

Delta Airlines Operational Delay and Cancellation Analysis

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Operations Management

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Question 2:

A: 17 carriers (airlines). 350 airports. 625,763 flights.

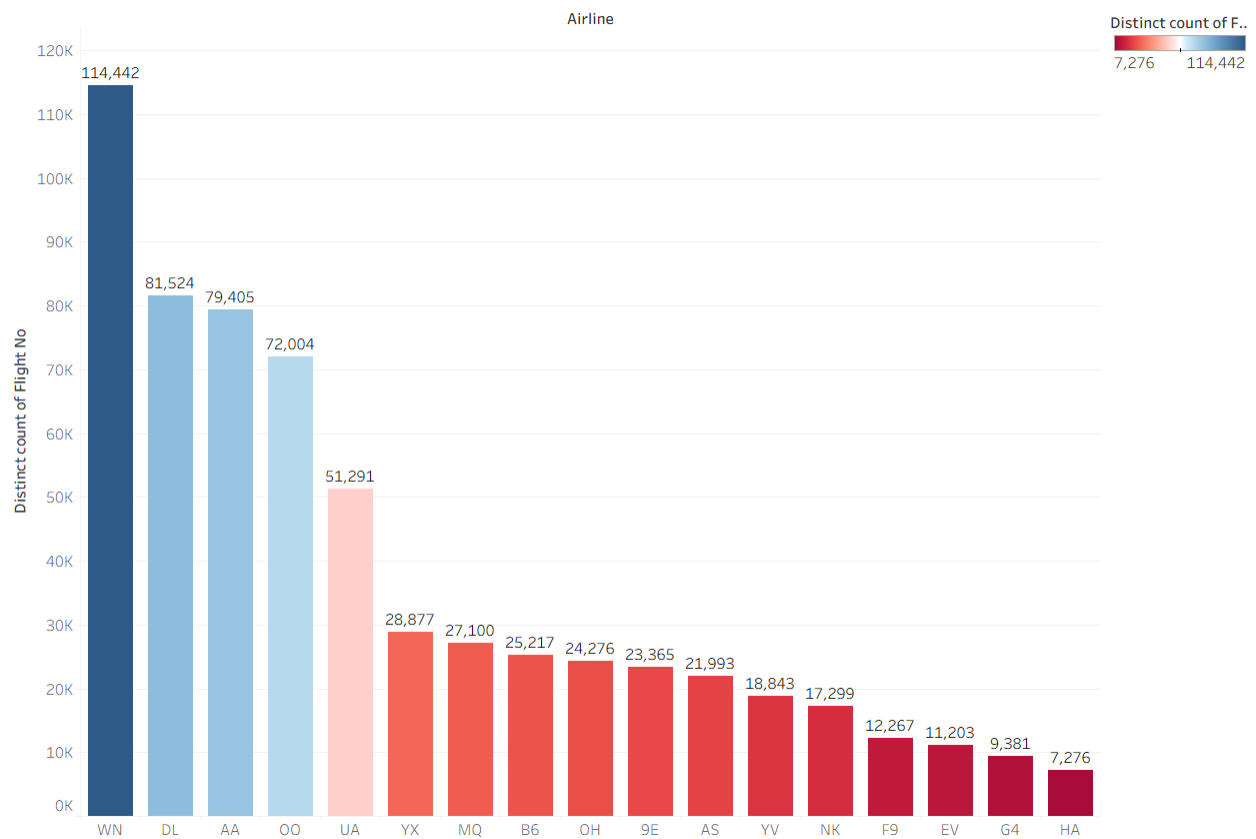
B: 36.37%

C: 6.12 miles

Question 3:

A:

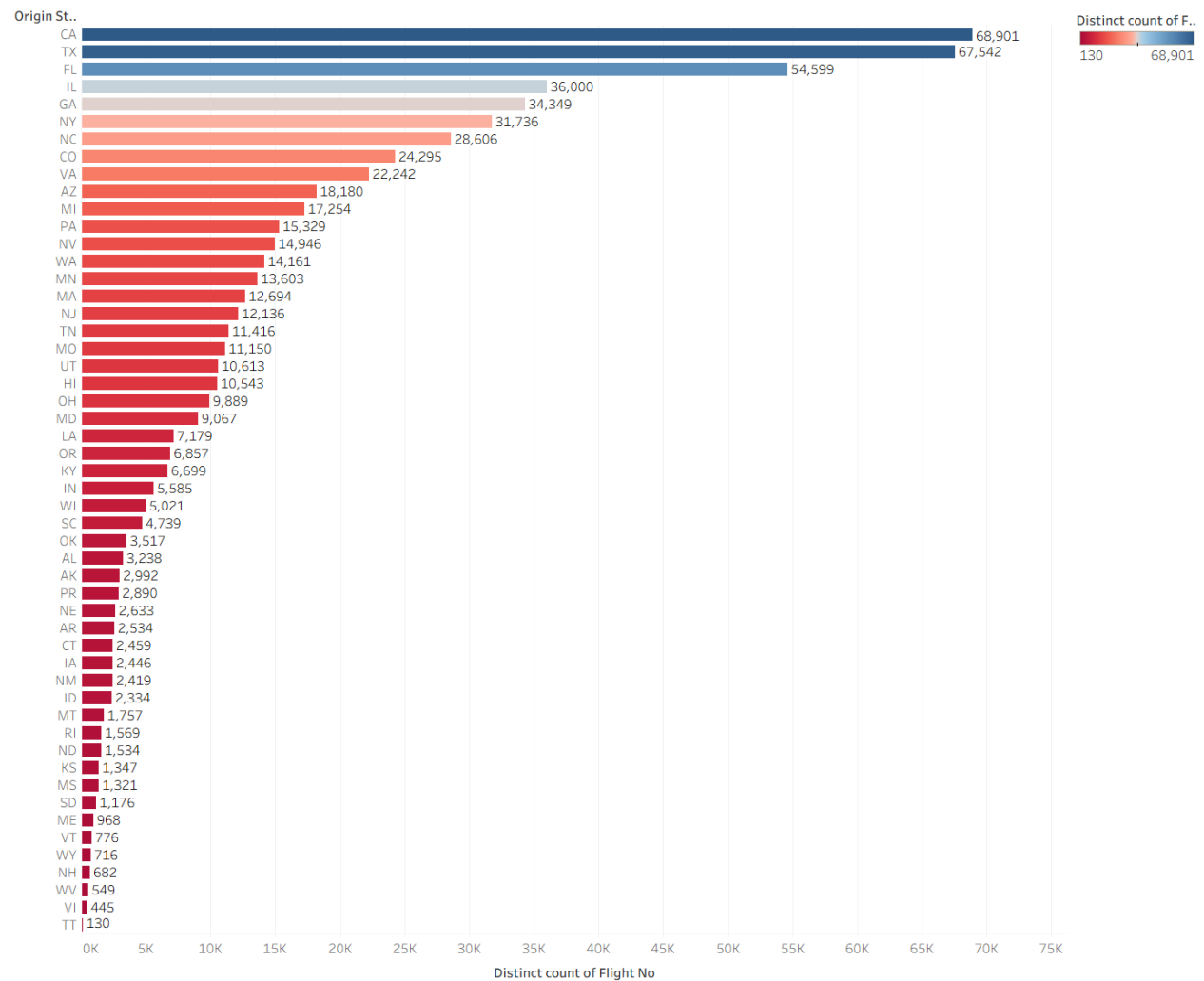
Departures per Airline



Distinct count of Flight No for each Airline. Color shows distinct count of Flight No.

B:

Departures per State



Distinct count of Flight No for each Origin State Abr. Color shows distinct count of Flight No.

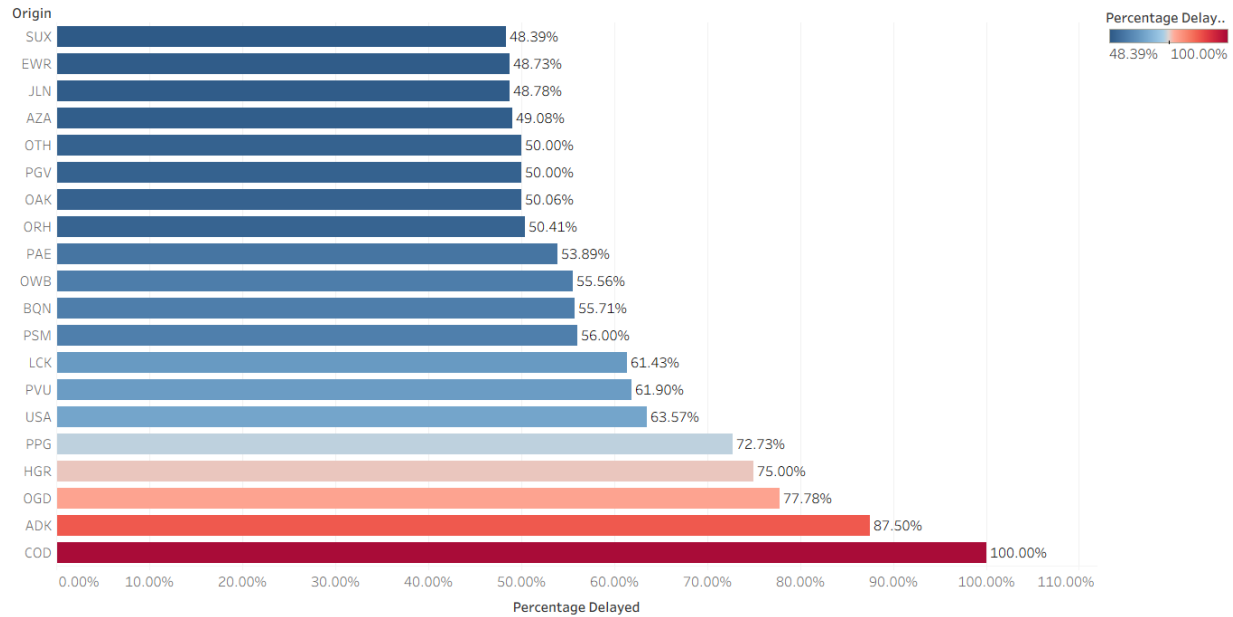
C: Georgia ranks number 5 among all states

Delta ranks number 2 among all airlines

Question 4:

A:

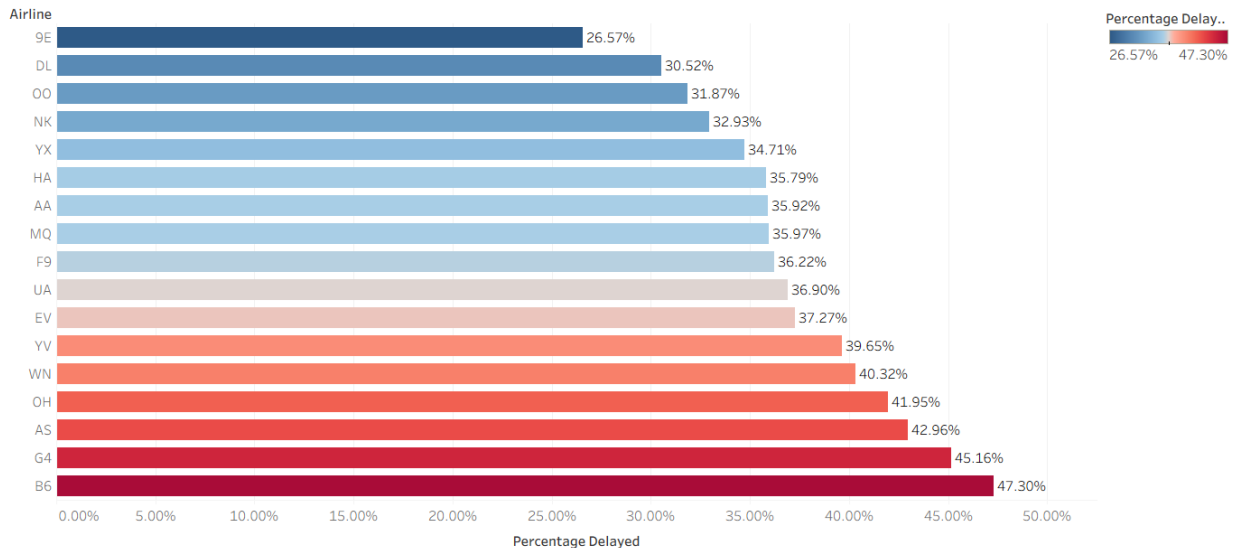
Airport Percentage Delay



Percentage Delayed for each Origin. Color shows Percentage Delayed. The view is filtered on Origin and Percentage Delayed. The Origin filter keeps 20 of 350 members. The Percentage Delayed filter includes everything.

B:

Airline Percentage Delay



Percentage Delayed for each Airline. Color shows Percentage Delayed.

C: ATL is ranked 242nd with a percentage of 29.10%.

Delta is ranked 2nd with a percentage of 30.52%.

Question 5:

A:

Total Delay by Source

Delay Type		Delay Type	
Late Aircraft Delay	3,577,033	Late Aircraft Delay	
Carrier Delay	2,684,814	Carrier Delay	
Nas Delay	1,922,148	Nas Delay	
Weather Delay	389,344	Weather Delay	
Security Delay	11,081	Security Delay	

Sum of Delay Minutes broken down by Delay Type. Color shows details about Delay Type. The data is filtered on Delayed, which keeps 1.

The top source of delay overall is Late Aircraft Delay

B:

Delay Breakdown by Airline

Delay Type						Delay Type	
Airline	Late Aircra..	Carrier Del..	Nas Delay	Weather D..	Security De..	Late Aircraft Delay	
9E	126,776	81,530	73,966	22,658	150	Carrier Delay	
AA	357,265	321,322	203,348	23,198	1,361	Nas Delay	
AS	124,338	87,950	96,684	3,785	896	Weather Delay	
B6	312,657	238,720	158,828	12,637	456	Security Delay	
DL	215,545	257,675	217,742	43,330	436		
EV	78,462	79,871	87,490	8,325	0		
F9	89,957	57,460	44,321	1,633	0		
G4	67,931	51,789	27,541	12,268	804		
HA	6,678	20,721	369	452	159		
MQ	175,206	79,169	74,871	39,127	286		
NK	58,372	49,635	88,978	9,233	943		
OH	220,241	101,718	58,039	12,629	349		
OO	484,754	473,345	185,341	127,948	838		
UA	306,385	161,066	255,759	27,418	0		
WN	558,419	401,750	167,596	11,873	3,742		
YV	212,093	142,485	30,524	16,910	348		
YX	181,954	78,608	150,751	15,920	313		

Sum of Delay Minutes broken down by Delay Type vs. Airline. Color shows details about Delay Type. The data is filtered on Delayed, which keeps 1.

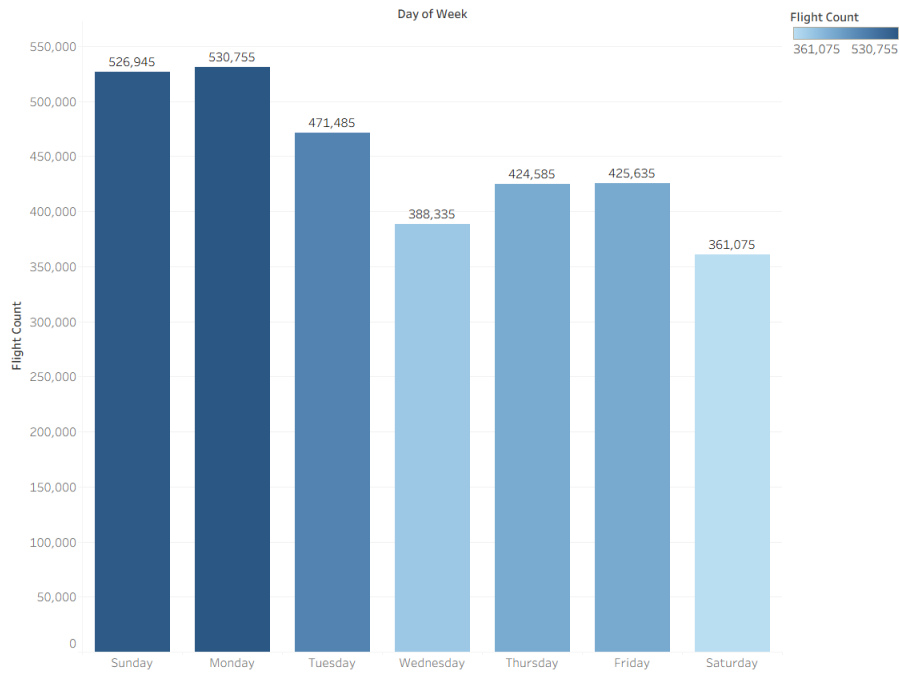
C:

The top source of delay for Delta is Carrier Delay with that contributing to 257,675 minutes of delayed time.

Question 6:

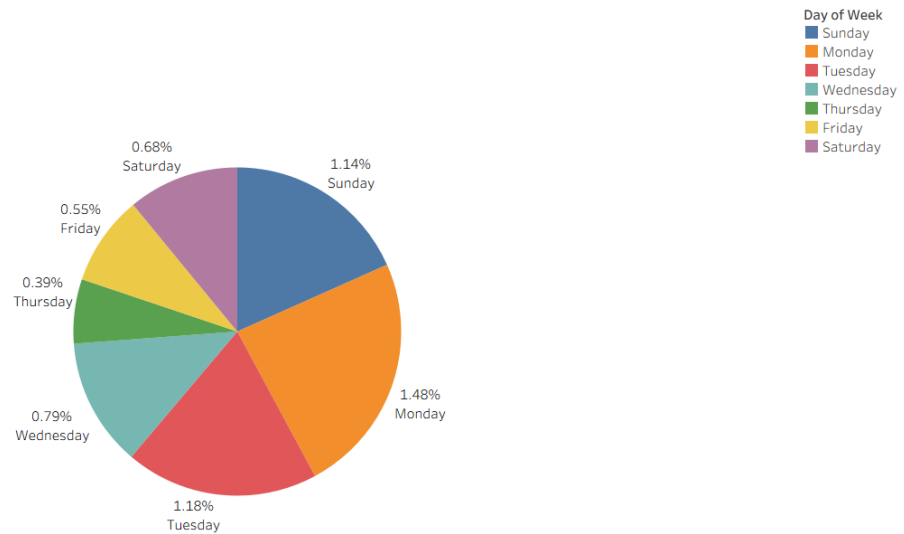
How do time-based and geographic factors within December 2019 affect Delta's flight cancellation patterns?

Day of Week Flight Travel



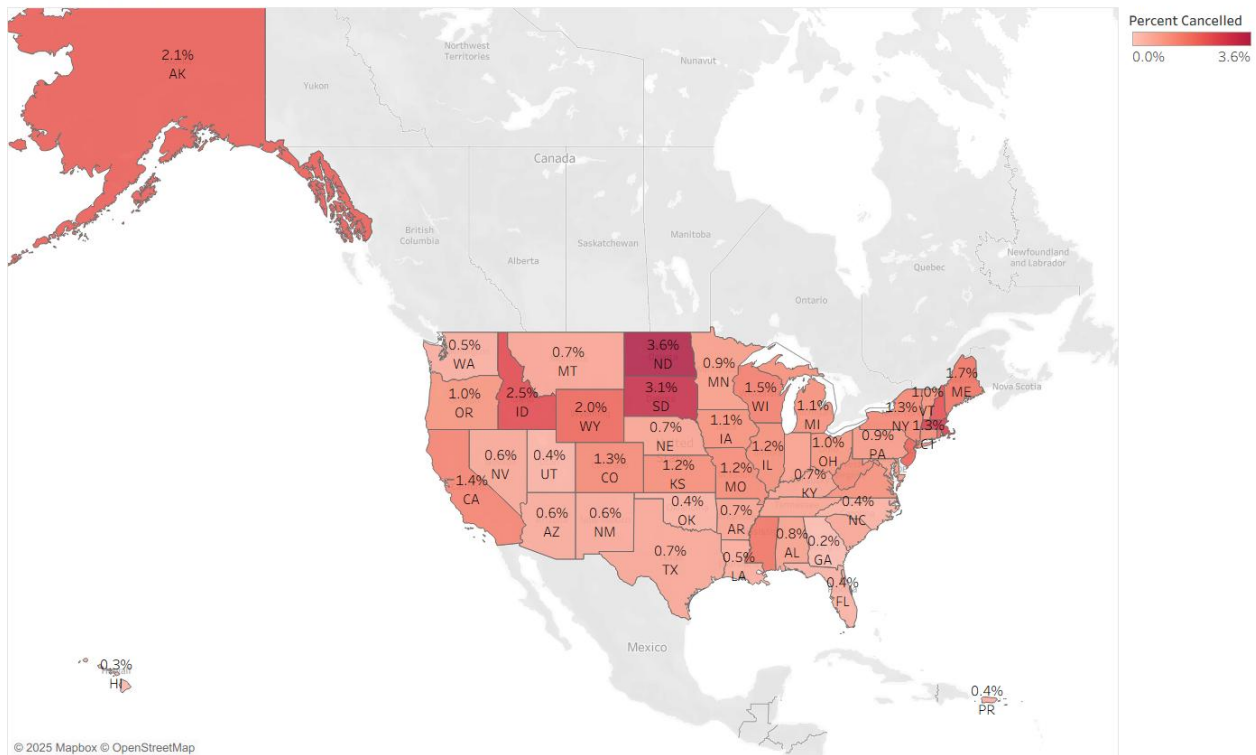
Sum of Flight Count for each Day of Week. Color shows sum of Flight Count. The marks are labeled by sum of Flight Count.

Percentage Cancelled per Day of Week



Percent Cancelled and Day of Week. Color shows details about Day of Week. The marks are labeled by Percent Cancelled and Day of Week.

Percentage Cancelled Per State



Map based on Longitude (generated) and Latitude (generated). Color shows Percent Cancelled. The marks are labeled by Percent Cancelled and Origin State Abr. Details are shown for Origin State Abr.

In addition to analyzing delays, I examined patterns in flight cancellations to determine whether specific times or locations in December 2019 contributed to higher disruption rates. Looking first at cancellations by day of the week, I found clear differences across beginning of the week and end of the week. Sundays through Tuesdays had the highest number of scheduled flights, which also meant they saw the most cancellations. With Christmas and New Year's Day both falling on Wednesdays, airlines prioritized keeping late-week flights (Thursday–Saturday) on schedule to handle peak holiday and weekend demand. Late in the week there were fewer flights overall, many travelers were already home for the holidays, and operations tended to run smoother. By contrast, Sundays through Tuesdays carried heavier traffic from people either traveling home for the holidays or leaving home after them, which made those days more prone to cancellations.

I also compared cancellation rates by state to see whether geography and seasonality influenced outcomes. States in colder regions such as North Dakota and Alaska experienced noticeably higher cancellation percentages than warmer states like Florida or Arizona. This suggests that winter weather disruptions were a contributing factor during the December holiday season. The results show that both temporal patterns (day of week) and geographic context (state) are critical in understanding cancellation dynamics. Together, these analyses emphasize that while delays are the more common issue, cancellations cluster in predictable ways that operations managers can anticipate and plan for.

Question 7:

Based on the analysis, Delta's management team should prioritize two main areas: reducing carrier-driven delays and anticipating cancellation risks in weather-sensitive regions. Late aircraft and carrier delays are the largest sources of lost time systemwide, with carrier delays being Delta's leading contributor. This points to operational inefficiencies such as aircraft turnaround time and scheduling buffers that require closer attention. Tighter coordination of ground crews, improved crew scheduling, and data-driven turnaround planning could help mitigate these delays.

Cancellations are most common on peak travel days and in states prone to winter weather. Proactive measures such as advanced planning, flexible rebooking systems, and precautionary customer communication are critical to managing disruptions during these high-risk periods.

The analysis also shows that disruptions are not evenly distributed across airlines, airports, or states. Georgia, Delta's home base, generally performs better than competitors, but challenges persist during peak seasons and in congested hubs. By combining operational improvements (carrier delay reduction) with proactive risk management (weather-related cancellations), Delta can strengthen both reliability and customer satisfaction. Future analysis that incorporates staffing levels and aircraft utilization data would further uncover root causes of carrier delays.

Finally, the visual presentation of findings incorporated Delta's brand identity through blue and red chart colors, reinforcing both readability and professionalism. By pairing operational improvements with predictive modeling and brand-conscious communication, Delta can reduce disruptions while reinforcing its reputation for reliability.