



# **Airline Insights 2015**

**Analysis of Flights Delay, Cancellation, and Diversions**

# Executive Summary

This project analyzed January 2015 airline data to uncover key patterns in flight delays, cancellations, and diversions. Using SQL for data cleaning and Power BI for data modeling and visualization.

I created an interactive dashboard to highlight performance metrics by airline and airport.

Key insights showed that airline issues were the top cause of cancellations, with delays on Fridays and long delays strongly linked to diversions.

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# Project Overview

## **Objective**

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Analyze January 2015 flight data to uncover patterns in delays, cancellations, and diversions, providing actionable insights for improving airline performance.

## **Data source**

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Airline data from the first week of January 2015.

## **Tools**

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SQL and Power BI



# Project Steps

## **Dashboard & Visualization**

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Developed a multi-page Power BI dashboard with views on cancellations, delays, and diversions. Created visuals to analyze key insights and trends by airline, airport, and day of the week.

## **Power Bi & Transformation**

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Imported cleaned data into Power BI and created transformations to ensure consistency and accuracy. Built slicers for filtering across the dashboard.

## **Data Import & Cleaning**

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Imported the flight data for January 2015 into SQL. Cleaned and prepared the data by addressing null values in key columns (e.g., arrival time, departure delay).

## **Data Modeling in SQL**

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Designed structured data model, creating fact table for flights & dimension tables for dates, airlines, airports. Established relationships to enable accurate filtration and analysis.

# Dashboard Structure

## **Overview Page**

Displays high-level metrics on flight performance, cancellations, and delays.

## **Airports Analysis**

Shows top airports by cancellation rate, delay trends, and flight volume

## **Airlines Analysis**

Compares cancellation and delay rates across airlines.

## **Diversions & Delays**

Examines patterns in flight diversions and their correlation with delays

# Key Insights

## Top Cancellation Reason

Airline issues were the most common cause, followed by air system delays and weather.



## Airport Delays

Highest delays occurred on Fridays, particularly at major hubs like Dallas/Fort Worth.



## Diverted Flights

Strong correlation between lengthy delays and diversions, especially during peak hours.



# Questionnaires

**66,000**

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Flights

**4,124**

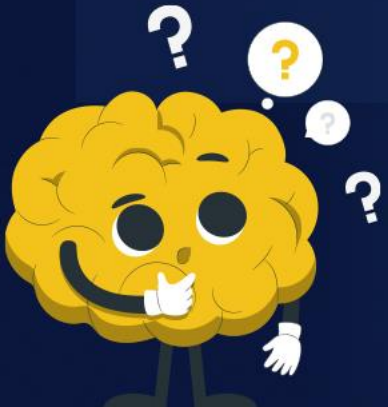
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Air

**312**

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Airport





# Recommendations



## **Operational Adjustments for High–Delay Days**

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Increase staffing on Fridays  
to manage delays.

## **Enhanced Communication for Delays**

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Notify passengers in advance  
for potential delays.

## **Structured Scheduling and Maintenance**

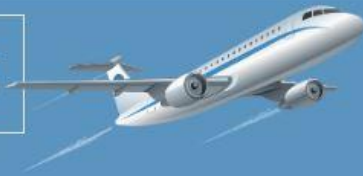
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Focus on reducing  
airline-caused cancellations

# Visual Highlights



# Airports Insights



**66K**  
Total Flights

**312**  
Airports

**4124**  
# Air Craft

State

All



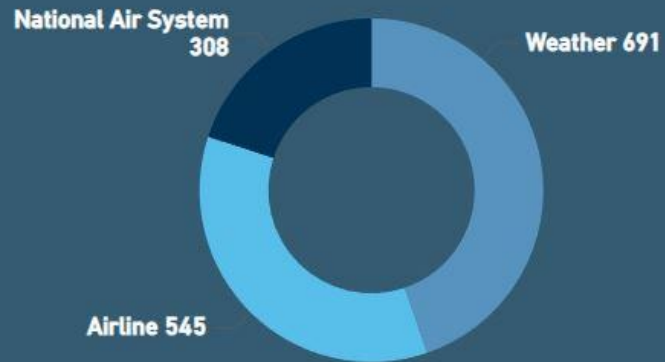
Airports

Airline

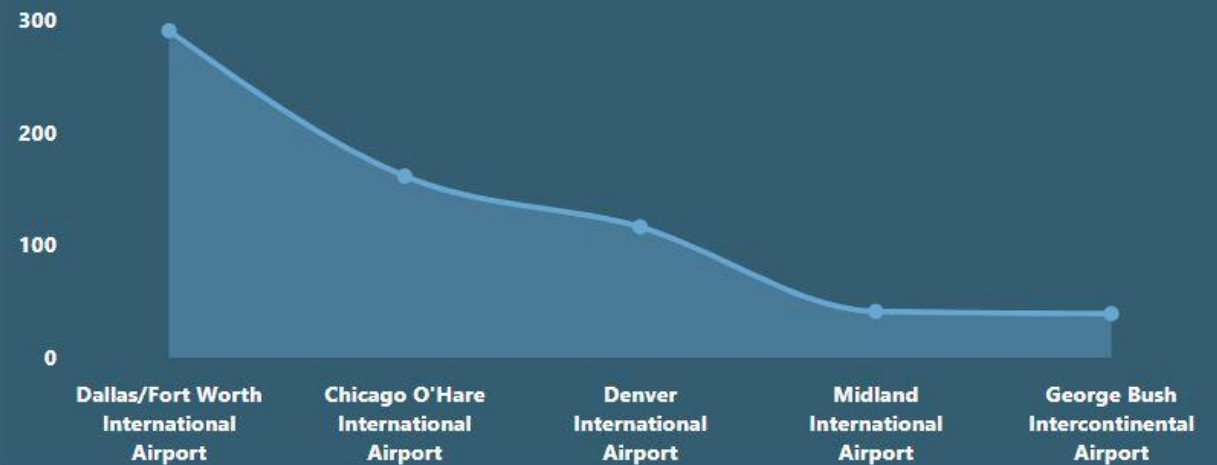
Cancellation  
Analysis

Diverted  
Analysis

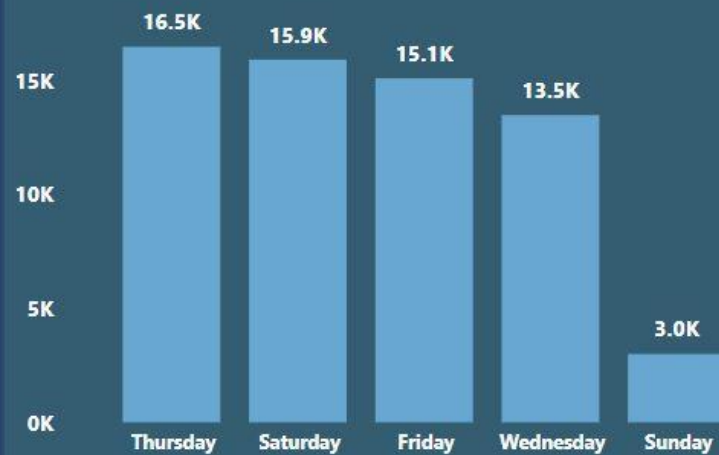
## Total Flights by CANCELLATION\_REASON



## Airports with the Highest Cancellations



## ON Board Flights by Days



## Airports with Highest On Board





# Airline Insights



54

# State

14

Airline

298

City

State

All

Airports

Airline

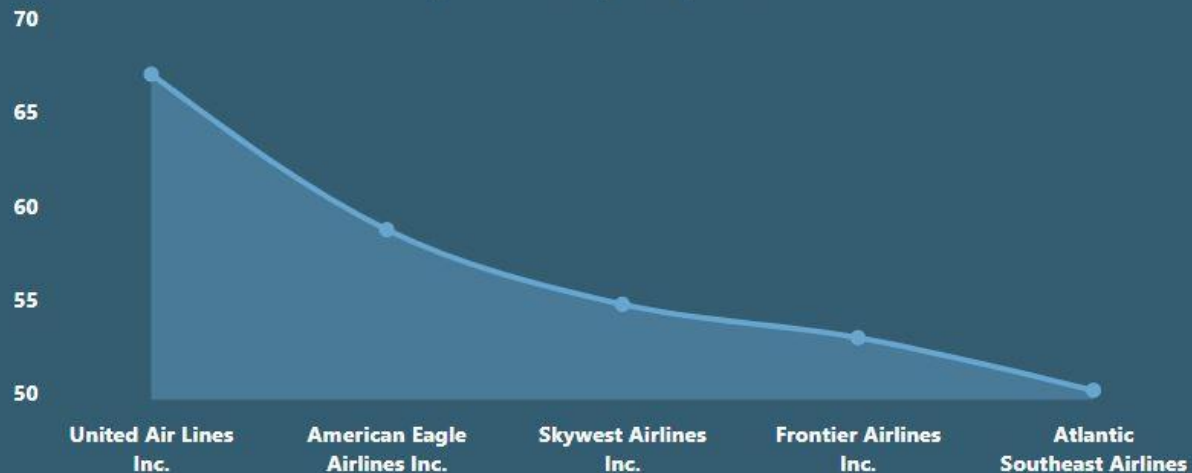
Cancellation  
Analysis

Diverted  
Analysis

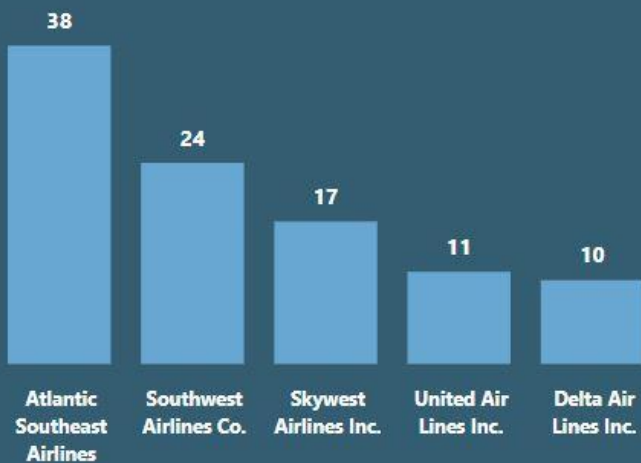
### Airlines with Highest Total Flights



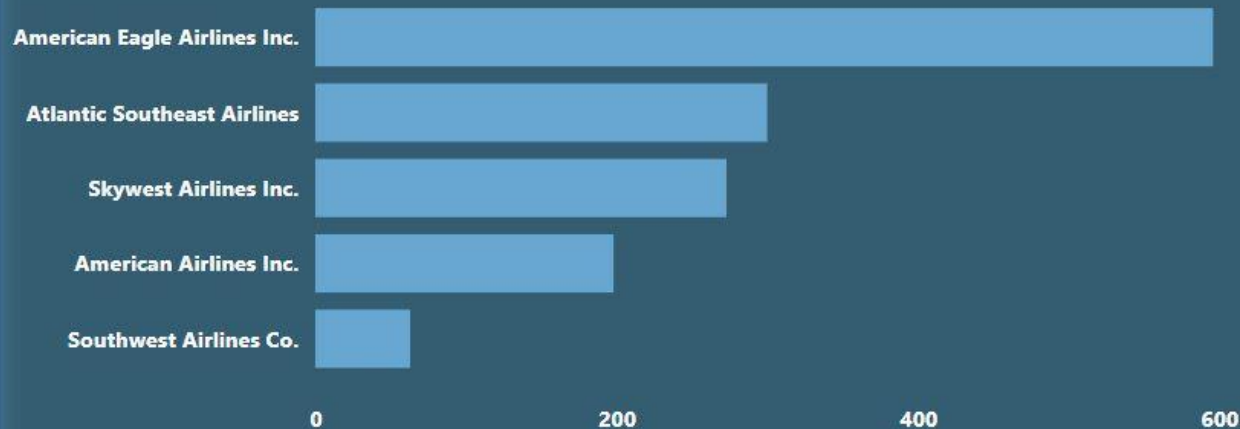
### Top 5 Airline by Delay Time



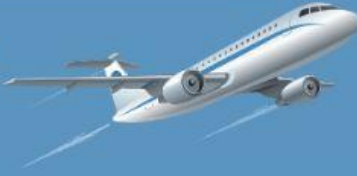
### Airlines with Highest Diverted Flights



### Airlines with Highest Canceled Trips



# Cancellation Analysis



1544  
Canceled

2.36%  
Cancellation Rate

42  
AVG Departure Delay

State

All

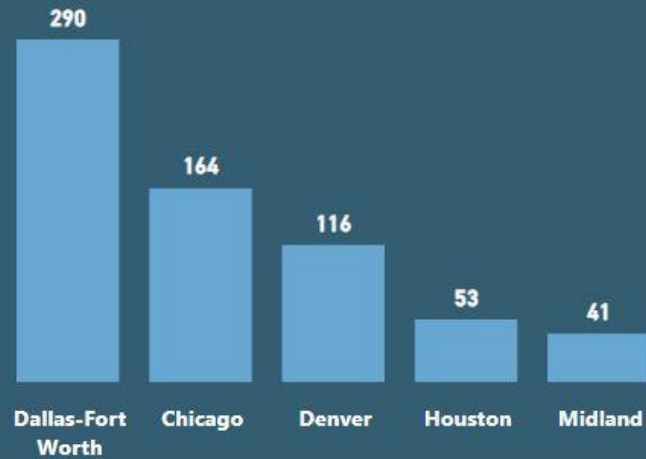
Airports

Airline

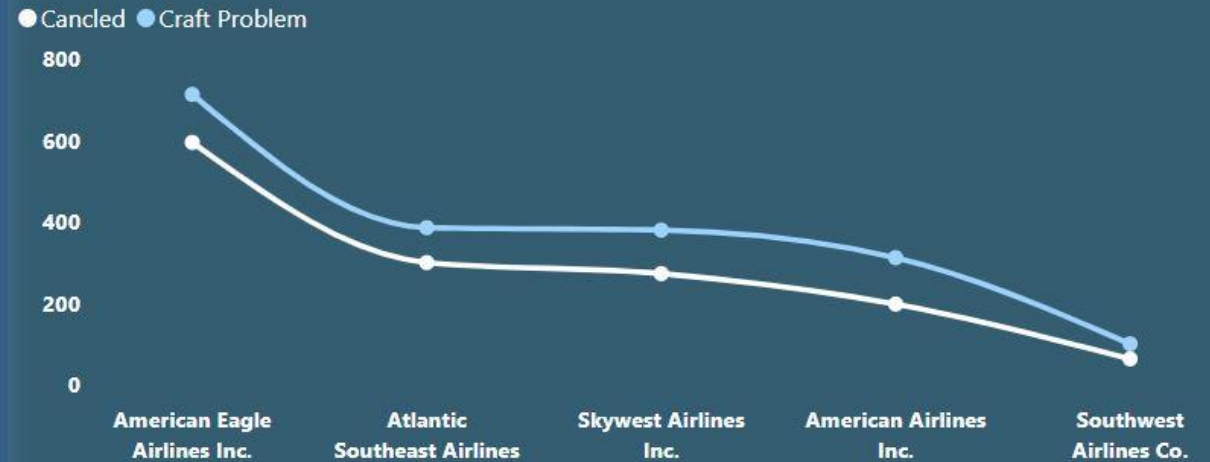
Cancellation  
Analysis

Diverted  
Analysis

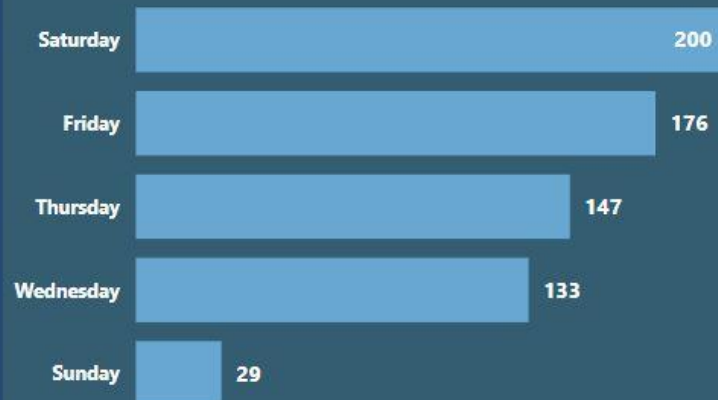
### Top 5 Cities by Cancellation



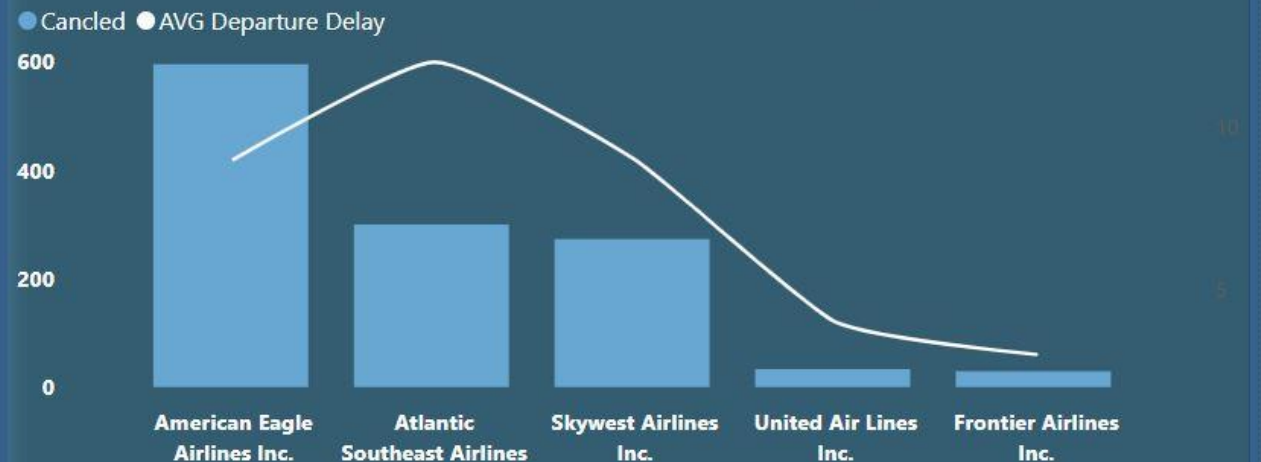
### Top 5 Airline With Air Craft Problem



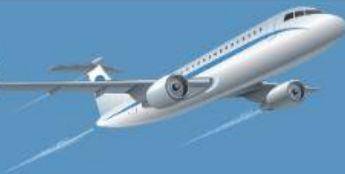
### Canceled Flight By Day



### Top 5 Airline With Departure Delay



# Diverted Analysis



134

# Diverted

17.97

Average Delay Time

54

# State

State  
All

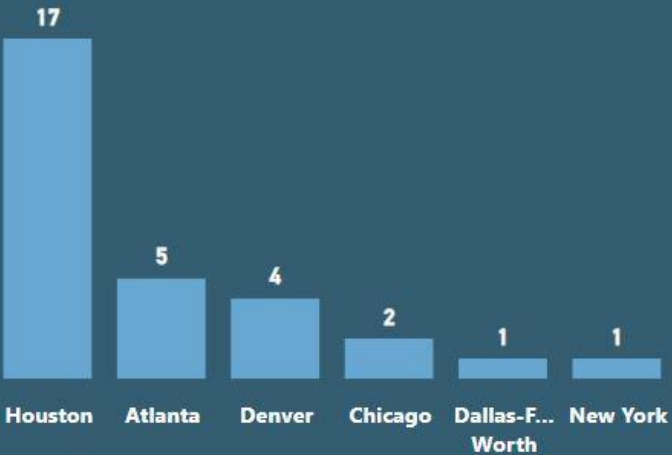
Airports

Airline

Cancelation  
Analysis

Diverted  
Analysis

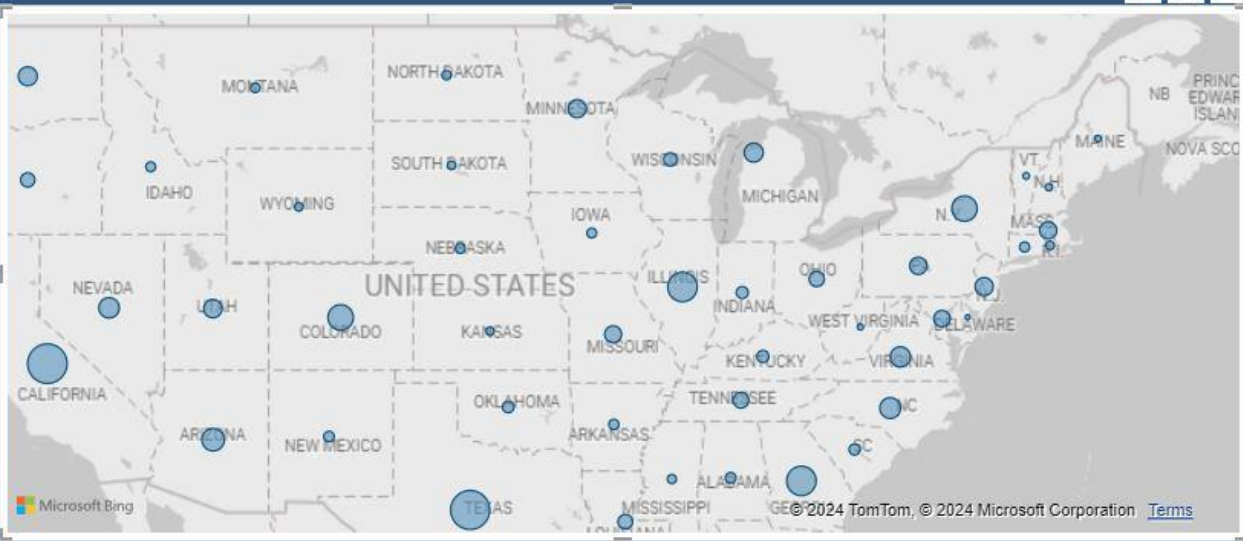
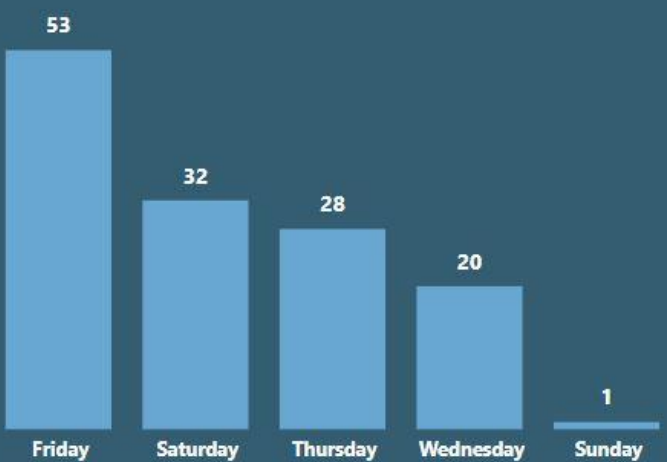
Top Cites by Diverted



Top 5 Airline Diverted By Time Delay



Diverted Flights by Days





# Conclusion

## Summary of Key Findings

The analysis highlighted significant patterns in flight cancellations, delays, and diversions, with airline issues emerging as the top cause of cancellations and Friday being the most delay-prone day. A clear correlation was identified between longer delays and higher rates of flight diversions, particularly in high-traffic airports.

# Achievements

## Project Achievements

Successfully transformed raw data into actionable insights through SQL data cleaning, structured modeling in Power BI, and detailed visualizations.

Provided a dashboard that allows for dynamic filtering and easy exploration of key airline performance metrics.

## Impactful Recommendations

Proposed operational improvements to optimize staffing on high-delay days and prioritize resource allocation at high-cancellation airports.

Suggested enhancing communication strategies to keep passengers informed of potential delays and cancellations.



# Thanks

**Do you have any questions?**

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