

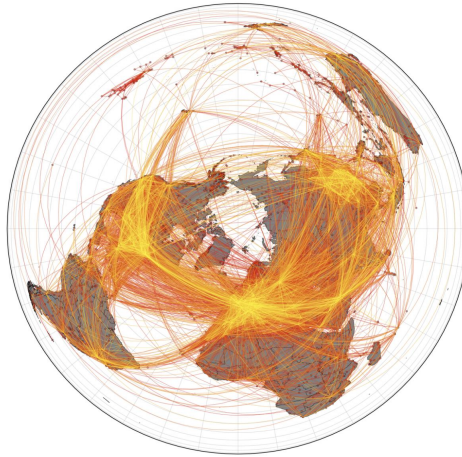
UNLOCKING INSIGHTS INTO THE GLOBAL AIR TRANSPORTATION NETWORK

1.INTRODUCTION

1.1 OVERVIEW

The global air transportation network is a complex and intricate web that connects people, goods, and ideas across the world. Understanding and optimizing this network is crucial for economic development, trade, and global connectivity. To unlock insights into this intricate system, one must delve into various facets, including routes, carriers, passenger behaviour, and environmental impacts. The global air transportation network comprises a vast array of routes and destinations. Air travel is a critical driver of globalization, enabling people and products to move quickly and efficiently. Researchers and analysts employ data analysis and modelling techniques to comprehend how routes are established, maintained, and adjusted over time. Geographic information systems (GIS) play a crucial role in mapping these networks, allowing researchers to visualize the interconnections among different cities and regions. Such insights are instrumental in route planning for airlines and can help identify underserved regions, thus fostering economic growth.

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1.2 PURPOSE

1. Air travel and the associated infrastructure contribute to economic growth by creating jobs, stimulating tourism, and facilitating trade. Airports and airlines are often major employers in their respective regions.

Air transportation networks transport goods and cargo across the world. They are essential for the timely delivery of perishable goods, high-value items, and products that require rapid transportation.

Air networks connect remote and distant locations, enabling global connectivity. This connectivity is crucial for international business, diplomacy, and emergency response efforts.

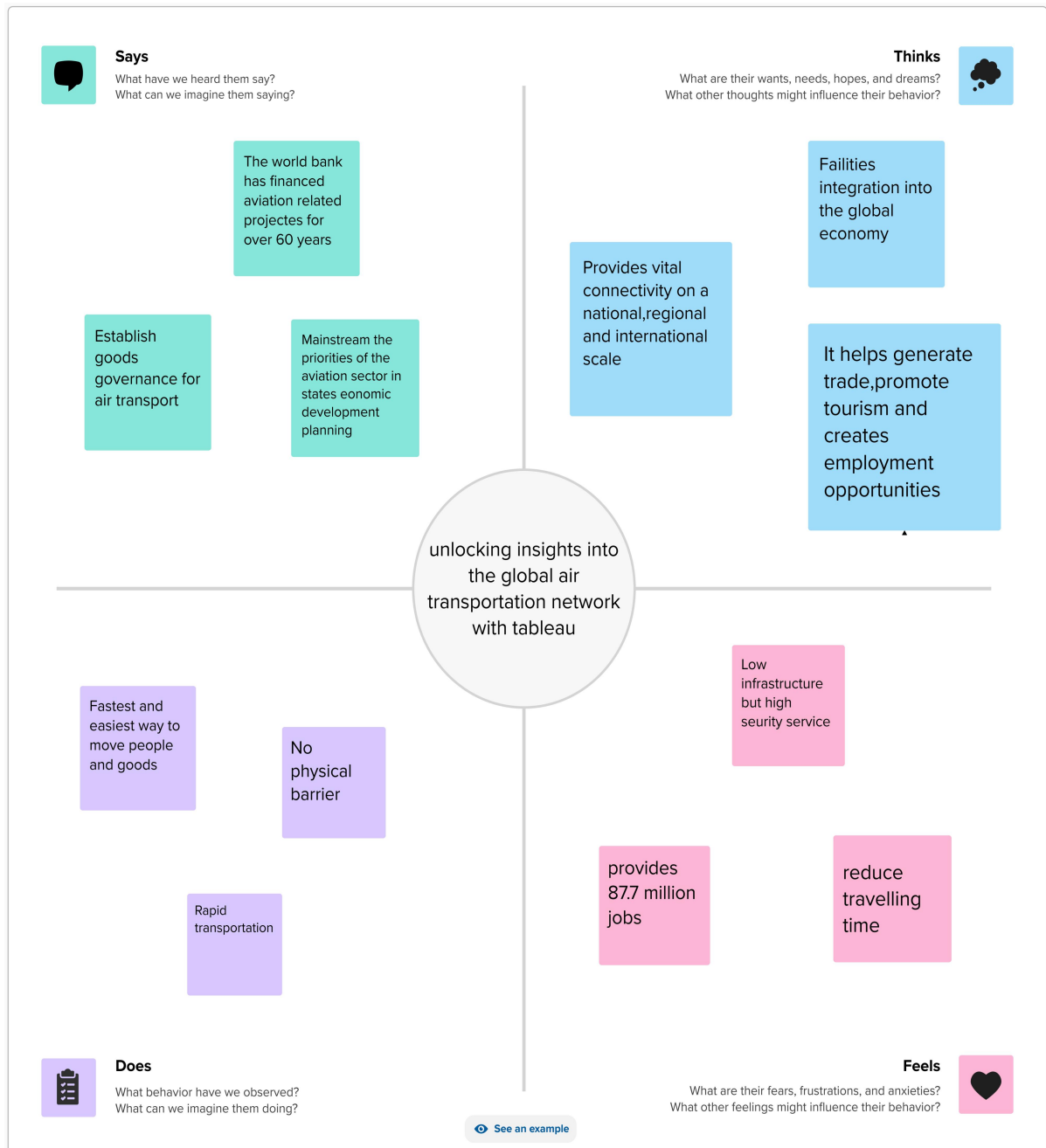
Air travel and the associated infrastructure contribute to economic growth by creating jobs, stimulating tourism, and facilitating trade. Airports and airlines are often major employers in their respective regions.

Air travel is often the fastest mode of transportation, particularly for long distances. This saves time for both passengers and shippers.

Air transportation networks play a vital role in emergency response, allowing for the rapid deployment of relief supplies, medical personnel, and equipment to disaster-stricken areas.

2.PROBLEM DEFINITION AND DESIGN THINKING

2.1 EMPATHY MAP



2.2 IDEATION & BRAINSTORMING MAPPING

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 10 minutes to prepare
- 1 hour to collaborate
- 2-8 people recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

- 10 minutes

- Team gathering: Define who should participate in the session and send an invite. Share relevant information to pre-visit shared.
- Set the goal: Think about the problem you'll be focusing on solving in the brainstorming session.
- Learn how to use the facilitation tools: Use the Facilitation Tooltips to learn a happy and productive session.

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

Climate conditions that are adverse. Extreme weather will cause planes to be grounded and airports to lose existing passengers for several days and rendering the service ineffective and there is some ground limitation due to air transportation.

Key rules of brainstorming

To run a session and produce success

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

Tip

You can select a sticky note and use the arrow button to attach it to the board or to another note to start a new group.

Person 1: [Sticky notes]

Person 2: [Sticky notes]

Person 3: [Sticky notes]

Person 4: [Sticky notes]

Person 5: [Sticky notes]

Person 6: [Sticky notes]

Person 7: [Sticky notes]

Person 8: [Sticky notes]

Need some inspiration?

Get inspired by ideas and examples to help you get started.

Open examples

[Sticky notes]

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

Tip

Ask participants to give sticky notes a color to make it easier to find. For example, red for "important", green for "inspiration", and blue for "ideas".

Promote the use of sustainable aviation fuels (SAF). Investing in advanced aerodynamics.

Improve air traffic management. Explore emerging technologies like hydrogen and electric aircraft.

Improving air traffic management and airport infrastructure can optimize flight routes.

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

Tip

Participants can use their own sticky notes or the ones provided. The facilitator will assign the sticky notes to the grid as they are shared.

Importance

Feasibility

Streamline flight paths

Promote the use of sustainable aviation fuels (SAF)

Improving air traffic management and airport infrastructure can optimize flight routes

Investing in advanced aerodynamics

Explore emerging technologies like hydrogen and electric aircraft

Educate the travelers about environmental impact of air travel

Develop and implement more fuel-efficient aircraft engines

Optimize flight routes

After you collaborate

You can export the board as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

- Share the board: Share a view link to the board with collaborators to keep them in the loop about the substance of the session.
- Export the board: Export a copy of the board as a PDF or PNG to attach to an email, include in a slide, or save to your drive.

Keep moving forward

- Strategy blueprint: Outline the components of a new idea or strategy.
- Customer experience journey map: Understand customer needs, motivations, and activities for an experience.
- Strengths, weaknesses, opportunities & threats: Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.

[Sticky notes]

[Sticky notes]

[Sticky notes]

[Sticky notes]

4 ADVANTAGES AND DISADVANTAGES

4.1 ADVANTAGES

Speed and Efficiency: Air travel is one of the fastest means of transportation. It allows people and goods to reach their destinations quickly, making it ideal for urgent travel and time-sensitive cargo.

Global Connectivity: Air transportation networks connect regions, countries, and continents, facilitating global connectivity. This connectivity is essential for international business, diplomacy, and personal travel.



Accessibility: Airports are often located in or near major urban areas, making them easily accessible to a large number of people. This accessibility reduces the time and effort required to reach airports, enhancing convenience.

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4.2 DISADVANTAGES

1.Environmental Impact: Air travel is a major contributor to carbon emissions and greenhouse gases. The aviation industry is responsible for a significant portion of global CO2 emissions, which contributes to climate change. Efforts are being made to reduce the environmental impact through fuel-efficient aircraft and sustainable practices, but this remains a significant concern.

2.Cost: Air travel can be expensive, especially for long-distance or international journeys. Ticket prices, taxes, and fees can add up, making it less affordable for some travelers



3.Limited Accessibility: Not all regions have access to airports or suitable runways for air travel, which can limit accessibility and connectivity in certain areas.

4.Airport Congestion: Major airports in busy metropolitan areas often experience congestion, leading to flight delays, long security lines, and overall inefficiency. This can be frustrating for travelers.

5. Security Concerns: Air travel requires strict security measures, including passenger and baggage screening. While these measures are essential for safety, they can also be time-consuming and inconvenient for travelers.

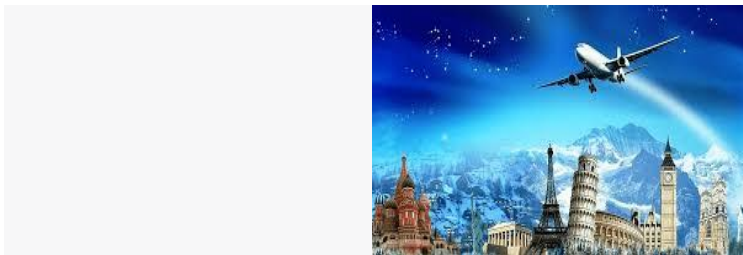


5.APPLIATIONS

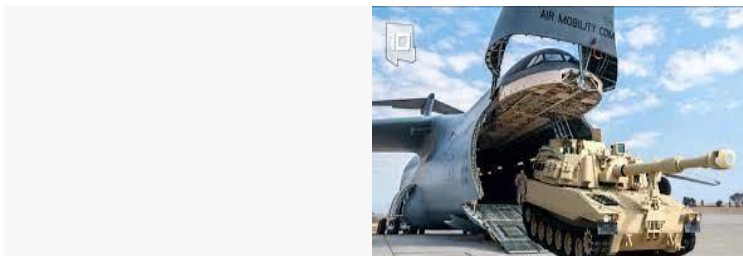
1.Cargo Transport: Air transportation is crucial for shipping high -value and time-sensitive cargo. It is often used to transport electronics, pharmaceuticals, perishable goods, and valuable commodities. Air freight services are essential for global trade and supply chain logistics.



2.Tourism: The tourism industry heavily relies on air transportation to bring visitors to destinations around the world. This includes tourists traveling for leisure, sightseeing, adventure, and cultural experiences.



Military Operations: The military relies on air transportation for troop deployment, cargo transport, aerial reconnaissance, and combat missions . Military aircraft are designed for various functions, including fighter jets , transport planes, and helicopters.



Emergency Response: Air transportation is vital in emergency response efforts. It allows for the rapid deployment of relief supplies, medical personnel , and humanitarian aid to disaster-affected areas, remote locations, and regions with limited infrastructure.

6. CONCLUSION

Air transportation networks have revolutionized the way the world connects, making distant lands accessible, and enabling the rapid movement of people and goods on a global scale. These networks consist of a complex interplay of airlines, airports, aircraft, air traffic control, and supporting infrastructure that collectively form the lifeblood of modern society. The advantages of air transportation are manifold, but they come with their own set of challenges.

One of the most significant advantages of air transportation is speed and efficiency. Whether it's for personal travel or the expedited delivery of cargo, air travel is unmatched in its ability to cover vast distances in remarkably short timeframes. This is particularly evident in long-distance and international travel, where air transport excels as the preferred mode of transit due to its rapidity. The frequency and convenience of scheduling further enhance its appeal, offering travelers a wide range of departure times and options to fit their specific needs.

Global connectivity is another major advantage, with air transportation networks functioning as the lifeblood of the world's economy. They bring nations closer together, providing essential links for international business, trade, and diplomacy. Major hub airports serve as gateways to the world, connecting passengers to an ever-expanding network of destinations, fostering economic growth, and fueling the global exchange of cultures and ideas.

The cargo transport facet of air networks ensures the timely delivery of high-value, perishable, and time-sensitive goods. From pharmaceuticals to electronic components, air freight services play an indispensable role in global trade and supply chain logistics. When disaster strikes or emergency relief is needed, air transportation networks become lifelines, transporting humanitarian aid and medical teams swiftly to affected areas.

7. FUTURE SCOPE

The future scope of the global air transportation network holds significant potential for evolution and expansion, driven by technological advancements, changes in passenger preferences, environmental concerns, and economic growth. Here are some key areas where we can anticipate developments and innovations in the coming years:

Sustainable Aviation: One of the most pressing challenges in air transportation is reducing its environmental impact. The future of the industry will focus on developing more sustainable aviation technologies, including electric and hybrid propulsion systems, alternative fuels, and more fuel-efficient aircraft designs. Efforts to lower carbon emissions and minimize noise pollution will be at the forefront of industry initiatives.



Advanced Aircraft Design: Future aircraft designs will incorporate advanced materials, aerodynamics, and technology to enhance efficiency, safety, and passenger comfort. These innovations may lead to quieter, faster, and more environmentally friendly aircraft.



Supersonic and Hypersonic Travel: There is renewed interest in supersonic and hypersonic passenger travel, which could dramatically reduce travel times for long-haul journeys. Companies are actively researching and developing supersonic and hypersonic aircraft concepts.

3.RESULT

DASHBOARD 1



DASHBOARD 2

Sheet 3

Name (airports.csv)	City	ICAO (airports.csv)	Country	
Capitan Nicolas Rojas Airport	Potosi	SLPO	Equatorial Guinea	12,913
Copacabana Airport	Copacabana	SLCC	Null	12,591
Daocheng Yading Airport	Daocheng	ZUDC	Null	14,472
El Alto International Airport	La Paz	SLLP	Guinea-Bissau	13,355
Golog Maqin Airport	Golog	ZLGL	Null	12,426
Inca Manco Capac International Airport	Juliaca	SPJL	United States	12,552
Kangding Airport	Kangding	ZUKD	Null	14,042
Ngari Gunsa Airport	Shiquanhe	ZUAL	Australia	14,022
Qamdo Bangda Airport	Bangda	ZUBD	Taiwan	14,219
Yushu Batang Airport	Yushu	ZYLS	Brazil	12,816

DASHBOARD 3

Sheet 4

Airline ID	Name	Icao	Callsign	Active
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 Airways	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
13905	Skyline nepc	\N	Null	N
16327	Indya Airline Group	IG1	Indya1	Y
16362	OCEAN AIR CARGO	IXO	Null	Y
16738	NEPC Airlines	\N	Null	N
16901	12 North	N12	12N	Y
19451	Air Costa	\N	Null	Y
20264	Air Vistara	VTI	Null	Y
20286	Air Pegasus	PPL	Null	Y
21270	Air Carnival	\N	Null	Y

Active

☒ N

☒ Y

Country

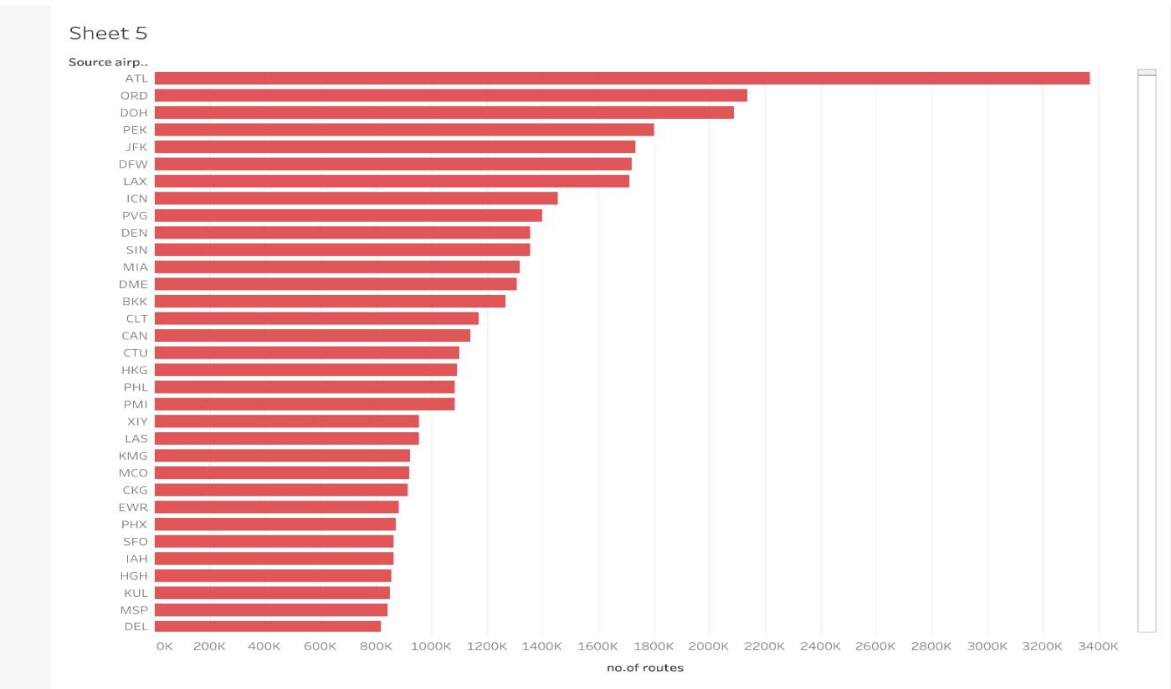
India

Active

☒ N

☒ Y

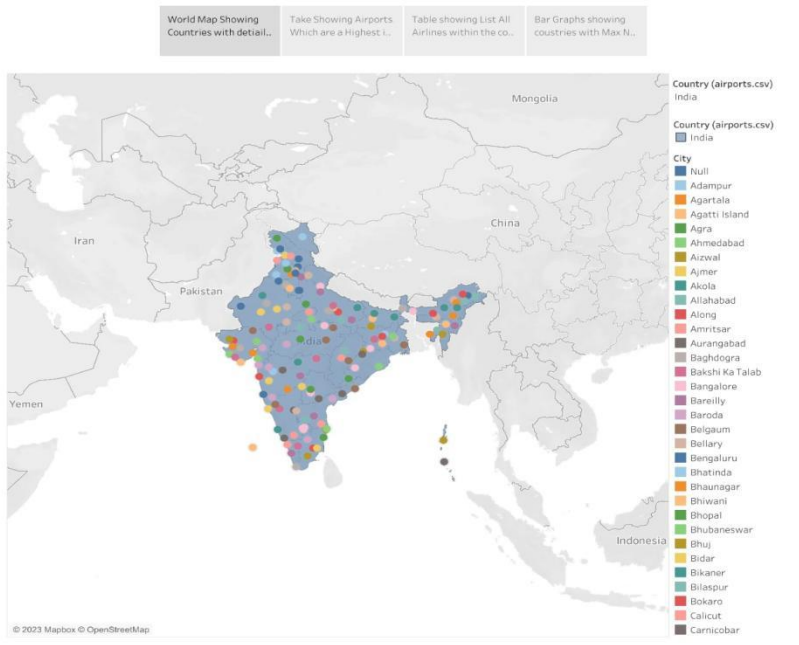
DASHBOARD 4



STORY

STORY 1

Global Air Transportation Network



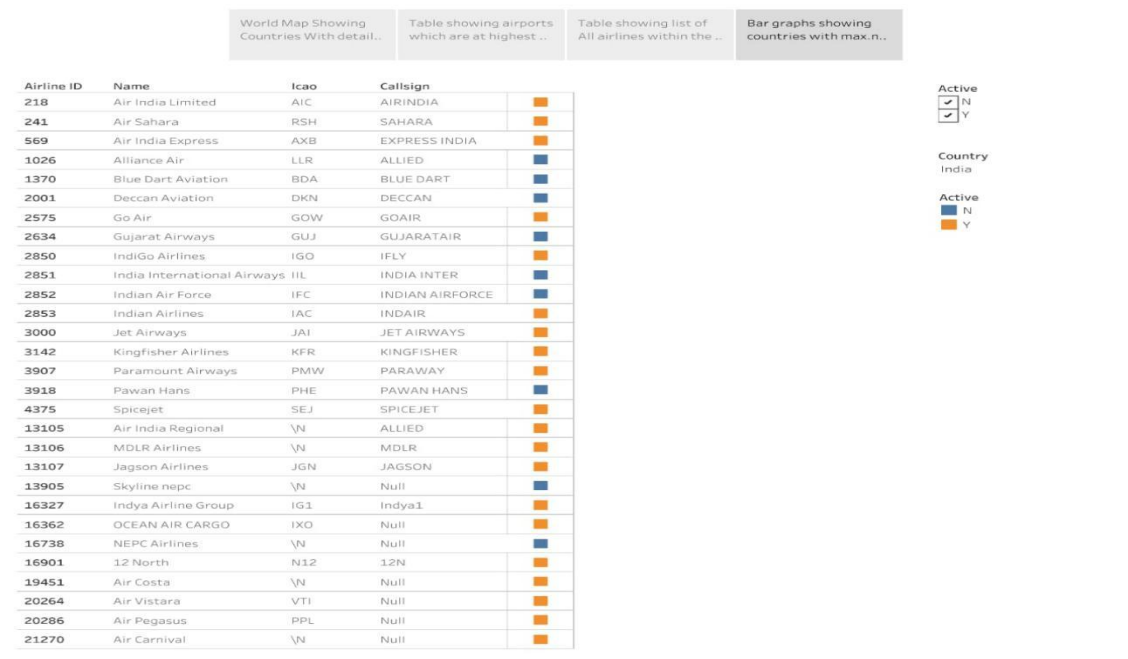
STORY 2

Global Air Transportation Network

world map showing countries with details...	table showing airports which are at highest...	table showing list of all airlines within the...	bar graph showing countries with max N...
Name (airports.csv)	City	ICAO (airpo...	
9 de Maio - Teixeira de Fre...	Teixeira de Freitas	SKTF	Abc
[Duplicate] Playa Samara ...	Playa Samara	MRSR	Abc
[Duplicate] Giebelstadt Ar...	Giebelstadt	ETEU	Abc
[Duplicate] Iliertissen see...	Not Specified	XXXX	Abc
A 511 Airport	Pyongtaek	RKSG	Abc
A Coruña Airport	La Coruña	LECO	Abc
Aachen-Merzbrück Airport	Aachen	EDKA	Abc
Aalborg Airport	Aalborg	EKYT	Abc
Aalen-Heidenheim/Elchin...	Aalen-heidenheim	EDPA	Abc
Appilattoq (Kujalleq) Hel...	Appilattoq	BGAQ	Abc
Appilattoq (Qaasuitsup) ...	Appilattoq	BGAG	Abc
Aarhus Airport	Aarhus	EKAH	Abc
Aarhus Seaplane Terminal	Aarhus	EKAC	Abc
Asiaat Airport	Asiaat	BGAA	Abc
Aba Tenna Dejazmach Yil...	Dire Dawa	HADR	Abc
Abaco I Walker C Airport	Walker's Cay	MYAW	Abc
Abadan Airport	Abadan	OIAA	Abc
Abaiang Airport	Abaiang Atoll	NGAB	Abc
Abakan Airport	Abakan	UNAA	Abc
Abbeville	Abbeville	LFQI	Abc
Abbotsford Airport	Abbotsford	CYXX	Abc
Abdul Rachman Saleh Airp...	Malang	WARA	Abc
Abeche Airport	Abeche	FTTC	Abc
Abeld Amani Karume Inter...	Zanzibar	HTZA	Abc
Abel Santamaria Airport	Santa Clara	MUSC	Abc
Abemama Atoll Airport	Abemama	NGTB	Abc
Aberdeen Dyce Airport	Aberdeen	EGPD	Abc
Aberdeen Regional Airport	Aberdeen	KABR	Abc
Abha Regional Airport	Abha	OEAB	Abc
Abilene Regional Airport	Abilene	KABI	Abc
Abqaiq Airport	Abqaiq	OEBO	Abc
Abraham González Intern...	Ciudad Juárez	MMCS	Abc
Abraham Lincoln Capital A...	Springfield	KSPI	Abc
Abu Dhabi International A...	Abu Dhabi	OMAA	Abc
Abu Musa Island Airport	Abumusa I.	OIBA	Abc
Abu Simbel Airport	Abu Simbel	HEBL	Abc
Acadiana Regional Airport	Louisiana	KARA	Abc
Achinsk Airport	Achinsk	UNKS	Abc

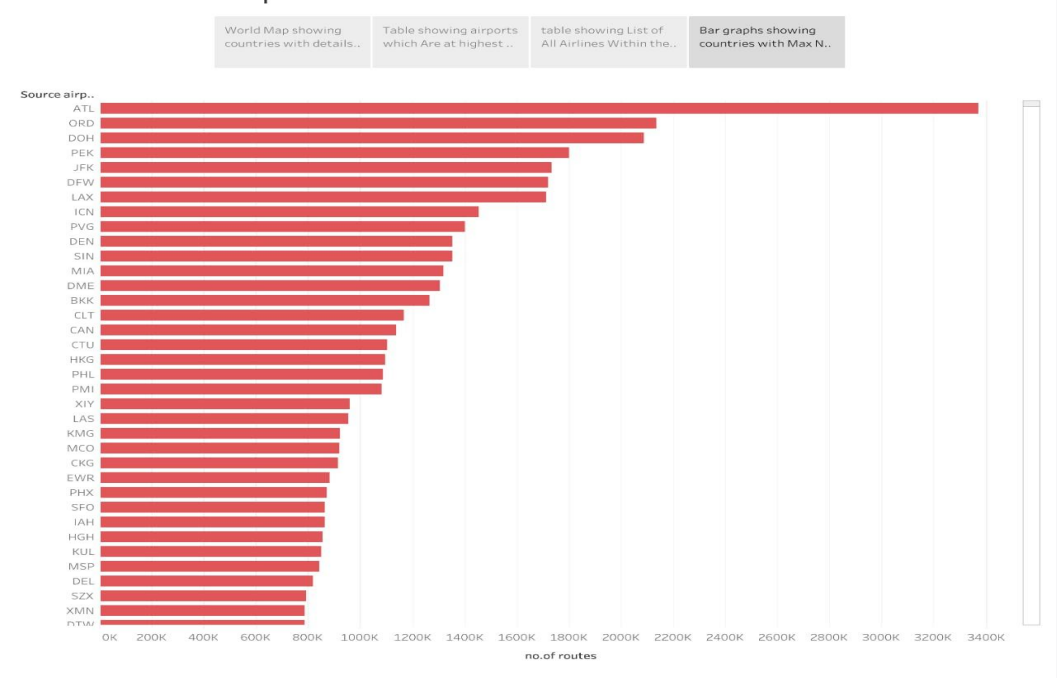
STORY 3

Global Air Transportation Network



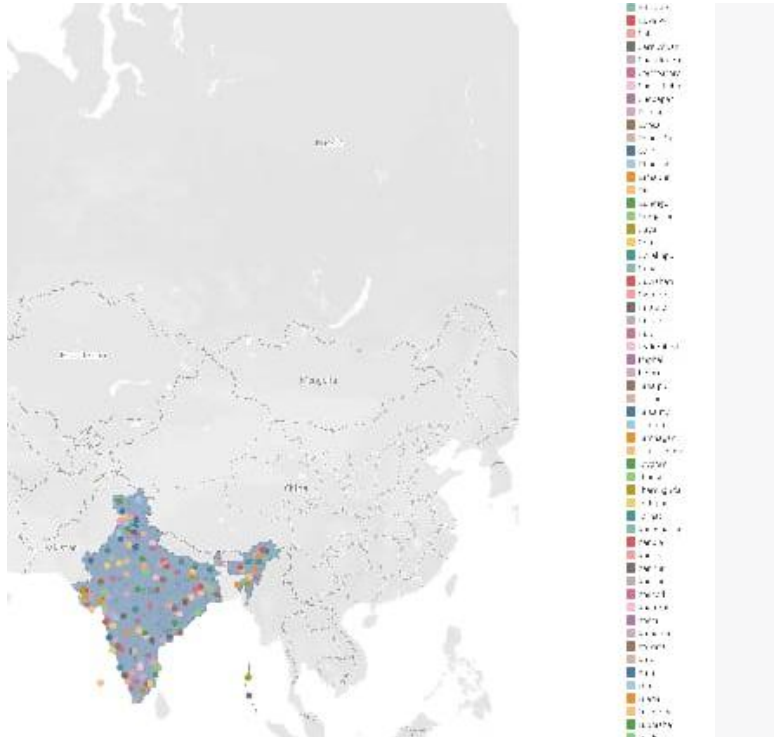
STORY 4

Global Air Transportation Network

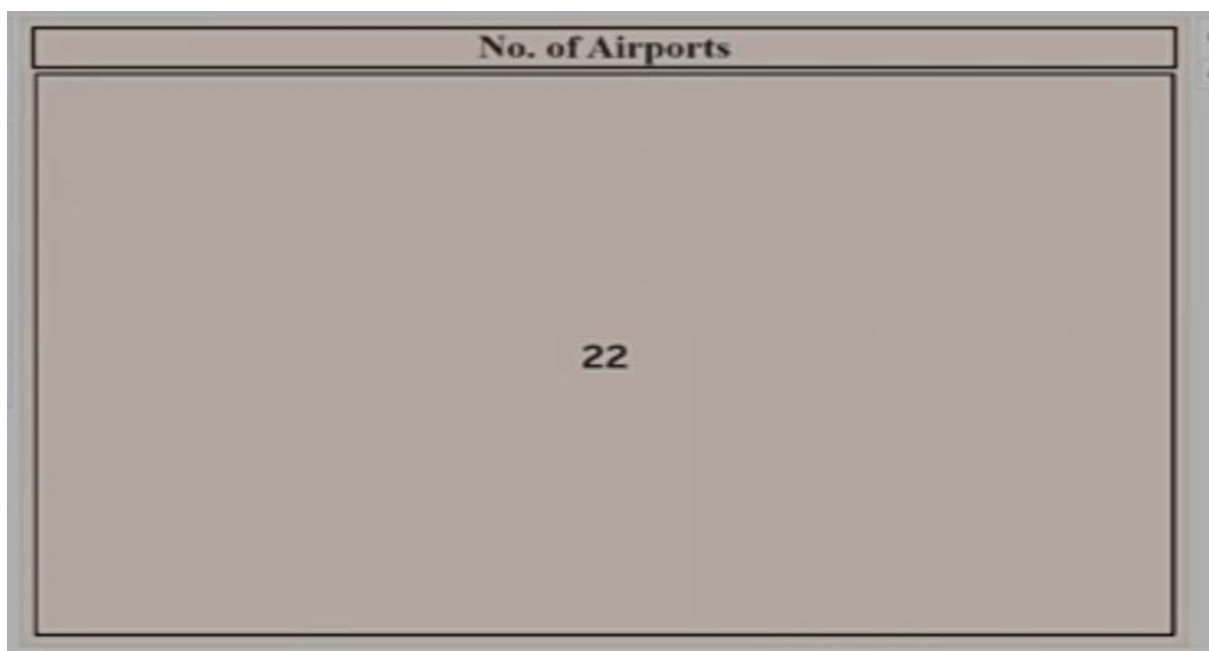


VISUALIZATION

1.WORLD MAP SHOWING DETAILS OF ALL AIRPORTS WITHIN A COUNTRY



2.Number of Airports within the country



3: Airports at Higher altitude within a country

Name (airports.csv)	City	ICAO (airpo..		
9 de Maio - Teixeira de Fre..	Teixeira de Freitas	SNTF		Abc
(Duplicate) Playa Samara ..	Playa Samara	MRSR		Abc
[Duplicate] Giebelstadt Ar..	Giebelstadt	ETEU		Abc
[Duplicate] Illertissen see ..	Not Specified	XXXX		Abc
A 511 Airport	Pyongtaek	RKSG		Abc
A Coruña Airport	La Coruna	LECO		Abc
Aachen-Merzbrück Airport	Aachen	EDKA		Abc
Aalborg Airport	Aalborg	EKYT		Abc
Aalen-Heidenheim/Eichin..	Aalen-heidenheim	EDPA		Abc
Aappilattoq (Kujalleq) Hel..	Aappilattoq	BGAQ		Abc
Aappilattoq (Qaasuitsup) ..	Aappilattoq	BGAG		Abc
Aarhus Airport	Aarhus	EKAH		Abc
Aarhus Seaplane Terminal	Aarhus	EKAC		Abc
Aasiaat Airport	Aasiaat	BGAA		Abc
Aba Tenna Dejazmach Yil..	Dire Dawa	HADR		Abc
Abaco I Walker C Airport	Walker's Cay	MYAW		Abc
Abadan Airport	Abadan	OIAA		Abc
Abaiang Airport	Abaiang Atoll	NGAB		Abc
Abakan Airport	Abakan	UNAA		Abc
Abbeville	Abbeville	LFOI		Abc
Abbotsford Airport	Abbotsford	CYXX		Abc
Abdul Rachman Saleh Airp..	Malang	WARA		Abc
Abeche Airport	Abeche	FTTC		Abc
Abeid Amani Karume Inter..	Zanzibar	HTZA		Abc
Abel Santamaria Airport	Santa Clara	MUSC		Abc
Abemama Atoll Airport	Abemama	NGTB		Abc
Aberdeen Dyce Airport	Aberdeen	EGPD		Abc
Aberdeen Regional Airport	Aberdeen	KABR		Abc
Abha Regional Airport	Abha	OEAB		Abc
Abilene Regional Airport	Abilene	KABI		Abc
Abqaiq Airport	Abqaiq	OEBQ		Abc
Abraham González Intern..	Ciudad Juárez	MMCS		Abc
Abraham Lincoln Capital A..	Springfield	KSPI		Abc
Abu Dhabi International A..	Abu Dhabi	OMAA		Abc
Abu Musa Island Airport	Abumusa I.	OIBA		Abc
Abu Simbel Airport	Abu Simbel	HEBL		Abc
Acadiana Regional Airport	Louisiana	KARA		Abc
Achinsk Airport	Achinsk	UNKS		Abc
Achmad Yani Airport	Semarang	WARS		Abc
Ada Regional Airport	Ada	KADH		Abc
Adak Airport	Adak Island	DADK		Abc

4: Airports at Higher altitude in the world

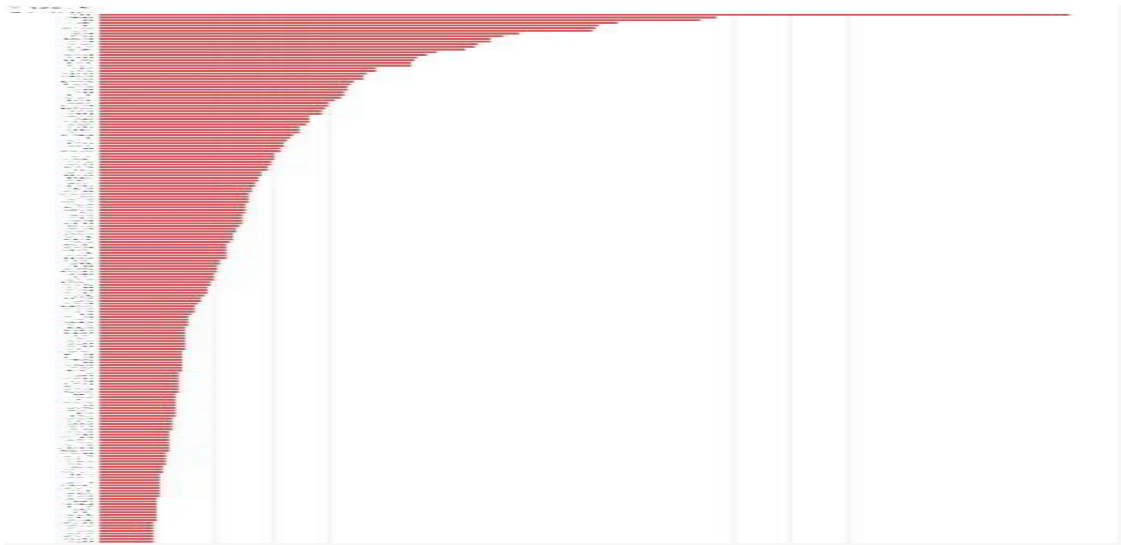
Sheet 3				
Name (airports.csv)	City	ICAO (airports.csv)	Country	
Capitan Nicolas Rojas Airport	Potosí	SLPD	Equatorial Guinea	12,933
Copacabana Airport	Copacabana	SLCC	Null	12,591
Daocheng Yading Airport	Daocheng	ZUDC	Null	14,472
El Alto International Airport	La Paz	SLLP	Guinea-Bissau	13,355
Golog Maqin Airport	Golog	ZLOL	Null	12,426
Isa Barra Cape International Airport	Juliaca	SPUL	United States	12,552
Kangding Airport	Kangding	ZURD	Null	14,042
Ngari Quna Airport	Shiquanhe	ZUAL	Australia	14,022
Qando Bangda Airport	Bangda	ZURD	Taiwan	14,239
Yushu Batang Airport	Yushu	ZYLS	Brazil	12,836

5: Airlines within a Country

Sheet 4

Airline ID	Name	Icao	Callsign	Active
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 Airways IIL		INDIA INTER	N
2852	Indian Air Force	IFC	INDIAN AIRFORCE	N
2853	Indian Airlines	IAC	INDAIR	Y
2854	Indian Airlines			Y

6: Number of flights from



8. APPENDIX

GITHUB LINK :

<https://github.com/Punithavelbalasubramanian/Unlocking-Insights-Into-The-Global-Air-Transportation-Network-With-Tableau-NM2023TMiD33357>

DASHBOARD 1

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DASHBOARD 2

https://public.tableau.com/app/profile/preethi.a7484/viz/Book1_16971732117940/Dashboard2?publish=yes

DASHBOARD 3

https://public.tableau.com/app/profile/preethi.a7484/viz/Book1_16971732117940/Dashboard3?publish=yes

DASHBOARD 4

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STORY 1

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STORY 2

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STORY 3

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STORY 4

https://public.tableau.com/app/profile/preethi.a7484/viz/Book1_16971732117940/Story4?publish=yes

VISUALIZATION

VISUALIZATION 1:

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VISUALIZATION 6:

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VIDEO DEMONSTRATION LINK:

<https://gemoo.com/tools/upload-video/share/571736821858152448?codeId=DW2Q05bb883Lg&card=571736817378635776&origin=videolinkgenerator>

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S.NO	TITLE	PAGE NO
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