Data Analytics
DAB-14

Decoding Flights Disruption

The Path to Optimize Airline Operations

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OVERVIEW

US Airline Flight Delay and Cancellation

Total Flights	Number of Airlines
3M	18

August 2019 - August 2023	372 US Cities

CORE PROBLEM

U.S. flight delays and cancellations are causing passenger dissatisfaction and operational inefficiencies

Evidence:

Number of passenger complaints increased 252% higher than 2019 levels.

(U.S. Department of Transportation, 2023)

GOAL & AUDIENCE

Pinpoint the biggest causes of flight delays and cancellations to fix them.

Targeted Audience: Airline Operations Management

OBJECTIVES

1. Analyze overall airline performance for delays and cancellations.

2. Assess the impact of routes and airport locations on disruptions.

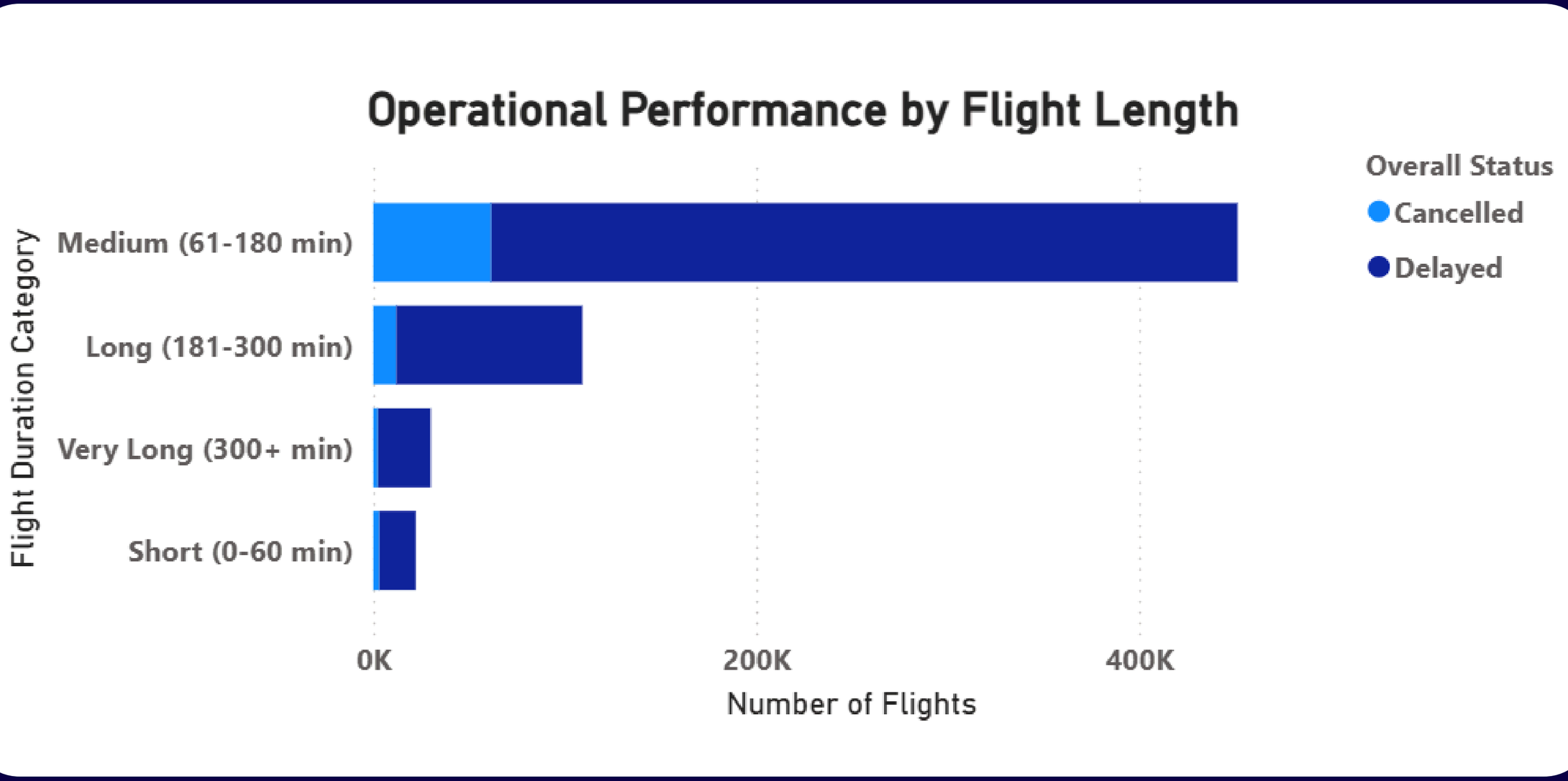
3. Identify how time, days, and months contribute to delays.

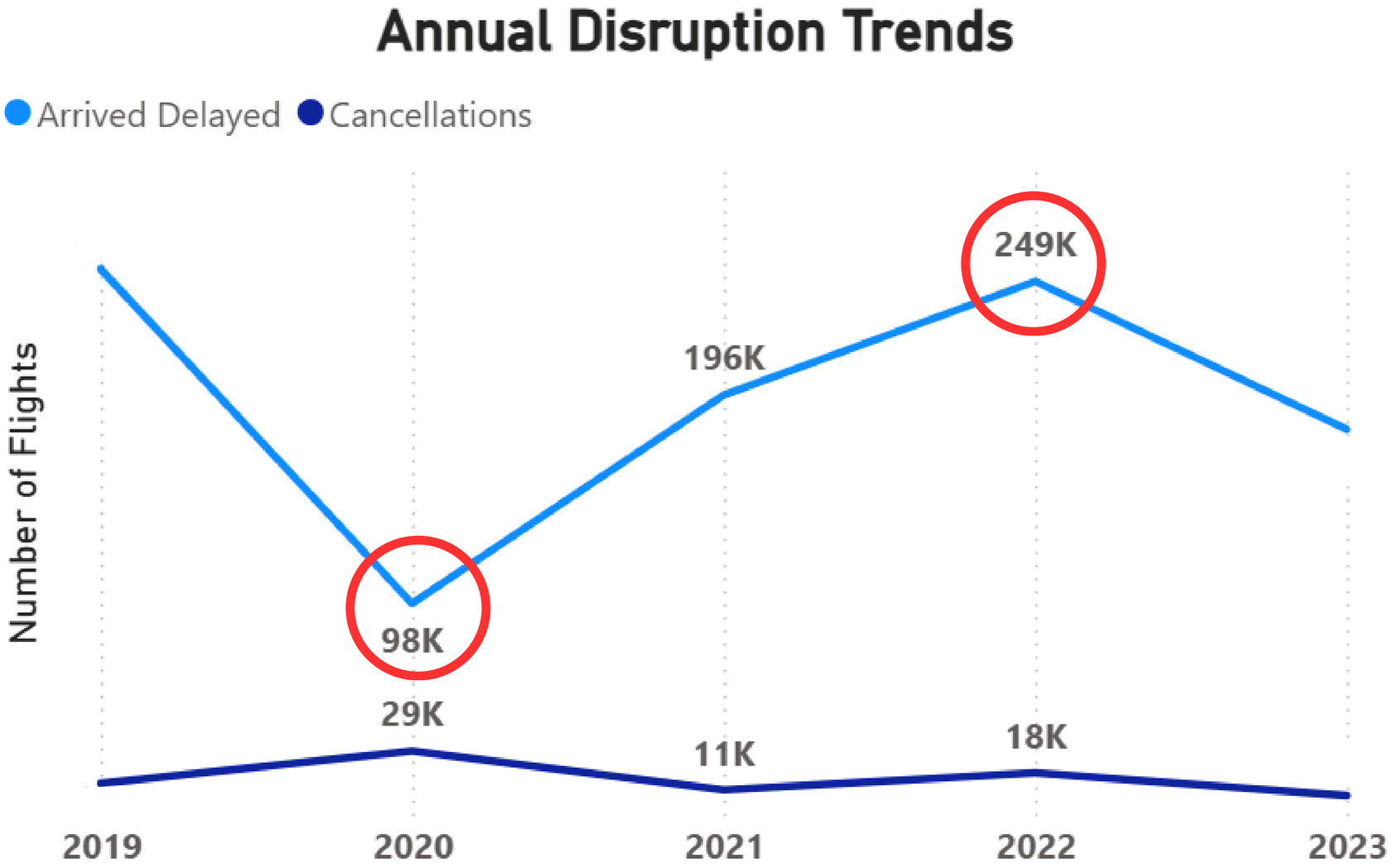
4. Evaluate airport operational efficiency and scheduling effectiveness.

OVERALL PERFORMANCE

3%	64%	2%	33%
Cancelled %	Arrived Early %	Arrived On-Time %	Arrived Delayed %

10.12	4.26
Avg Departure Delay	Avg Arrival Delay


Operational Performance by Flight Length
Overall Status
Cancelled
Delayed
Flight Duration Category
Medium (61-180 min)
Long (181-300 min)
Very Long (300+ min)
Short (0-60 min)
0K
200K
400K
Number of Flights



2020:

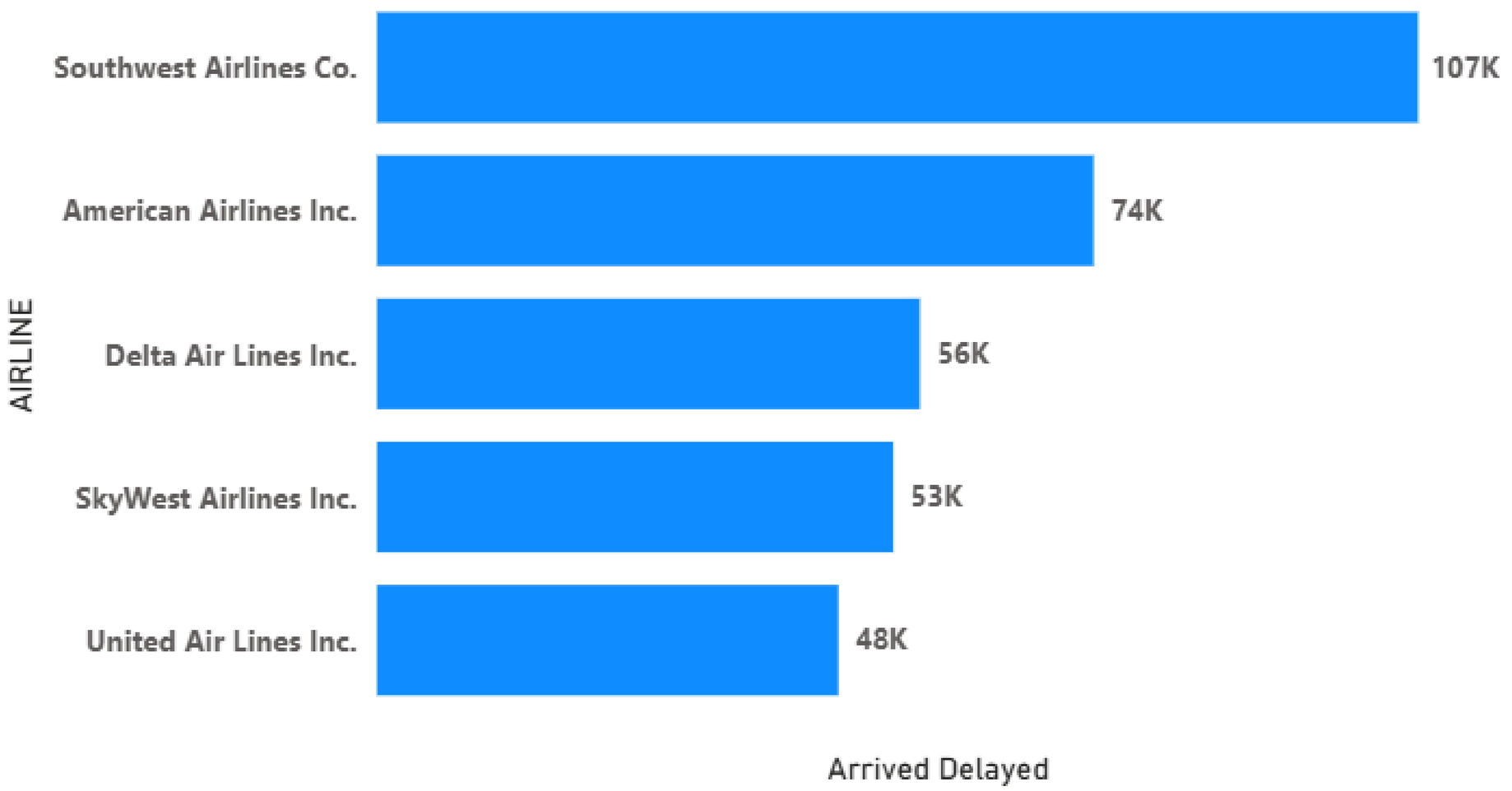
U.S. Airline passenger traffic dropped 96% due Covid.

2022:

U.S. Airlines scheduled 16% more flights than they could.

(U.S. Bureau of Transportation Statistics, 2023 ; U.S. Department of Transportation, 2023)

Top Airlines Affecting Disruption



Cancellation Cause:

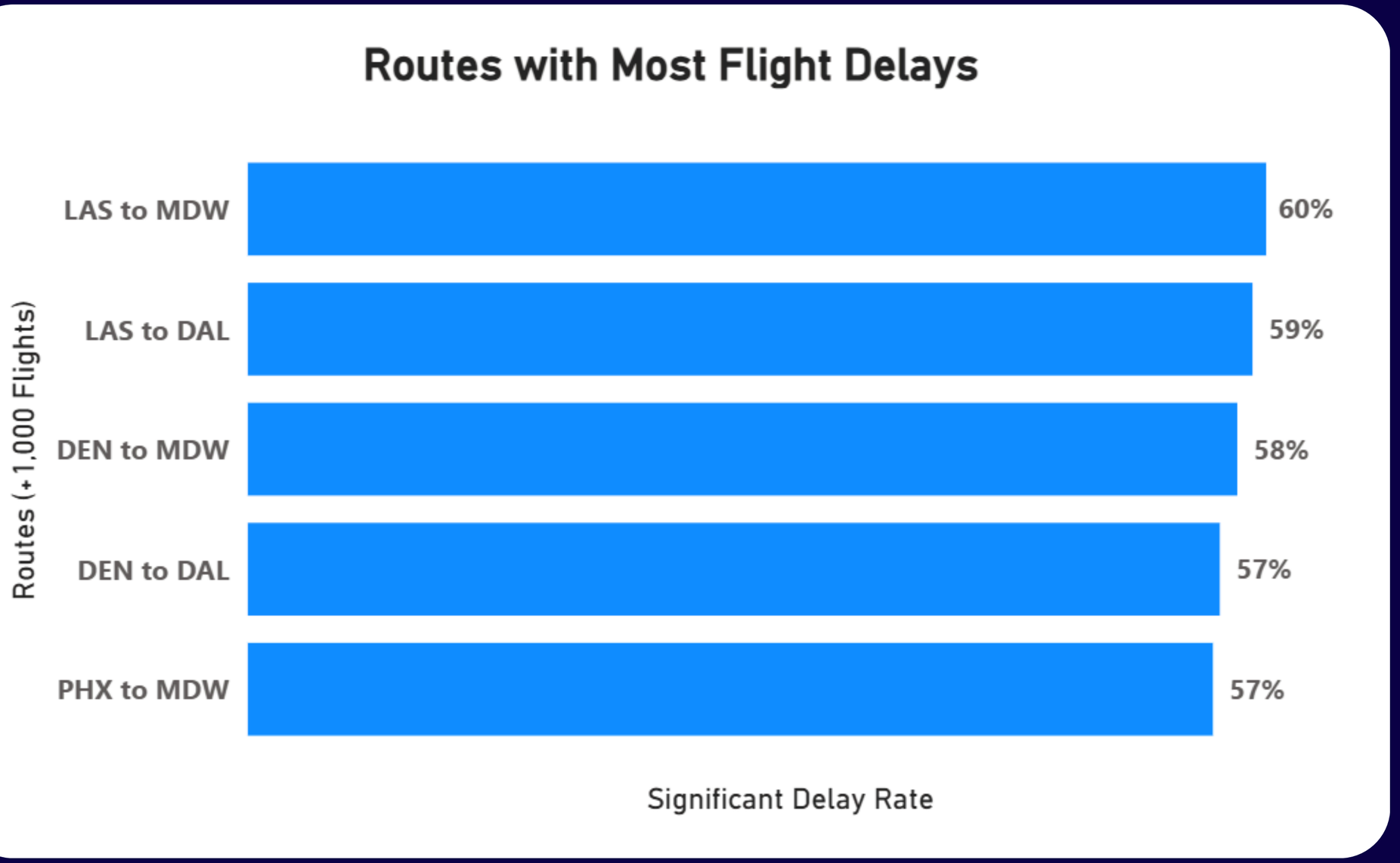
Southwest's December 2022 operational meltdown, where they cancelled 16,700 flights in 10 days

(U.S. Department of Transportation, 2023)

Recommendation on Performance

- Buffer short flights with extra time.
- Mandate meltdown-proof plans for major airlines.
- Cap flights during peaks to match real capacity

LOCATIONS & ROUTES



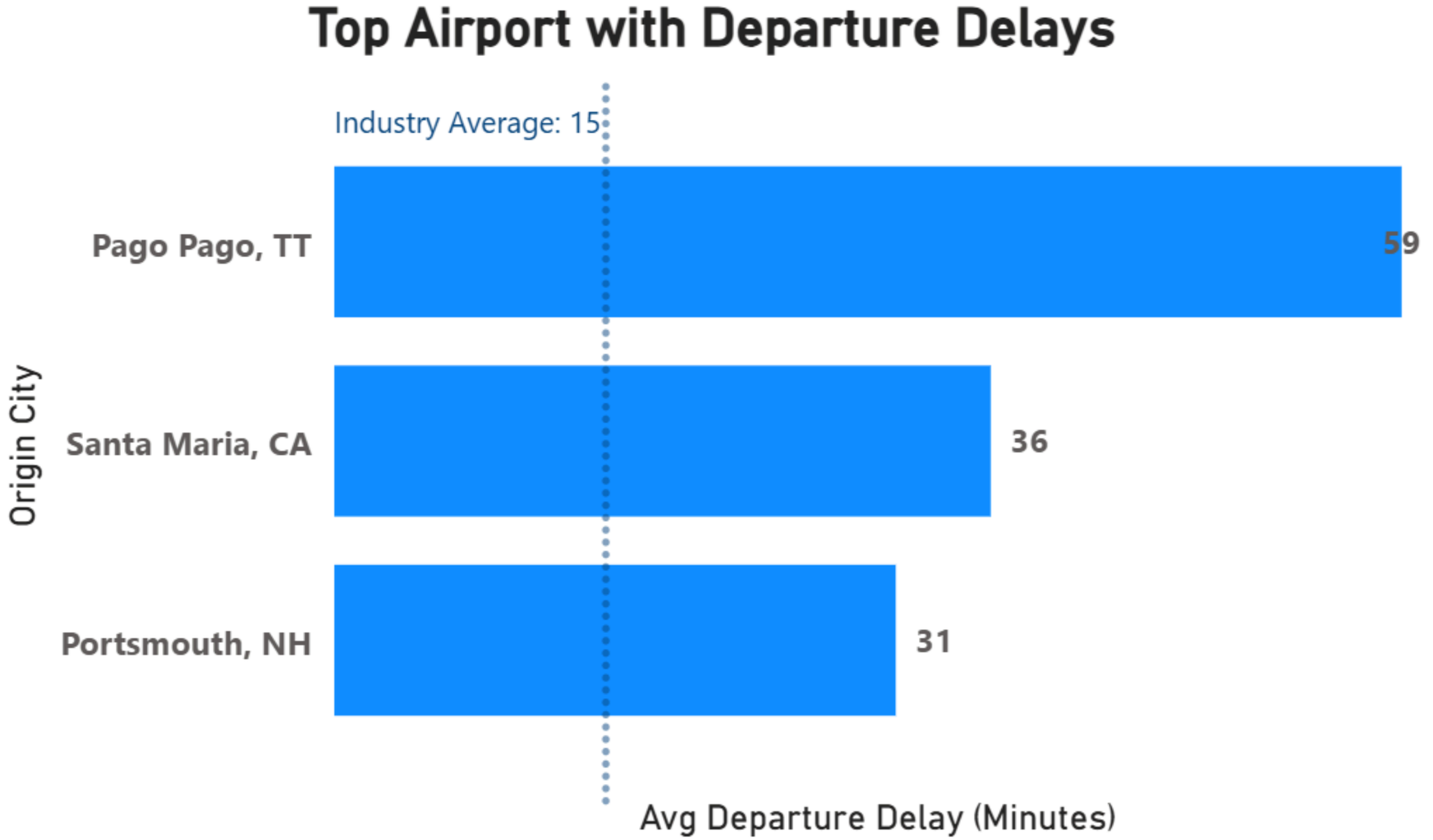
Delay Cause:

Extremely tight turnaround times

No recovery buffers

One delay cascades through the entire day's schedule

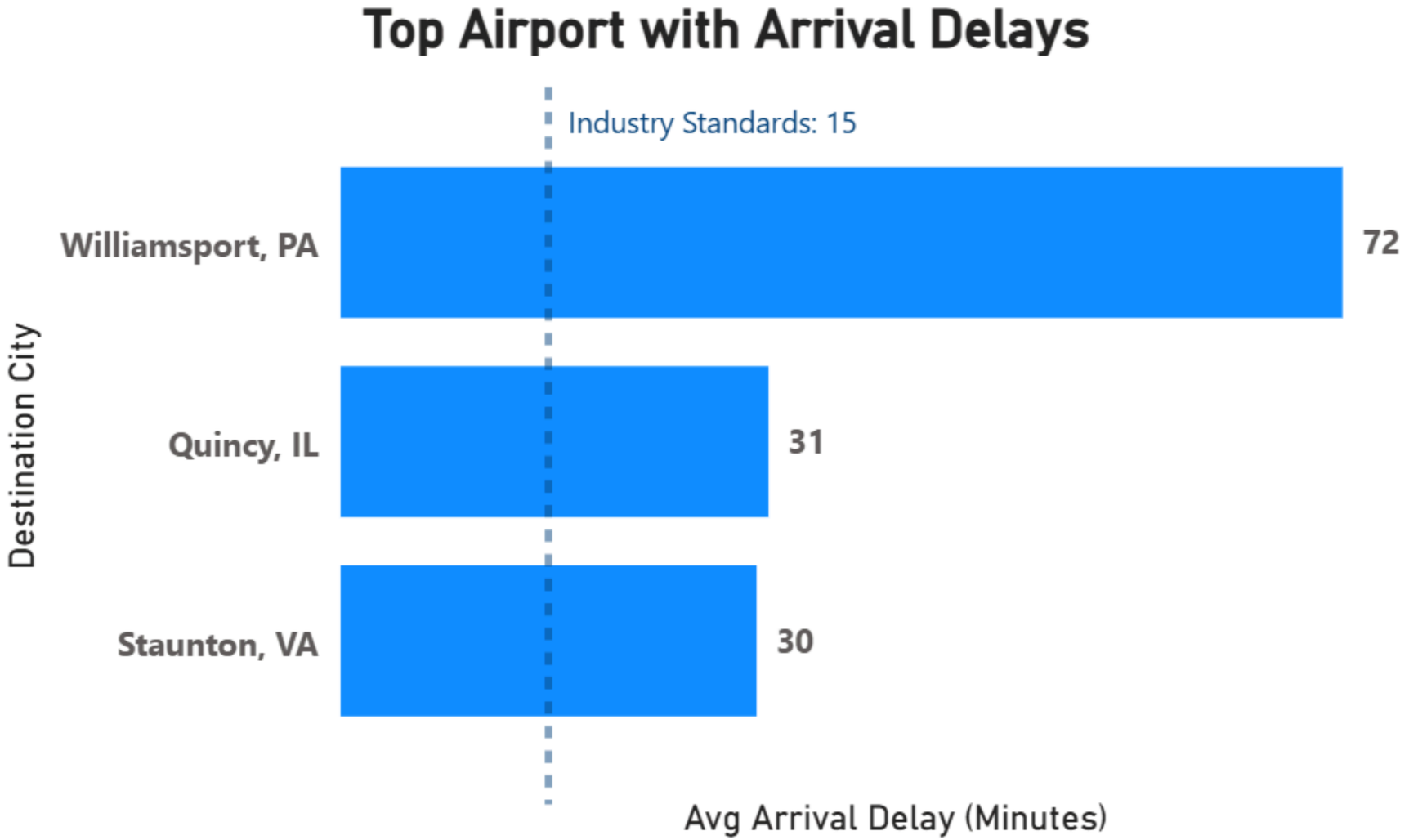
(U.S. Department of Transportation, Office of Inspector General, 2023)



Delay Cause:

They lack ground resources, infrastructure, and scheduling priority of major hubs, causing delays despite low flight volumes

(Federal Aviation Administration, 2022)



Delay Cause:

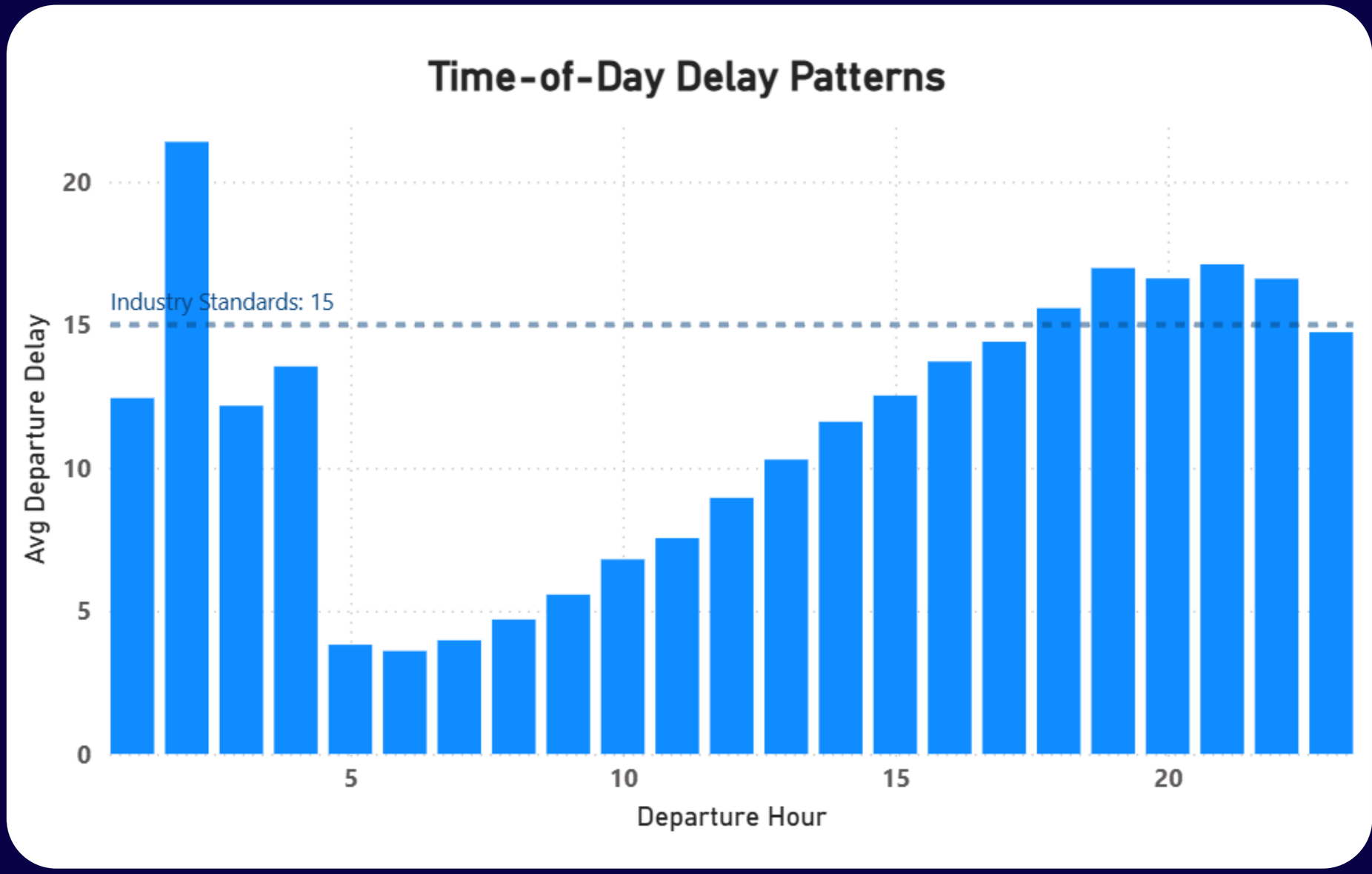
Single-runway airports experience 45% longer arrival delays during peak hours due to limited capacity

(Federal Aviation Administration, 2022)

Recommendation on Location & Routes

- Add 10-15 minute schedule timings for short flights.
- Upgrade ground resources at regional airports.
- Optimize arrival sequences at congested hubs.

TIME CONTRIBUTION



Delay Cause:

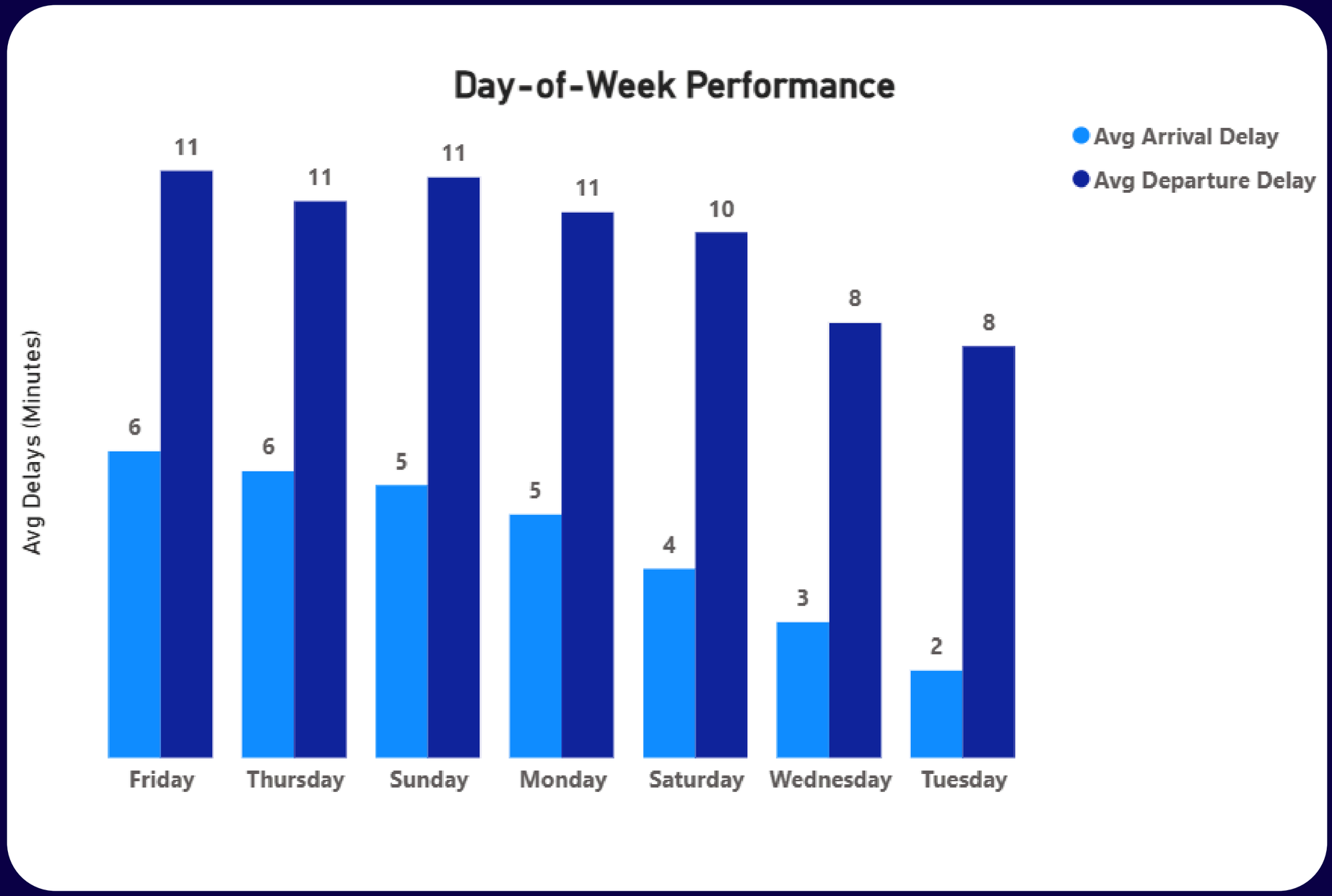
During peak travel hours, too many planes try to use runways and gates at the same time.

A single delay can cause later flights to be held back

(Bureau of Transportation Statistics, 2021).

Seasonal Disruption Patterns

June & December consider as holiday season, number of flights increase and airlines are more prone to delays



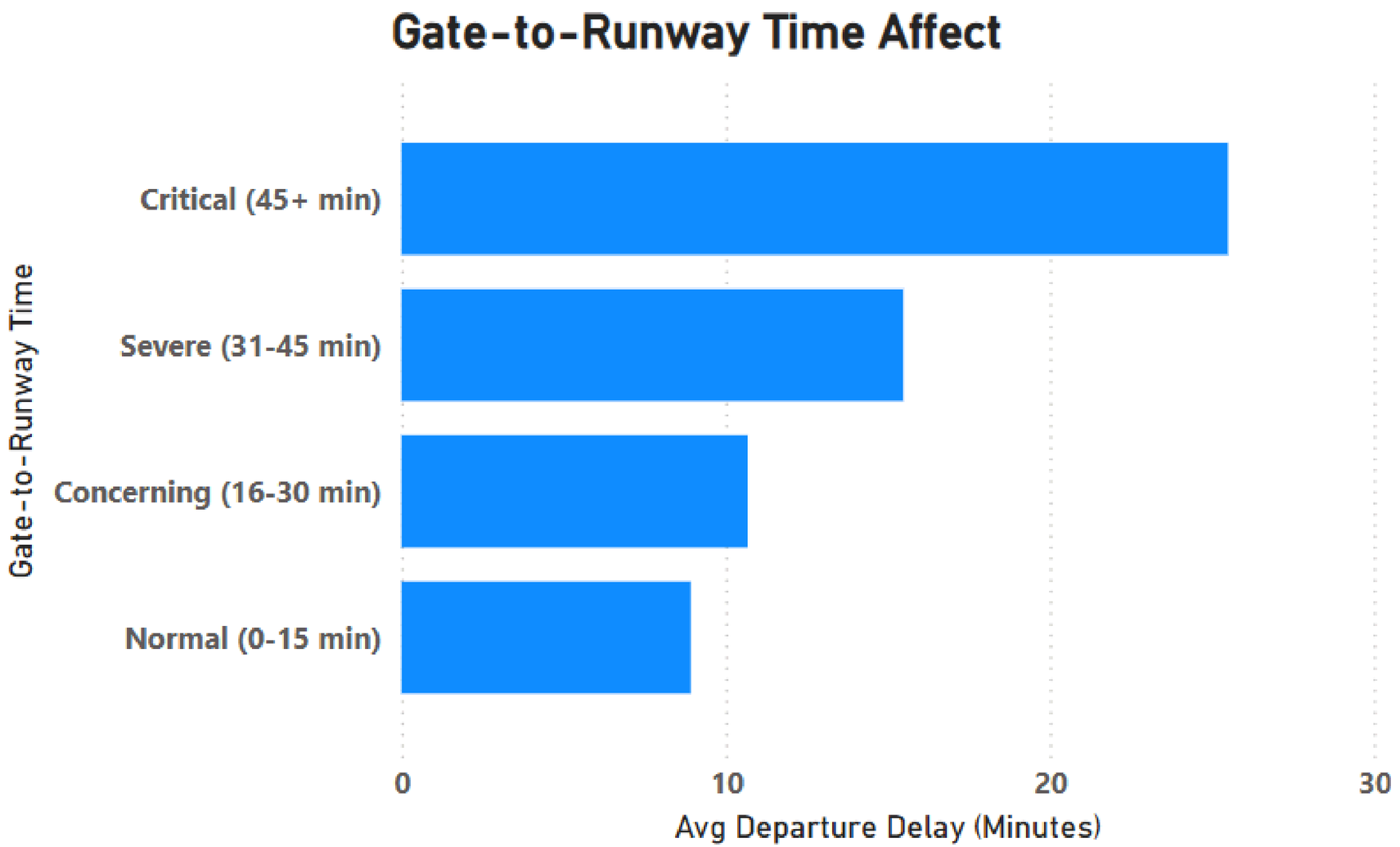
Friday & Thursday has the worst delays (both arrival and departure are highest)

while Tuesday has the best performance with the shortest delays.

Recommendation on Time

- Staff strategically during peak hours.
- Boost operations on high-delay Fridays.
- Reinforce capacity for holiday rushes.

OPERATIONAL EFFICIENCY



Severely delayed flights get runway priority, so their recorded departure delay doesn't reflect the full ground wait time.

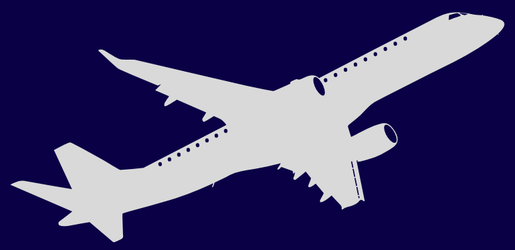
Delay Recovery

The airline's ability to make up for lost time during a flight, so it arrives closer to its scheduled time

Avg Delay Recovery (Minutes)

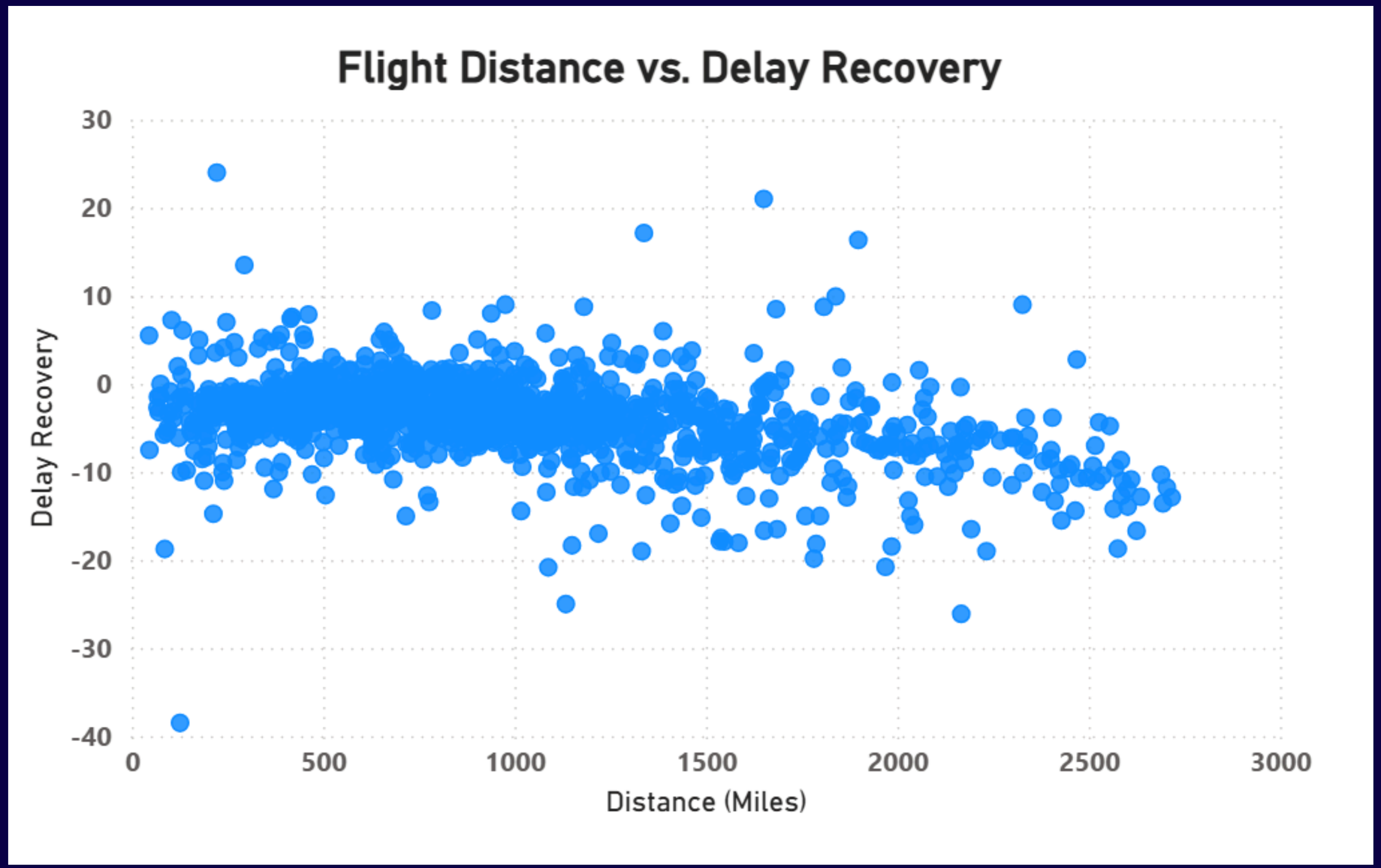
-6

Departure
Late 16 min



10 - 16 = -6
Delay Recovery:
6 minutes faster in the air

Arrival
Late 10 min

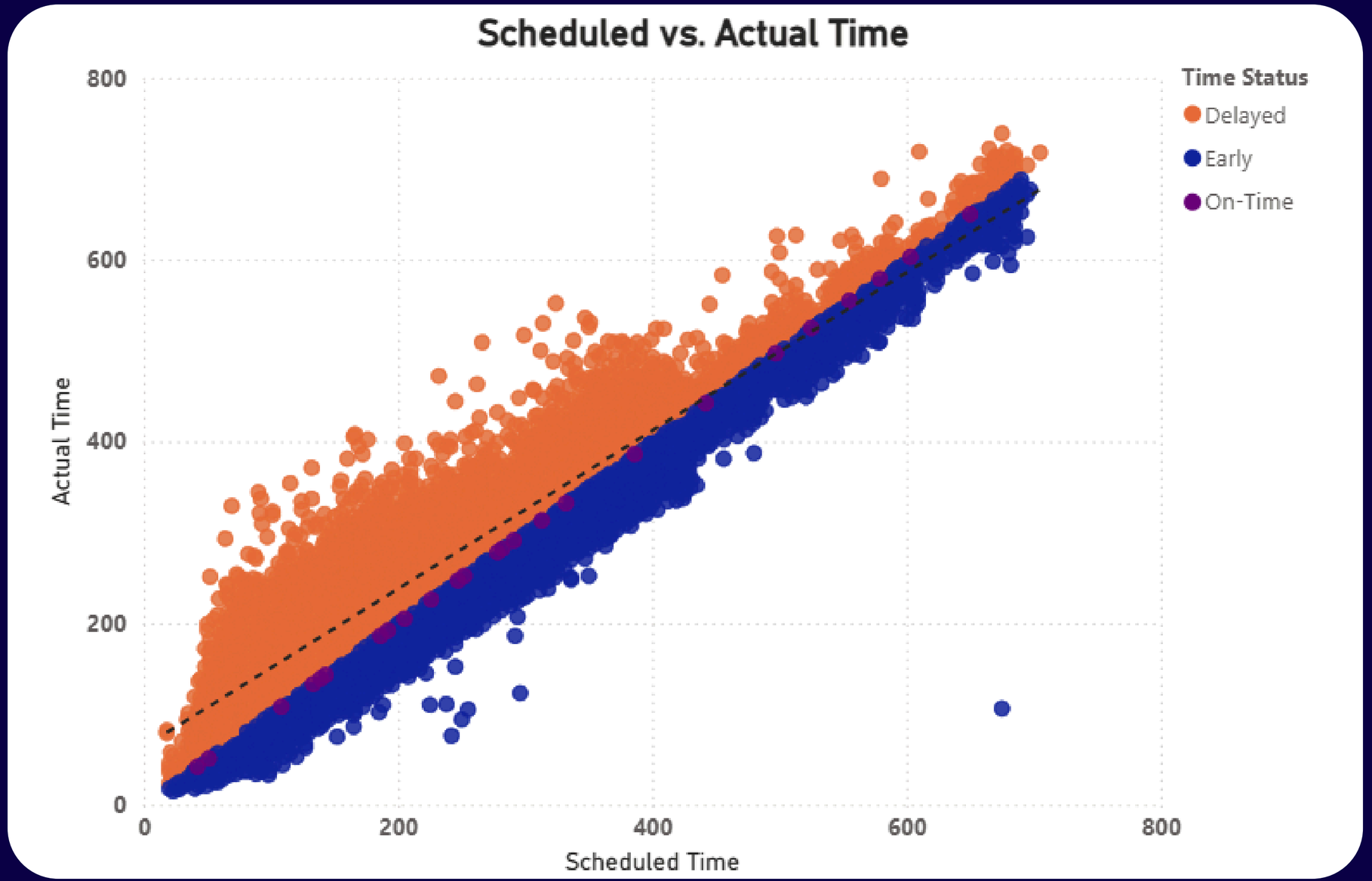


Short Flights:

No enough time in the air to catch up, so they arrive late.

Long Flights:

Pilots can increase speed, so delays at departure are reduced by arrival.



Orange = Delayed:
Flights took longer than scheduled

Blue= Early:
Flights were faster than scheduled

Purple= On-Time:
Flights matched the exact scheduled time

Recommendation on Operational Efficiency

- Add buffers to short flights to compensate for poor delay recovery.
- Reduce taxiway congestion at airports with long wait times.
- Tighten schedules for long flights that arrive early

CONCLUSION

To achieve lasting improvement, Airlines must:

Right-Size Schedules

Add buffers to short flights and reduce excess time on long-hauls.

Reinforce Operations

Increase resources on high-risk days and require contingency plans.

Target Key Airports

Upgrade ground resources and optimize flow at congested hubs.

THANK YOU!