
UNLOCKING
INSIGHTS INTO
GLOBAL AIR
TRANSPORTATION
NETWORK

GOVINDAMMAL ADITANAR COLLEGE FOR WOMAN – TIRUCHENDUR

III BSC MATHEMATICS

TEAM MEMBERS

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INTRODUCTION

OVER VIEW:

Air transport network or air transportation network is an example of transport networks and spatial networks. The nodes of the network are the airports and the links represent direct flight routes between two airports. Alternatively, cities can be considers as the nodes with links representing direct flight connection between them. Air transport networks can be defined worldwide as well as for one region or for one airline company; the scale of thenetwork can be global or domestic.

PROPERTIES OF AIR TRANSPORT NETWORKS:

The graph of an air transport network is spatial but not a planar graph. The air transportation network is a complex network and scale-free networks. The degree distribution of the nodes displays a heavy-tailed distribution. The hubs of the networks have large connectivities and long-distance connectivities at the same time.

An anomalous property of the air transport network is that nodes with relatively low degrees may have very high betweeness centrality. It is an important observation related to this robustness of complex networks. According to this finding the critical points of the system are not necessarily the hubs, but some other cities which uniquely provides routes to certain region. For example, Alaska can be easily isolated from the other parts of the worldwide air transport network.

The worldwide air transport network defines communities. These communities are mainly determined by geographical factors. However, in some cases the borders of the communities are different from the borders of geographic regions. Such an example is the community of Europe and Asian Russia.

The worldwide air transportation network is represented by the database of International Air Transport Association. The worldwide air transportation network is a critical infrastructure with high impact on mobility, trade and economy.

PURPOSE:

Air transport mode is define by four basic elements: airlines, commercial transport aircraft, the air space used for their flights, and the infrastructure required to supporting their operations, like airports and Air Traffic Management facilities.

Air transport, which represent the next most substantial energy-consuming transport sector ,that is, aircraft configured for transporting passengers, freight ,or mail.

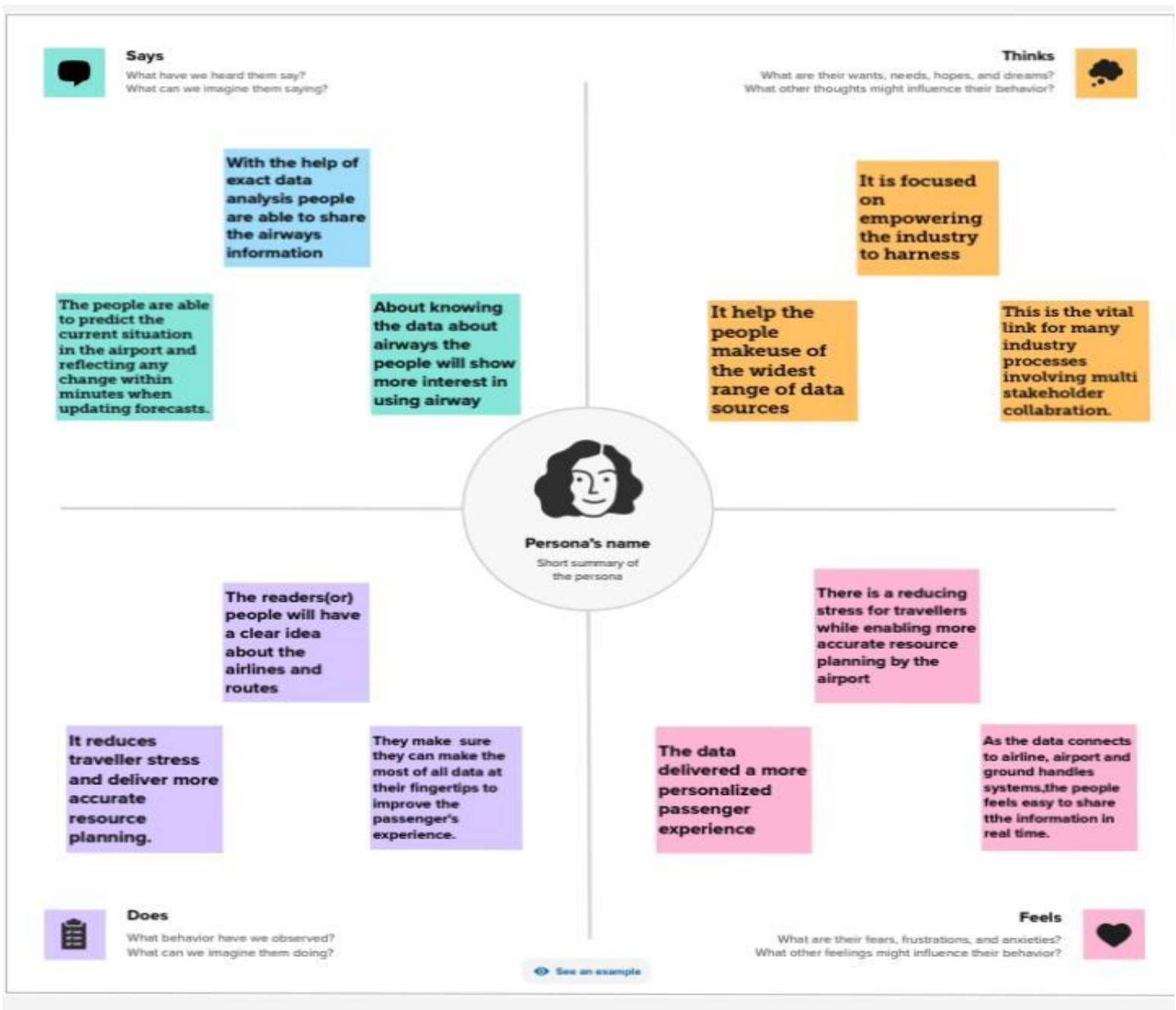
The International Air Transport Association was created almost at the same time as ICAO, and also with worldwide reach and also headquartered in Montreal. However , this is not an organization that sets rules for governments. It is a less kindred association of representatives from privately and publicly owned aircraft operators.

Air transport enables highly perishable and valuable products to be moved fast over long distances, but it lacks the environment control that is possible for other modes. In-flight storage will be at hold temperature and whilst it may be quite low over most of the distance, the quality of the product will be highly dependent on prompt and speedy handling at the airports. Exposure to local weather conditions whilst waiting to be loaded onto a plane or being moved to and from the airport can constitute a major part of the total travelling time.

Air transport is one of the fastest modes of public transport which connects international boundaries. Air transport allows people from different countries to cross international boundaries and travel other countries for personal, business, medical and tourism purposes. Although, air transport provides fastest means by saving the time of journey, another aspects of air transport is the facilities and comfort level of the passenger.

PROBLEM DEFINITION &DIFINE THINKING

EMPATHY MAP



SAYS:

- *With the help of exact data analysis people are able to share the airways information.*
- *The people are able to predict the current situation in the airport and reflecting any change within minutes when updating forecast.*
- *About knowing the data about airways the people will show more interest in using airway.*

THINKS:

- *It is focused on empowering the industry to harness.*
- *It help the people make use of the widest range of data sources.*
- *This is the vital link for many industry processes involving multi stakeholder collaboration .*

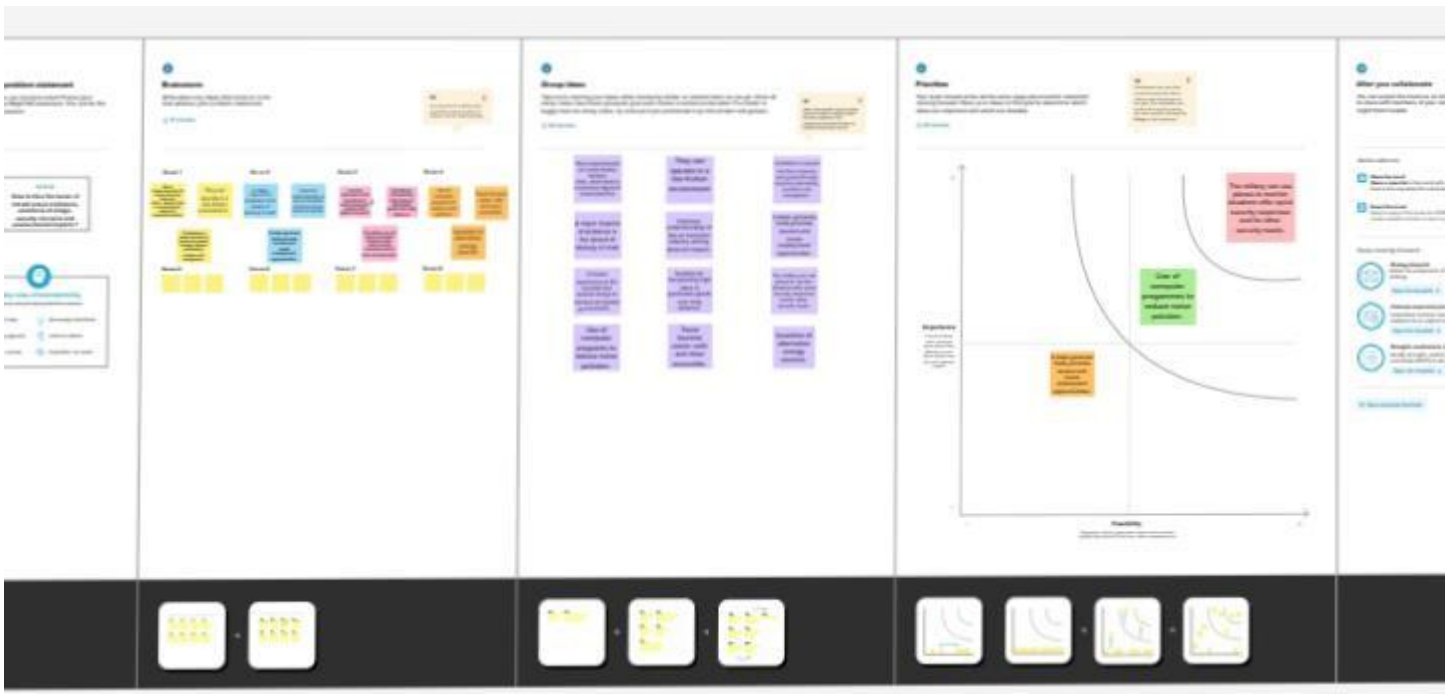
DOES:

- ***It reduces traveler stress and deliver more accurate resources planning***
- ***The people will have a clear idea about the airlines and routes.***
- ***They make sure they can make the most of all data at their fingertips to improve the passenger's experience.***

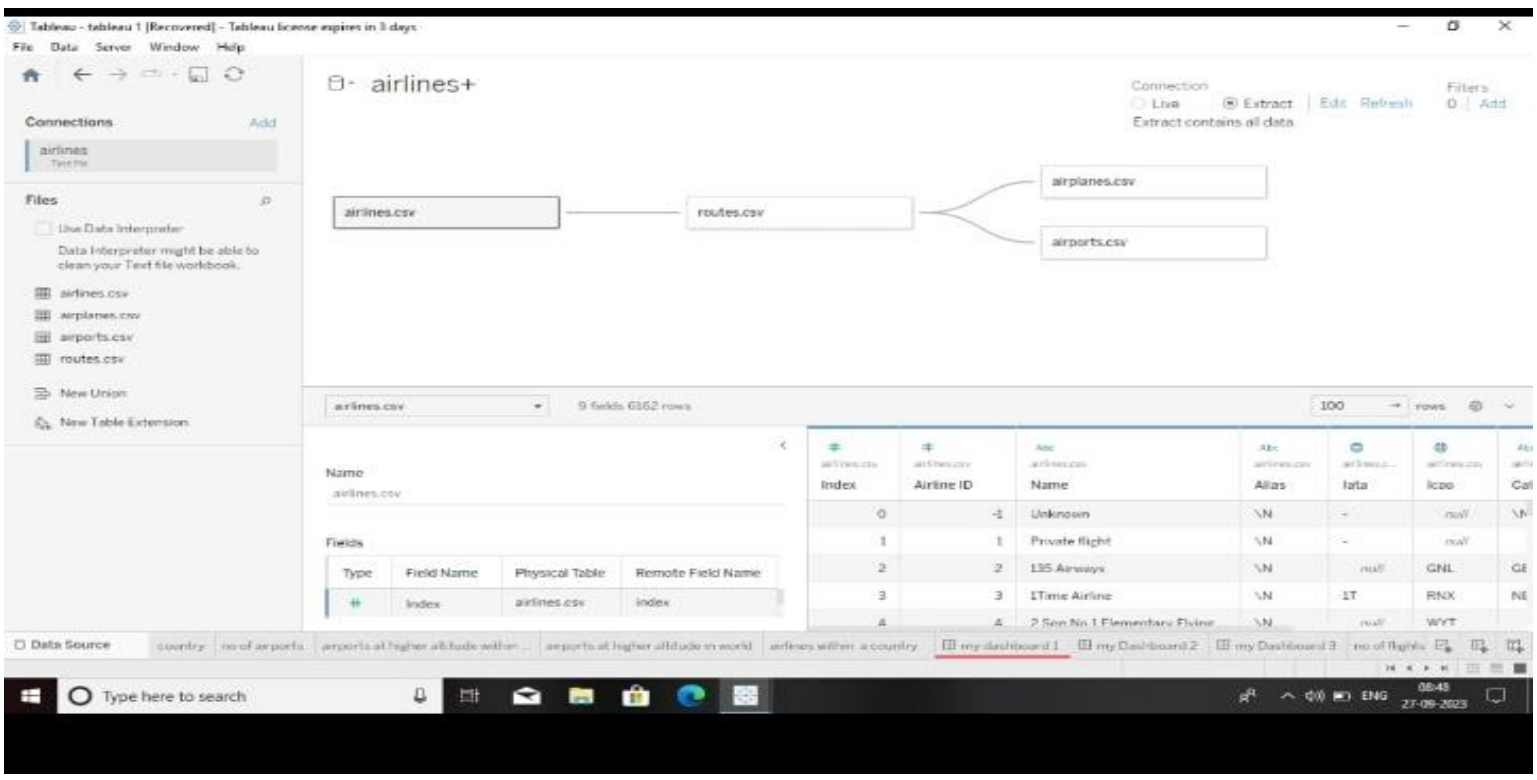
FEELS:

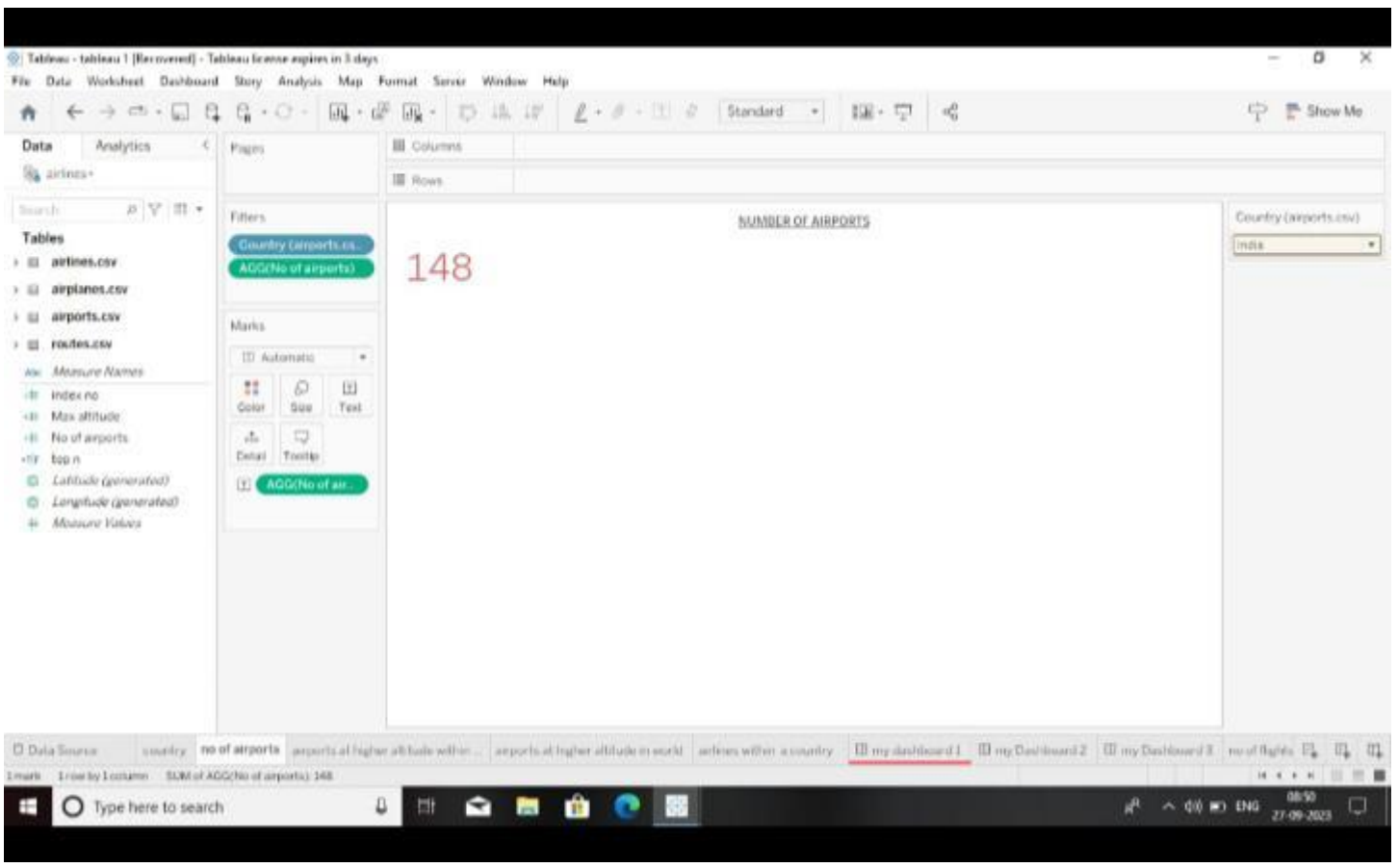
- **There is a reducing stress for travelers while enabling more accurate resource planning by the airport.**
- **The data delivered a more personalized passengers experience.**
- **As the data connects to airline ,airport systems the people feels easy to share the information in real time.**

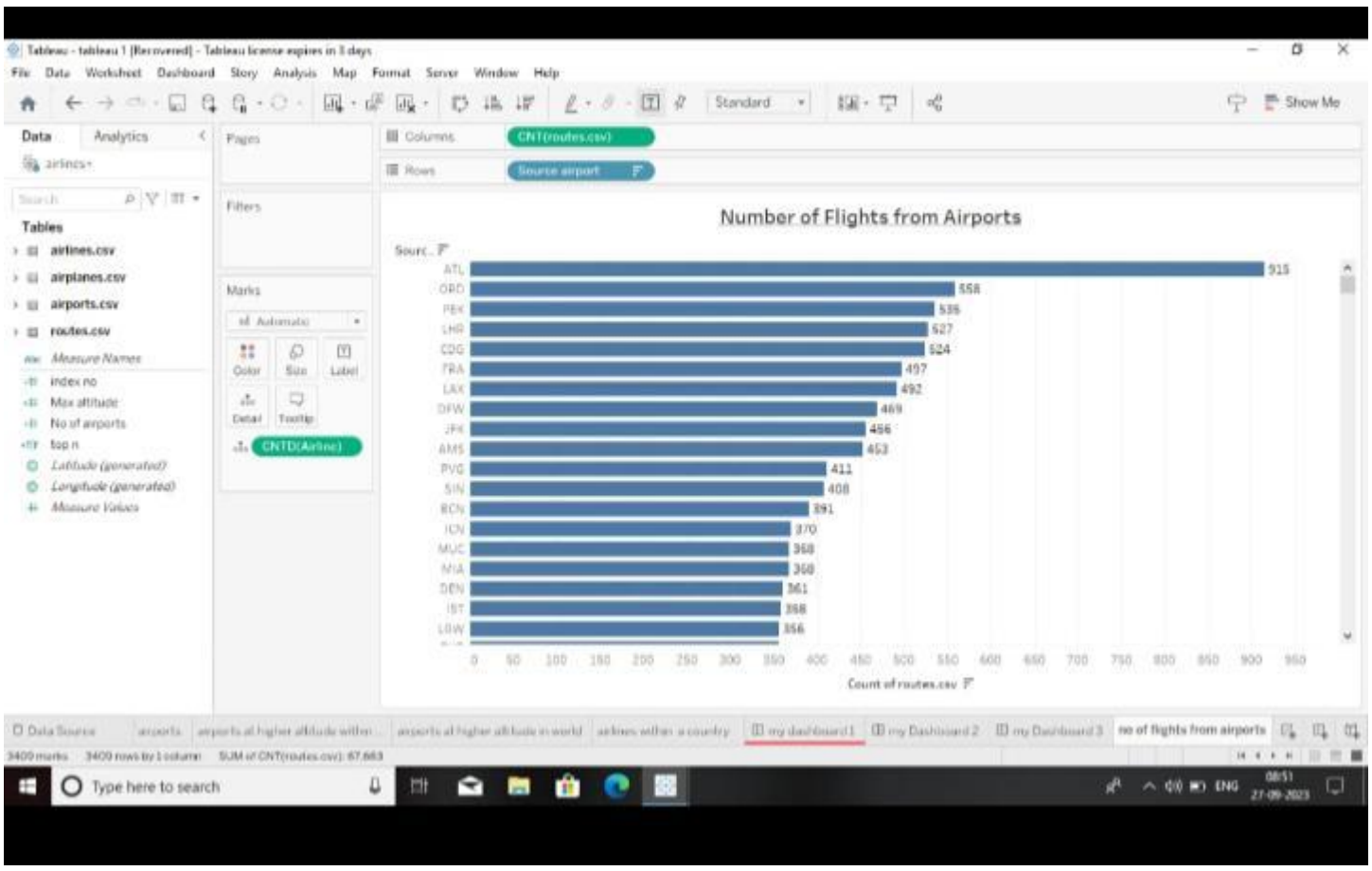
IDEATION & BRAINSTORMING MAP

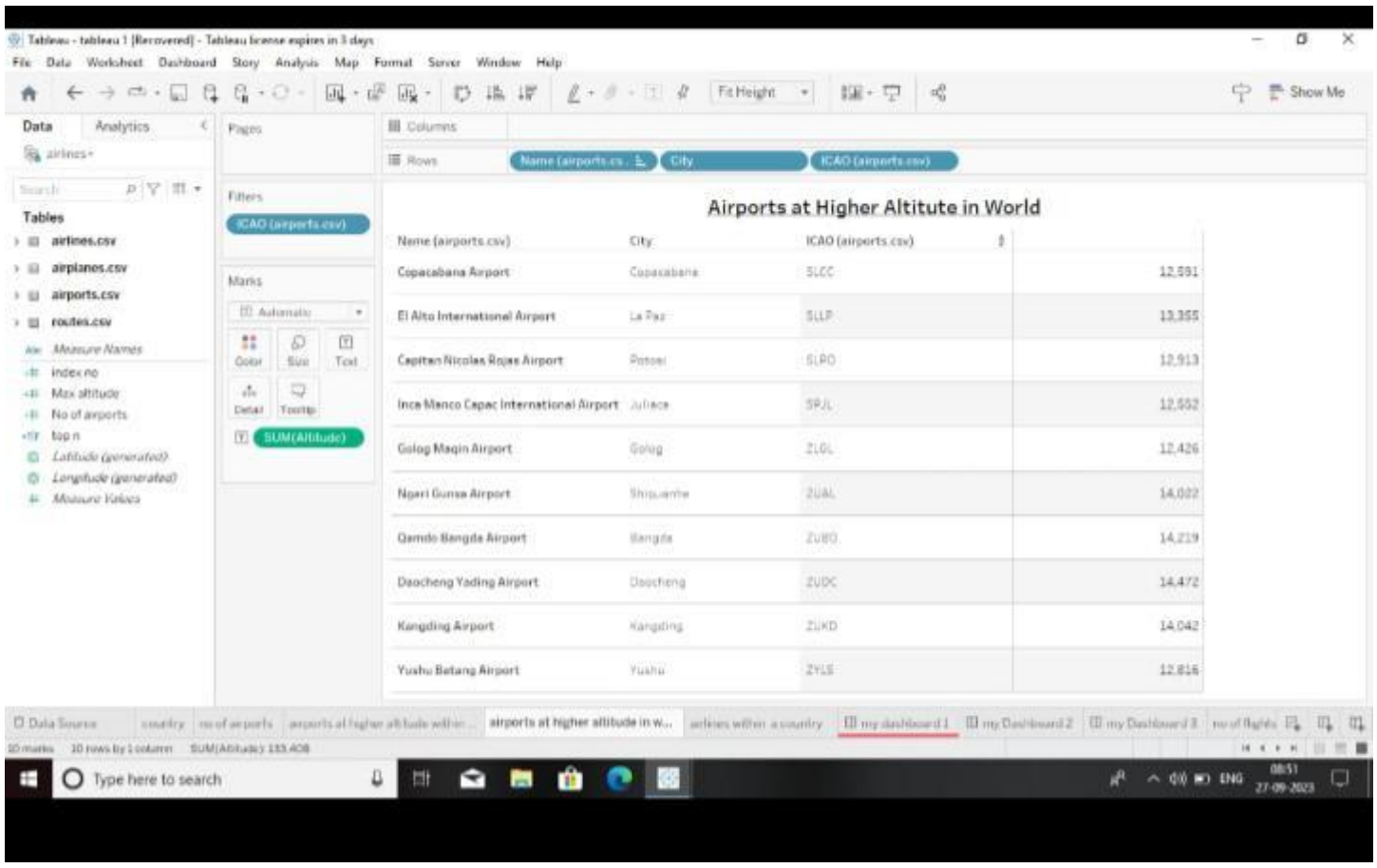


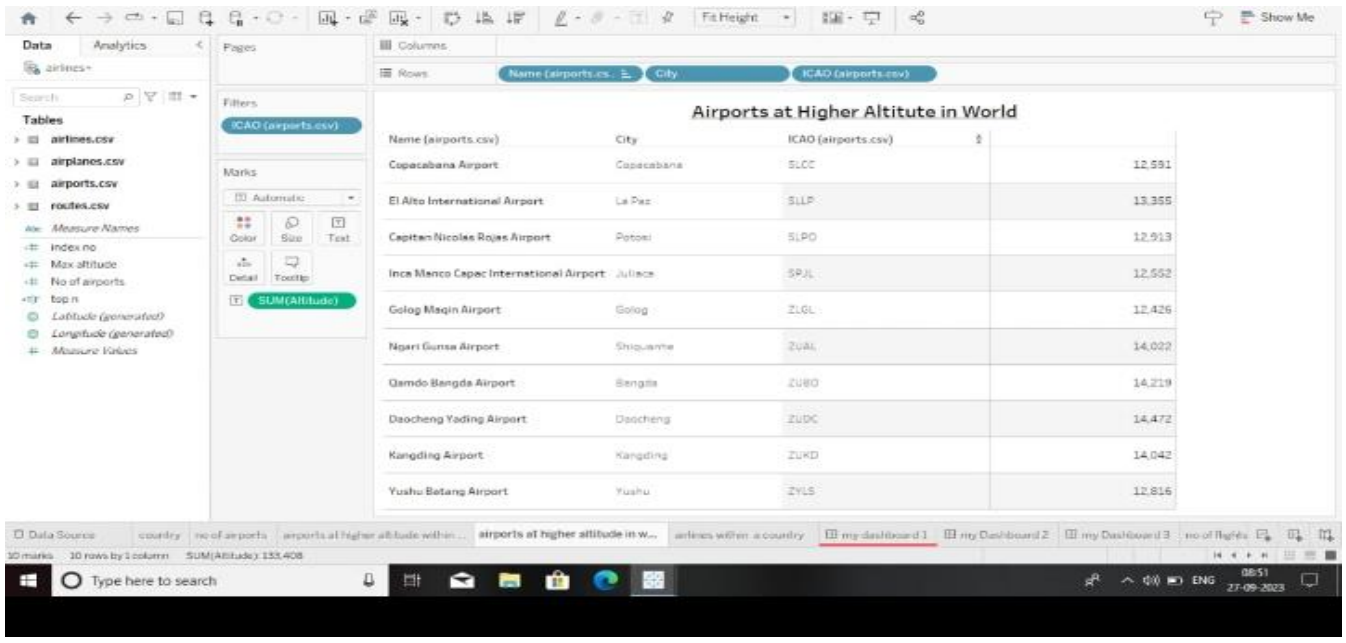
RESULT


airlines+
airlines.csv
routes.csv
airplanes.csv
airports.csv
Connections
Files
Index
Airline ID
Name
Alias
Iata
Icao


NUMBER OF AIRPORTS
148
Tables
airlines.csv
airplanes.csv
airports.csv
routes.csv
Filters
Marks
Country (airports.csv)
India
no of airports


Number of Flights from Airports
Source airport
CNT(routes.csv)
ATL 915
ORD 558
PEK 535
LHR 527
CDG 524
FRA 497
LAX 492
DFW 469
JFK 466
AMS 453
PVG 411
SIN 408
BCN 391
ICN 370
MUC 368
MIA 368
DEN 361
IST 358
LGW 356
Count of routes.csv


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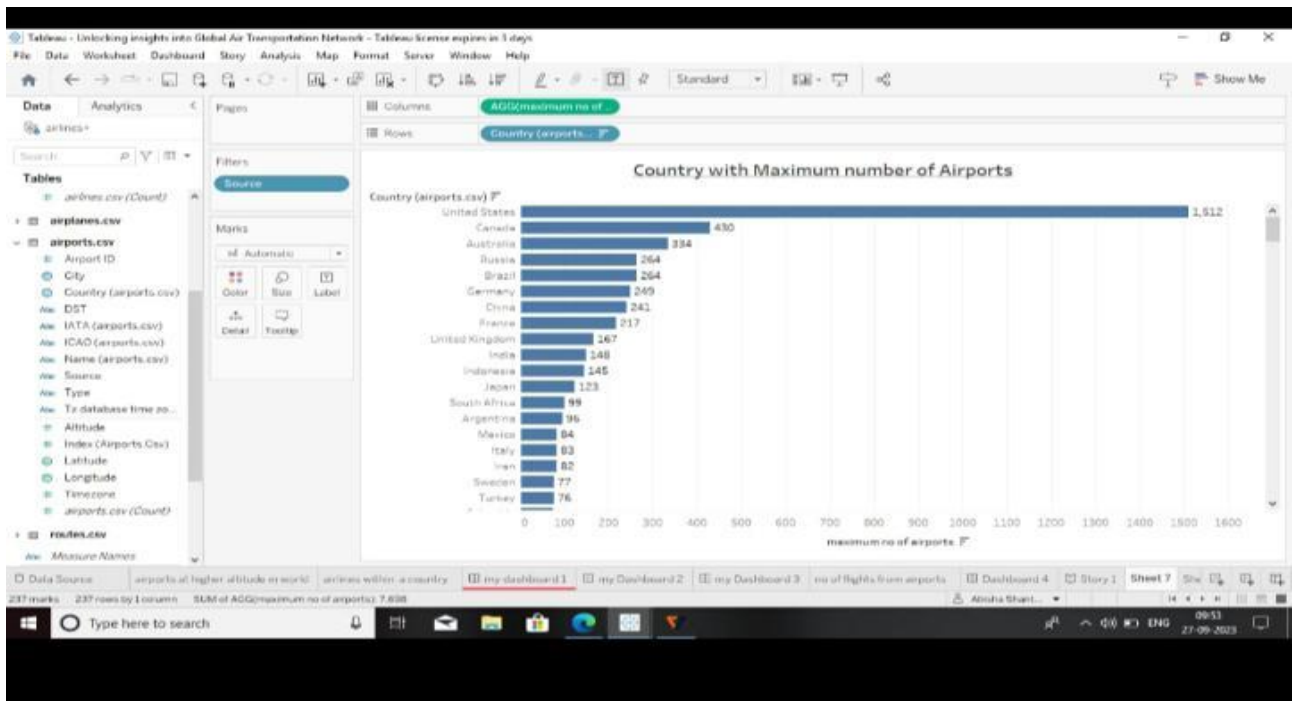
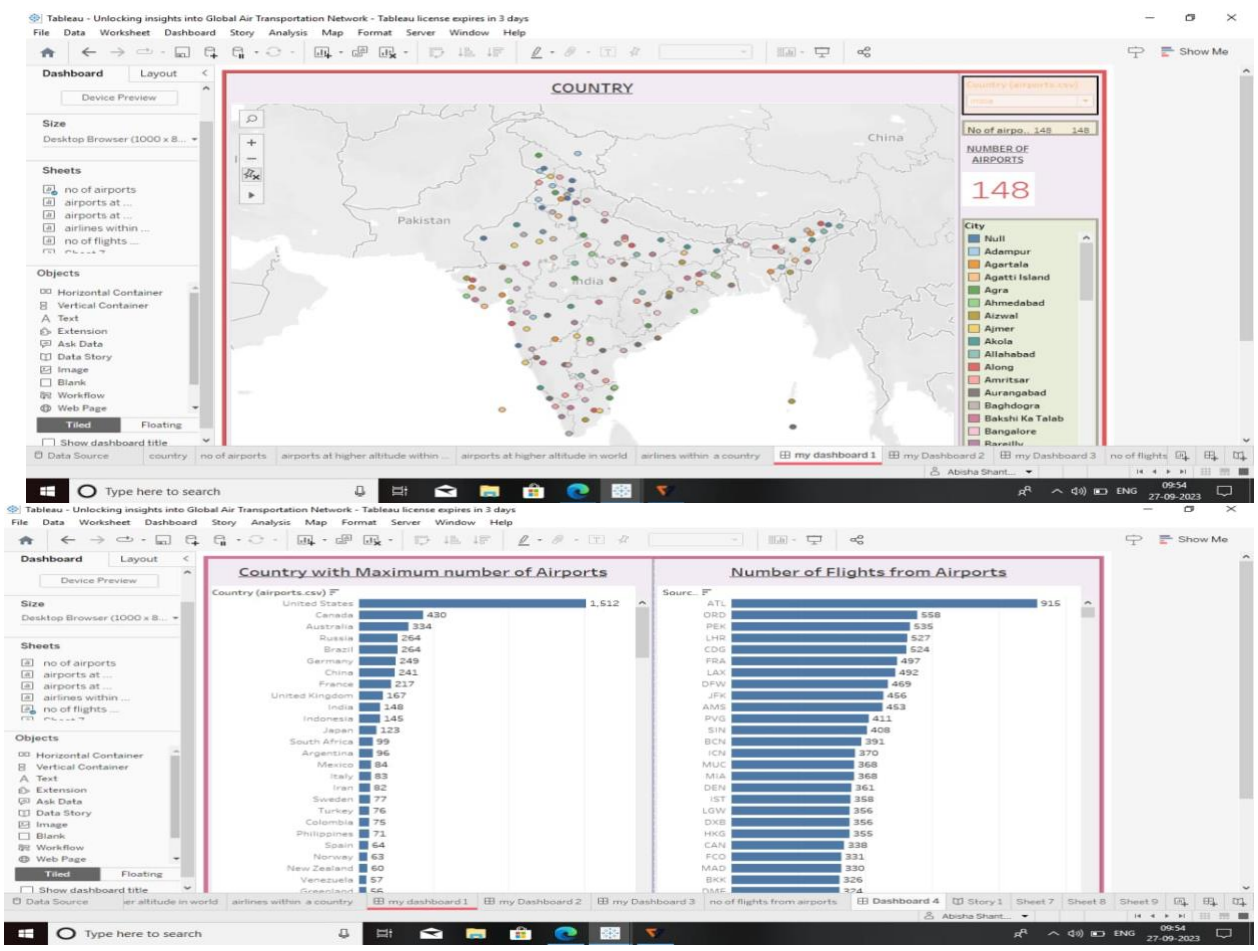
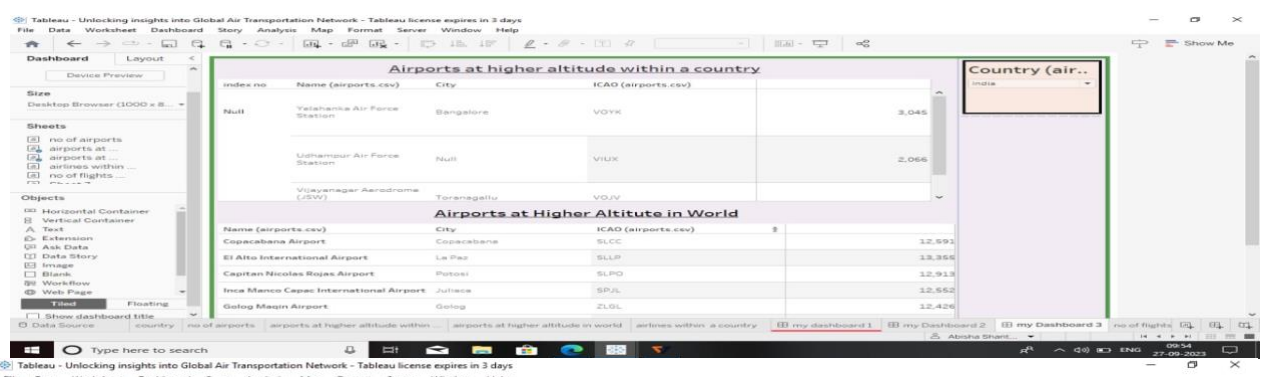
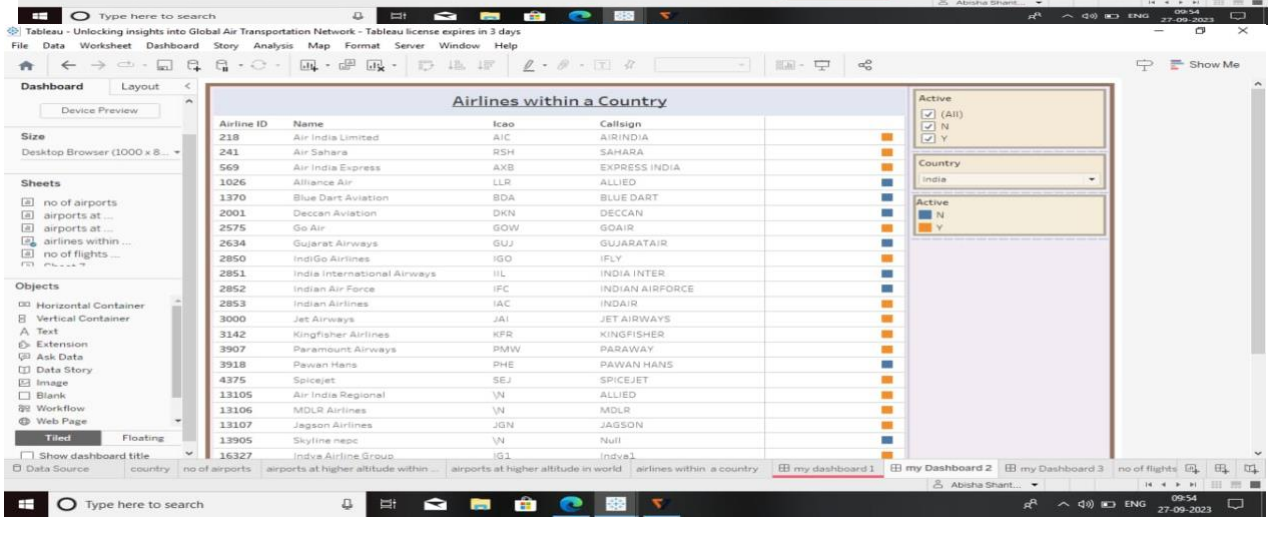

Country with Maximum number of Airports
United States 1,512
Canada 430
Australia 334
Russia 264
Brazil 264
Germany 249
China 241
France 217
United Kingdom 167
India 148
Indonesia 145
Japan 123
South Africa 99
Argentina 96
Mexico 84
Italy 83
Iran 82
Sweden 77
Turkey 76

DASHBOARD


COUNTRY
China
Pakistan
India
NUMBER OF AIRPORTS
148
City
Null
Adampur
Agartala
Agatti Island
Agra
Ahmedabad
Aizwal
Ajmer
Akola
Allahabad
Along
Amritsar
Aurangabad
Baghdogra
Bakshi Ka Talab
Bangalore
Country with Maximum number of Airports
Number of Flights from Airports


Airports at higher altitude within a country
Airports at Higher Altitute in World


Airlines within a Country

STORY

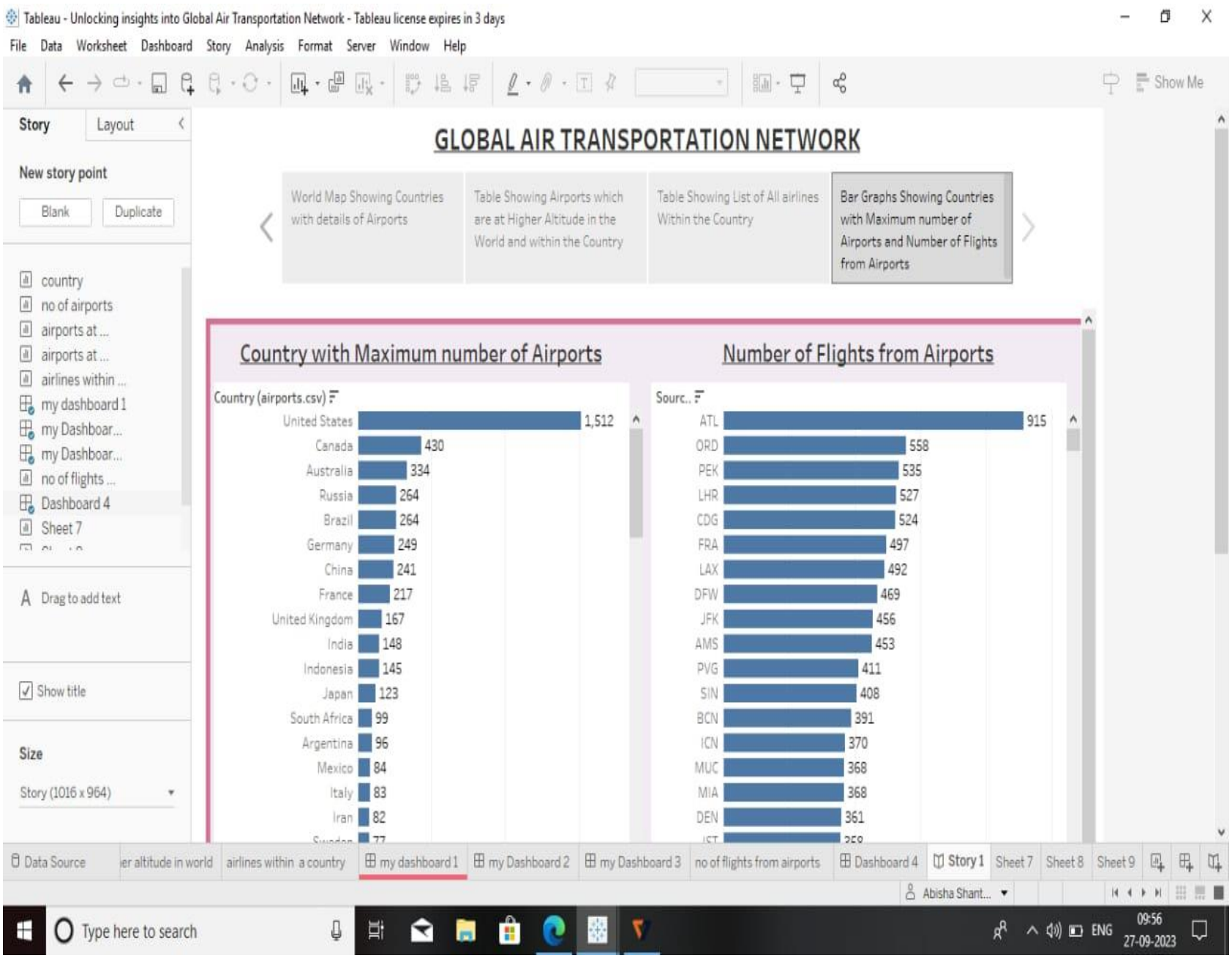


Tableau - Unlocking insights into Global Air Transportation Network - Tableau license expires in 3 days
File Data Worksheet Dashboard Story Analysis Format Server Window Help
Show Me
Story
Layout
New story point
Blank
Duplicate
country
no of airports
airports at ...
airports at ...
airlines within ...
my dashboard 1
my Dashboar...
my Dashboar...
no of flights ...
Dashboard 4
Sheet 7
Drag to add text
Show title
Size
Story (1016 x 964)
GLOBAL AIR TRANSPORTATION NETWORK
World Map Showing Countries with details of Airports
Table Showing Airports which are at Higher Altitude in the World and within the Country
Table Showing List of All airlines Within the Country
Bar Graphs Showing Countries with Maximum number of Airports and Number of Flights from Airports
Country with Maximum number of Airports
Country (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
Number of Flights from Airports
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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
Data Source
airlines within a country
my dashboard 1
my Dashboard 2
my Dashboard 3
no of flights from airports
Dashboard 4
Story 1
Sheet 7
Sheet 8
Sheet 9
Abisha Shant...
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ADANTAGES

Speed and efficiency:

- ***One of the key advantages of air transport is its unparalleled speed.***

Global Reach:

- ***Air transport provides extensive global coverage, connecting businesses to various destination around the world.***

Reliable Timelines:

- ***Air transport operates on fixed schedules, ensuring reliable timelines for delivers***

- ***. Airlines maintain strict adherence to departure and arrival times, minimizing delays and enhancing supply chain efficiency.***
- ***This reliability is crucial for businesses that require precise order preparation and fulfillment to meet customer expectations.***

Reduce:

- ***The fast transit times offered by air transport help reduce inventory holding costs.***
- ***With shorter lead times, businesses can maintain lower inventory levels while still meeting customer demands.***
- ***This frees up working capital and minimizes storage expenses, contributing to overall cost savings.***

DISADVANTAGES

Higher cost:

- ***One of the significant drawbacks of air transport is its higher cost compared to other modes, such as sea or land transport.***

Limited Capacity:

- ***Airplanes have limited cargo space compared to ships or trains.***

Restrictions on Hazardous Goods:

- ***Air transportation has strict regulation regarding the transportation of hazardous goods.***

APPLICATIONS

- ***Modelling air transport networks aims companies to organize their routes in a cost- efficiency way and therefore maximize their profits.***
- ***Air transport network models are also the tool to investigate system robustness.***
- ***They help to determine weakness of the system in case of various kinds of disruptions.***
- ***Once weaknesses are determined, a substitute node which can support all or part of the traffic load can be identified through the alternative strength for the pair.***
- ***An alternative application is modeling human disease networks.***
- ***Air transport network is used by millions of people every day, therefore it plays key role in the spread of some infections, such as influenza.***

CONCLUSION

The air transportation network as whole increase in relation to the number of destinations served and the frequency of flights. However, the access available from an individual airport or country to the global air transport network is relatable not just to the number and size of the destination served, but also the number of onward flight connections from these destination. In other words the overall benefit of an air service is linked to both the economic importance of the destination served and the network

connections from that airport to additional destinations.

FUTURE SCOPE

Businesses recognize the value of air transport network at present. But it is also important to assess whether the air transport network will continue to meet business needs over the next ten years. From the responses received from the businesses it seems that the air transport network will continue to play a vital role in their future operations

and growth, especially in developing countries.

APPENDIX

SOURCE CODE