Quantified Findings for Operational Risk Mitigation Strategy (ORMS)

This report outlines the findings and suggestions based on an analysis of United Air Lines Inc. (UA) Operational Risk Mitigation Strategy (ORMS). This analysis focuses on key areas affecting operational performance, specifically **Revenue Protection** (delays and cancellations), **Morning Hub Congestion**, and **Ground Crew Process Streamlining**

Cascading Delay Control on High-Impact Routes

Analysis of the top five routes contributing the greatest total accumulated arrival delay (**LAD ratios**) across the UA operation revealed:

- The **ORD-LGA** route is a top 5 route for LAD ratios in both the network and the UA operation.
- The origin airport for three of the five high-impact routes in the UA operation is **ORD (Chicago O'Hare International Airport)**.

TOP 5 LAD RATIOS IN NETWORK

Route	LAD Ratio
SFO-LAX	47.0 %
LAX-SFO	39.3 %
ORD-LGA	24.6 %
LAS-LAX	38.6 %
LAX-JFK	21.5 %

T0P 5 LAD RATIOS IN UA OPERATION

Route	LAD Ratio
ORD-LGA	24.6 %
ORD-SFO	29.4 %
IAH-LAX	32.2 %
LGA-ORD	49.3 %
ORD-DEN	40.4 %

- **Focus on ORD-Related Routes:** Implement operational safeguards to control cascading delays on the high-impact routes originating at ORD, as three of the top five routes for Late Accumulated Delay (LAD) ratios in the UA operation begin at ORD.

- **Address ORD-LGA Specifically:** Deploy focused delay mitigation strategies on the **ORD-LGA** and **LGA-ORD** routes, as the ORD-LGA segment is a top 5 LAD route for both the network and UA.

Cancellation Failure Rate Assessment

When examining the reasons for cancellations across the network:

- **43.7%** of the cancellations were caused by **controllable factors** (Airline/Carrier).

Cancellation Reason	Cancellation Count	Cancellation Ratio
Airline/Carrier (A)	2,870	43.7 %
National Air System (B)	391	5.9 %
Weather (C)	3,312	50.4 %

UA's rate of controllable cancellations is higher than the network average:

- In a network-wide approach, **4 of every 1,000** flights were cancelled due to controllable reasons.
- UA flights were cancelled at a rate of **6 of every 1,000**

UA shares this rate with two other carriers (EV and NK), but it is below the highest rate observed (MQ at 8 per 1,000).

airline	airline_cancelled	planned_flight	cont_cancel_in_1000_flight
DL	594	875,881	1
AS	334	172,521	2
HA	170	76,272	2
VX	157	61,903	3
F9	308	90,836	3
B6	883	267,048	3
Network	25,262	5,819,079	4
AA	2,879	725,984	4
US	1,007	198,715	5
WN	6,122	1,261,855	5
OO	3,205	588,353	5
EV	3,604	571,977	6
NK	654	117,379	6
UA	2,870	515,723	6

MQ	2,475	294,632	8

A significant majority of UA's controllable cancellations originate from a limited number of airports:

- The **top 10 airports** account for **63.5%** of the total controllable cancellation in minutes.
- These same airports represent **62.3%** of total UA cancellations in terms of count.

Below are the top origin airports contributing to this issue:

Origin_airport	cancellation_count	total_planned_flights	cont_cancel_in_1000_flights
UA Company	2,870	515,723	6
ORD	367	59,538	6
IAH	265	53,985	4
DEN	215	46,218	4
SFO	270	45,587	5
EWR	189	43,002	4
LAX	170	27,429	6
IAD	131	18,067	7
MCO	59	11,290	5
BOS	64	11,282	5
LAS	56	11,153	5

Controllability Intervention: Implement targeted process improvements and training initiatives to address the **43.7%** of cancellations caused by controllable factors (Airline/Carrier) , aiming to reduce UA's rate from **6 per 1,000** flights to the network average of 4 per 1,000.

Morning Hub Congestion Strategy

The longest average departure delays for United Air Lines (UA) and the network occur during this early morning window.

- For **UA**, the **4 AM block** has the longest average departure delay at **95 minutes**.
- For the **Network**, the **3 AM block** has the longest average departure delay at **42 minutes**.

Departure hour block	Avg_departure delay in minutes
3	42
20	37
19	37
4	37
2	37

Departure hour block	Avg_departure delay in minutes
4	95
3	58
2	43
20	39
18	37

The data highlights that UA's average departure delay in the 4 AM block is significantly higher than key competitors.

- UA's average delay is **95 minutes**.
- B6 (JetBlue) has a 36-minute delay.
- NK (Spirit) has a 24-minute delay.

airline	Avg_departure_delay
UA	95
B6	36
NK	24

airline	Avg departure delay (4 AM)
UA	95
B6	36
NK	24

airline	Avg departure delay (3 AM)
UA	58
B6	39
NK	34
AS	7

- **Address the 4 AM Peak:** Develop preliminary solutions and resource adjustments for the **2:00 AM - 5:00 AM** time block , as the **4 AM block** has the longest average departure delay for UA at **95 minutes**.

- **Benchmark Competitor Performance:** Analyze and adopt best practices from competitors, as UA's 4 AM delay of 95 minutes is substantially higher than B6 (36 minutes) and NK (24 minutes).

Ground Crew Process Streamlining

origin_airport	avg_taxiout
JFK	27
LGA	26.7
12953	26.7
13502	23.7
12478	23.7

origin_airport	avg_taxiout	flight_count	network_median	total_minutes_savings
LGA	23.4	8,162	14	77,051
JFK	26.6	3,288	14	41,347
12953	23.6	782	14	7,546
12478	23	294	14	2,633

Note: There is no UA flight from 12502 airport.

The most critical finding is the potential cumulative savings if UA were able to achieve the network median taxi-out time:

- If the **network median (14 minutes)** were achieved in the taxi-out process, **128,577 minutes** would be saved for UA airline.
- The potential savings are highest at **LGA** with **77,051 minutes** , and **JFK** with **41,347 minutes**.

This suggests that implementing preliminary solutions and process streamlining at high-volume, high-delay airports like LGA and JFK can yield the most significant immediate benefits in operational efficiency.

- **Achieve Taxi-Out Median:** Implement process streamlining to reduce taxi-out times, aiming for the network median of **14 minutes**. Achieving this target across the network would save a potential **128,577 minutes** annually for UA.

- **Prioritize LGA and JFK:** Immediately focus ground crew process improvements at **LGA** and **JFK**, where the potential savings are highest at **77,051 minutes** and **41,347 minutes**, respectively.