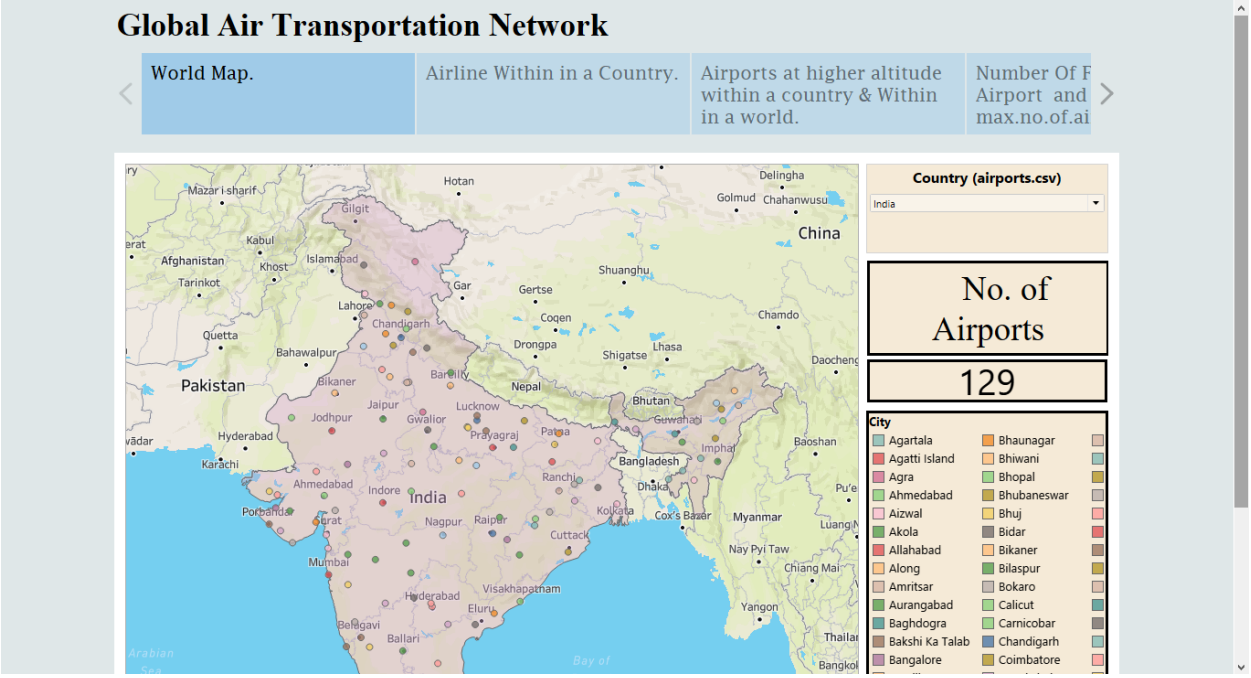
Airports at Higher Altitude Within a World

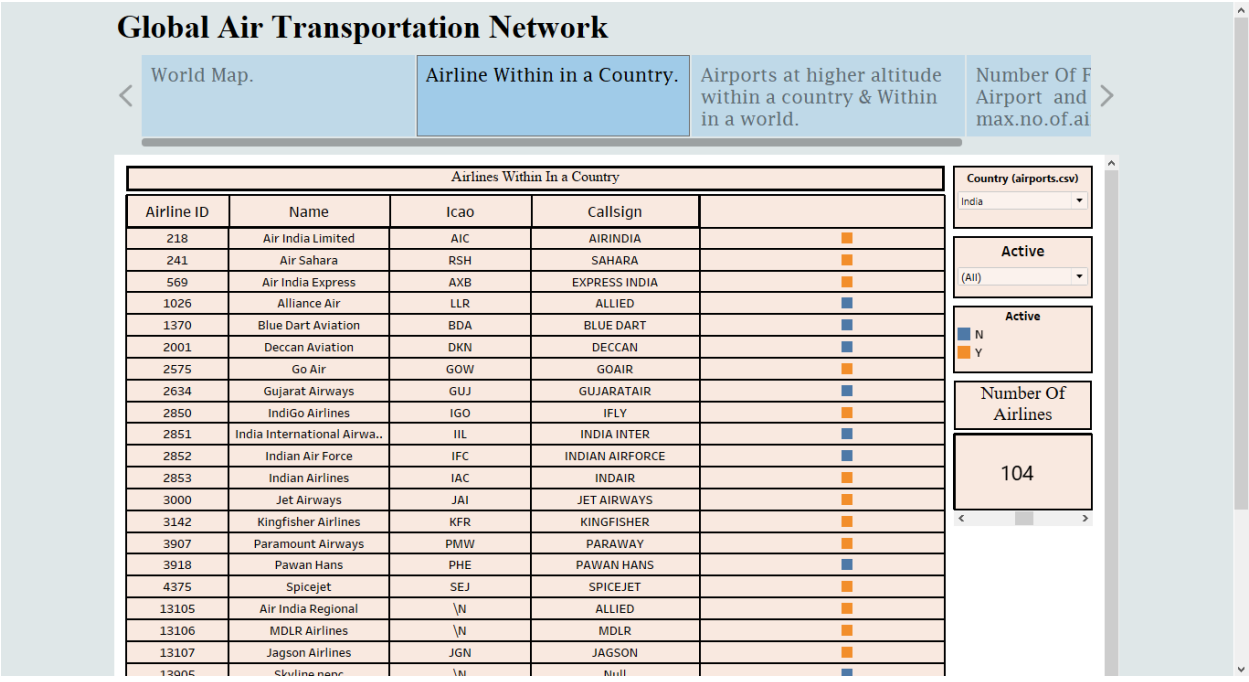
Name (airports.csv)	City	ICAO code	
Siglufjörður Airport	Siglufjordur	\N	10
Arviat Airport	Eskimo Point	\N	32
Îles-de-la-Madeleine Airport	Iles De La Madeleine	\N	35
Natashquan Airport	Natashquan	\N	39
Tofino / Long Beach Airport	Tofino	\N	80
Stephenville Airport	Stephenville	\N	84
Nanaimo Airport	Nanaimo	\N	92
Kingston Norman Rogers Airport	Kingston	\N	305
Campbell River Airport	Campbell River	\N	346
Geraldton Greenstone Regional Air..	Geraldton	\N	1,144
Fort McMurray Airport	Fort Mcmurray	\N	1,211
Prince Albert Glass Field	Prince Albert	\N	1,405
Kelowna International Airport	Kelowna	\N	1,421
Fort St John Airport	Fort Saint John	\N	2,280
Williams Lake Airport	Williams Lake	DC91	3,085
Djanet Inedbirene Airport	Djanet	C130	3,176
Rocky Mountain House Airport	Rocky Mountain House	C25C	3,244
Bou Chekif Airport	Tiaret	PC12	3,245
Calgary International Airport	Calgary	E35L	3,557
Mecheria Airport	Mecheria	MD88	3,855
Aguenar – Hadj Bey Akhamok Airport	Tamanrasset	MD83	4,518

Dashboard 4



Stories


Global Air Transportation Network
World Map.
Airline Within in a Country.
Airports at higher altitude within a country & Within in a world.
Number Of F Airport and max.no.of.ai
Country (airports.csv)
India
No. of Airports
129
City
Agartala
Agatti Island
Agra
Ahmedabad
Aizwal
Akola
Allahabad
Along
Amritsar
Aurangabad
Baghdogra
Bakshi Ka Talab
Bangalore
Bhaunagar
Bhiwani
Bhopal
Bhubaneswar
Bhuj
Bidar
Bikaner
Bilaspur
Bokaro
Calicut
Carnicobar
Chandigarh
Coimbatore
Pakistan
India
China
Nepal
Bhutan
Bangladesh
Myanmar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241 | Air Sahara | RSH | SAHARA
569 | Air India Express | AXB | EXPRESS INDIA
1026 | Alliance Air | LLR | ALLIED
1370 | Blue Dart Aviation | BDA | BLUE DART
2001 | Deccan Aviation | DKN | DECCAN
2575 | Go Air | GOW | GOAIR
2634 | Gujarat Airways | GUJ | GUJARATAIR
2850 | IndiGo Airlines | IGO | IFLY
2851 | India International Airwa.. | IIL | INDIA INTER
2852 | Indian Air Force | IFC | INDIAN AIRFORCE
2853 | Indian Airlines | IAC | INDAIR
3000 | Jet Airways | JAI | JET AIRWAYS
3142 | Kingfisher Airlines | KFR | KINGFISHER
3907 | Paramount Airways | PMW | PARAWAY
3918 | Pawan Hans | PHE | PAWAN HANS
4375 | Spicejet | SEJ | SPICEJET
13105 | Air India Regional | \N | ALLIED
13106 | MDLR Airlines | \N | MDLR
13107 | Jagson Airlines | JGN | JAGSON
Country (airports.csv)
India
Active
(All)
Active
N
Y
Number Of Airlines
104

Global Air Transportation Network

World Map. | Airline Within in a Country. | Airports at higher altitude within a country & Within in a world. | Number Of F Airport and max.no.of.ai

Airports at Higher Altitude within a Country

index no.	Name (airports.csv)	City	ICAO (airports.csv)	
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Geraldton Greenstone Regional Air..	Geraldton	\N	1,144

Global Air Transportation Network

Airline Within in a Country. | Airports at higher altitude within a country & Within in a world. | Number Of Flights From Airport and country with max.no.of.airports

Number Of Flights From Airport

Sour..	
ATL	31,33,417
PEK	21,59,055
ORD	16,90,592
LAX	15,18,828
DFW	14,70,787
PVG	14,68,780
CAN	14,06,552
CTU	13,75,081
DEN	12,97,817
SIN	12,69,964
XIY	12,12,739
ICN	11,55,178
HKG	11,53,021
CKG	11,42,517
KMG	11,29,286

Country With Maximum Number of Airports

Country (airports...	
United States	1,512
Canada	430
Australia	334
Germany	249
Brazil	264

ADVANTAGES & DISADVANTAGES

Advantages

- Data Visualization:

Tableau excels in creating interactive and visually appealing data visualizations. It can help users easily understand complex air transportation data through charts, graphs, and maps.

- Real-time Analysis:

Tableau can connect to real-time data sources, allowing for up-to-the-minute analysis of flight data, which can be crucial for decision-making in the dynamic aviation industry.

- Historical Analysis:

Users can explore historical flight data trends, allowing airlines, airports, and aviation authorities to make informed decisions based on past performance.

- Geographic Insights:

Tableau's mapping capabilities can provide geographic insights into flight routes, helping identify potential expansion opportunities or route optimization.

- Custom Dashboards:

Tableau allows users to create customized dashboards tailored to their specific needs, enabling them to focus on the metrics and KPIs most relevant to them.

Disadvantages

- Data Complexity:

  The global air transportation network involves vast amounts of data, which can be challenging to manage and analyze effectively in Tableau. Ensuring data quality and consistency is crucial.

- Cost:

Tableau licenses and maintenance costs can be high, making it a less accessible option for smaller organizations or individuals.

- Learning Curve:

Using Tableau effectively requires a learning curve, and not all users may have the necessary skills to harness its full potential.

- Integration Challenges:

Integrating Tableau with other data sources and systems used in the aviation industry can be complex and may require additional technical expertise.

- Security Concerns:

Handling sensitive flight data comes with security and privacy concerns. Proper data security measures must be in place to protect this information.

In summary, Tableau can be a powerful tool for gaining insights into the global air transportation network, but it comes with challenges related to data complexity, cost, and learning curve. Organizations should carefully weigh the pros and cons before implementing Tableau for aviation data analysis.

APPLICATIONS

- Route Optimization:

Airlines can use Tableau to analyze historical flight data and passenger trends to optimize their flight routes for efficiency and profitability.

- Customer Segmentation:

Airlines can segment their customer base using Tableau to tailor marketing campaigns and services to different passenger groups.

- Operational Efficiency:

Tableau can be used to monitor and improve the efficiency of airport operations, such as baggage handling and passenger flow.

- Safety and Compliance:

Airlines can use Tableau to track safety and compliance metrics, ensuring that they meet regulatory requirements.

- Cost Analysis:

Tableau can help airlines analyze their costs, from fuel expenses to maintenance, to identify areas for cost reduction.

- Airport Management:

Tableau can assist airport authorities in managing and optimizing their resources, such as runways, gates, and terminal facilities.

- Environmental Impact:

Tableau can be employed to assess the environmental impact of air travel, aiding in sustainability efforts and emissions reduction strategies.

- Competitive Analysis:

Airlines can use Tableau to compare their performance with competitors in terms of routes, prices, and customer satisfaction

- Real-time Monitoring:

Tableau dashboards can provide real-time insights into flight delays, weather conditions, and other factors affecting air travel, allowing for quicker decision-making. These are just a few examples of how Tableau can be applied to unlock insights into the global air transportation network, benefiting airlines, airports, and passengers alike.

CONCLUSION

- Route Optimization:

Identify the most profitable routes and optimize flight schedules based on historical data and passenger demand.

- Cost Efficiency:

Examine operational costs, fuel consumption, and maintenance data to identify areas for cost reduction and efficiency improvements.

- Safety Enhancements:

Analyze safety incident reports and maintenance records to proactively address safety concerns and improve overall aviation safety.

- Market Expansion:

Identify underserved regions and potential growth markets for airlines, leading to strategic expansion opportunities.

- Environmental Impact:

Assess carbon emissions and environmental impact data to develop sustainable aviation practices and reduce the industry's carbon footprint.

- Forecasting:

Utilize predictive analytics to forecast demand, revenue, and operational needs, aiding in long-term planning.

In conclusion, Tableau can help unlock a wealth of insights in the global air transportation network, empowering airlines, airports, and industry stakeholders to make informed decisions, enhance operations, and provide better services to passengers while addressing environmental and economic challenges.

FUTURE SCOPE

- Real-time Data Integration:

Incorporating real-time data feeds from airlines, airports, and air traffic control systems can provide up-to-the-minute insights into flight delays, weather-related disruptions, and other critical information for both passengers and operators.

- Predictive Analytics:

Utilize machine learning and predictive analytics to forecast flight delays, passenger demand, and maintenance needs. This can help airlines and airports proactively manage resources and improve the passenger experience.

- Enhanced Visualizations:

Continuously improve the visualizations in Tableau to make them more interactive and intuitive. Incorporate 3D maps and animations to provide a more immersive understanding of the air transportation network.

- ## Personalized Passenger Insights:

Develop dashboards that allow passengers to track their flights, get personalized travel recommendations, and receive notifications about flight changes or disruptions via mobile apps or websites.

- ## Environmental Impact Analysis:

Use Tableau to analyze and visualize the environmental impact of the air transportation network, including carbon emissions and fuel consumption. This can aid in the development of more sustainable practices.

- ## Security and Safety Monitoring:

Create dashboards that monitor security and safety aspects of air travel, including tracking incidents, analyzing security vulnerabilities, and ensuring compliance with safety regulations.

- ## Cost Optimization:

Help airlines and airports reduce operational costs by identifying areas where efficiency improvements can be made, such as baggage handling, gate assignments, and fuel consumption.

- ## Global Network Collaboration:

Collaborate with international organizations and aviation stakeholders to create a global network of data sharing and insights, facilitating a more coordinated and efficient air transportation system.

- ## AI-Driven Chatbots:

Implement AI-driven chatbots within Tableau dashboards to answer passenger queries, provide real-time flight updates, and assist with travel planning.

- ## Data Security:

Enhance data security and privacy measures to ensure that sensitive information about passengers, flights, and operations is protected.

- Accessibility:

Make Tableau dashboards accessible to individuals with disabilities, ensuring that everyone can benefit from the insights provided.

By continually innovating and expanding the capabilities of Tableau in the context of the global air transportation network, you can contribute to safer, more efficient, and more convenient air travel experiences for passengers and better operations for airlines and airports.

APPENDIX

Link for Dashboard 1:

https://public.tableau.com/views/dashboard1_16965876906300/Dashboard1?:language=en-US&:display_count=n&:origin=viz_share_link

Link for Dashboard 2:

https://public.tableau.com/views/dashboard2_16965878406790/Dashboard2?:language=en-US&:display_count=n&:origin=viz_share_link

Link for Dashboard 3:

https://public.tableau.com/views/dashboard3_16965878919630/Dashboard3?:language=en-US&:display_count=n&:origin=viz_share_link

Link for Dashboard 4:

https://public.tableau.com/views/dashboard4_16965879588820/Dashboard4?:language=en-US&:display_count=n&:origin=viz_share_link

Link for Story

https://public.tableau.com/views/story_16965880864310/Story1?:language=en-US&:display_count=n&:origin=viz_share_link

THANK YOU