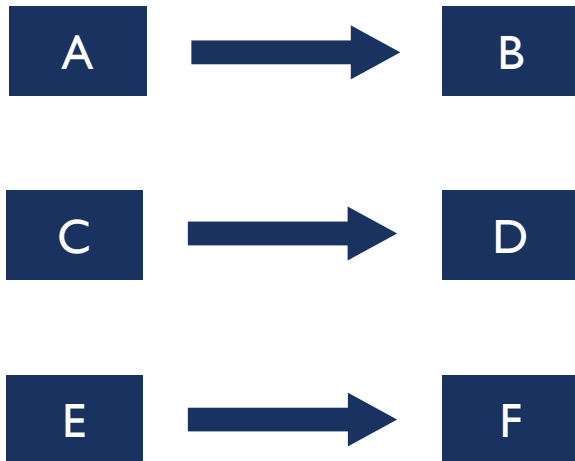

SCHEDULED TURNAROUND TIME

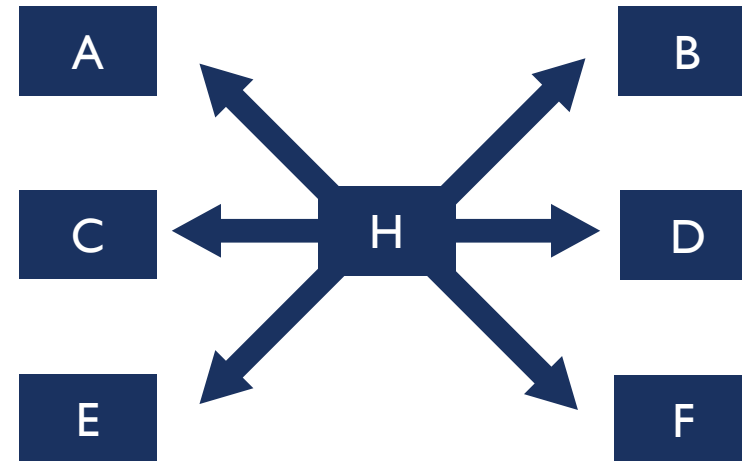
What effect does turnaround time have in late Aircraft arrivals?

Route Strategy

Point-to-Point Carriers

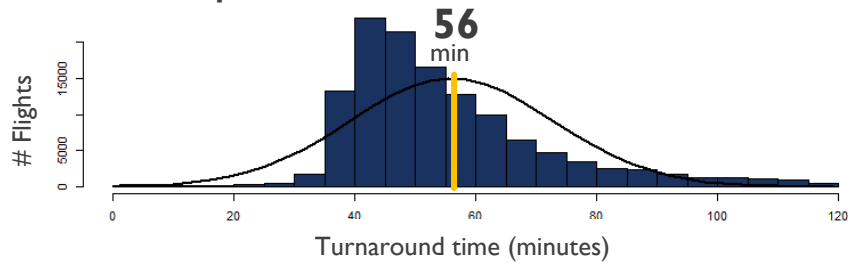


Hub-and-Spoke Carriers



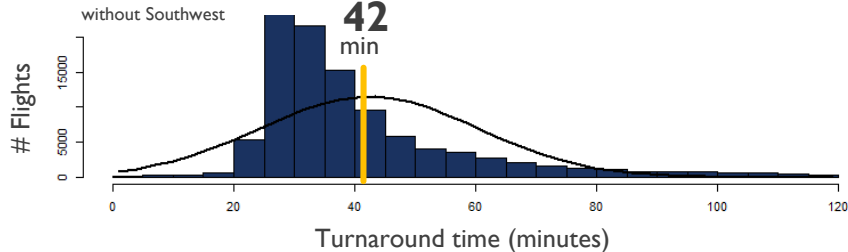
Scheduled Turnaround Times

Hub-and-Spoke

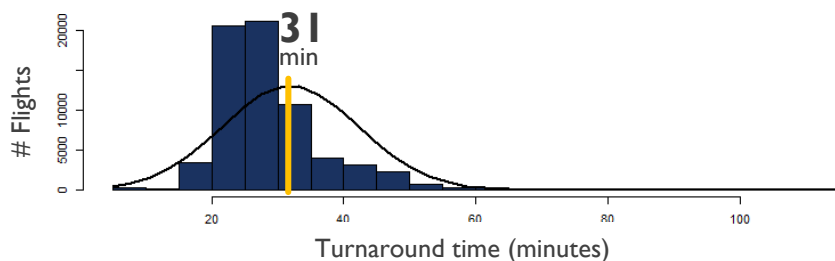


Point-to-Point

without Southwest



Southwest



Turnaround times and flights per day

- **Southwest** has **half** the turnaround times of Hub-and-Spoke airlines.

Hub-and-Spoke

3.2

Aircraft's
Flights
per day

Point-to-Point
without Southwest

4.7

Aircraft's
Flights
per day

Southwest

5.2

Aircraft's
Flights
per day

- **80% of Southwest** flights operate on **short routes**.
(<1000 miles)
- **79% of delays** occurring during short flights.

*Considering flights with scheduled turnaround times between 0 to 120 minutes.

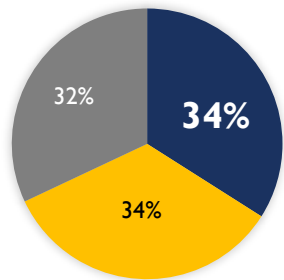
*Point-to-Point are carriers that did over 3.68 flights per day on average

Departure Delays

Departure Delay Causes

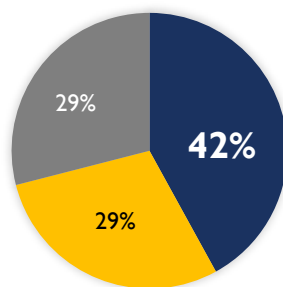
- **Late aircraft arrival** amounts to **56%** of **departure delays** for Southwest.

Hub-and-Spoke



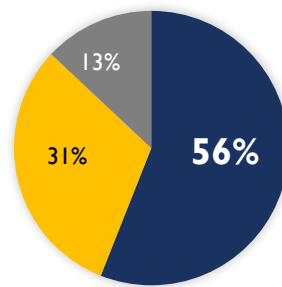
■ Other

Point-to-Point
without Southwest



■ Carrier

Southwest



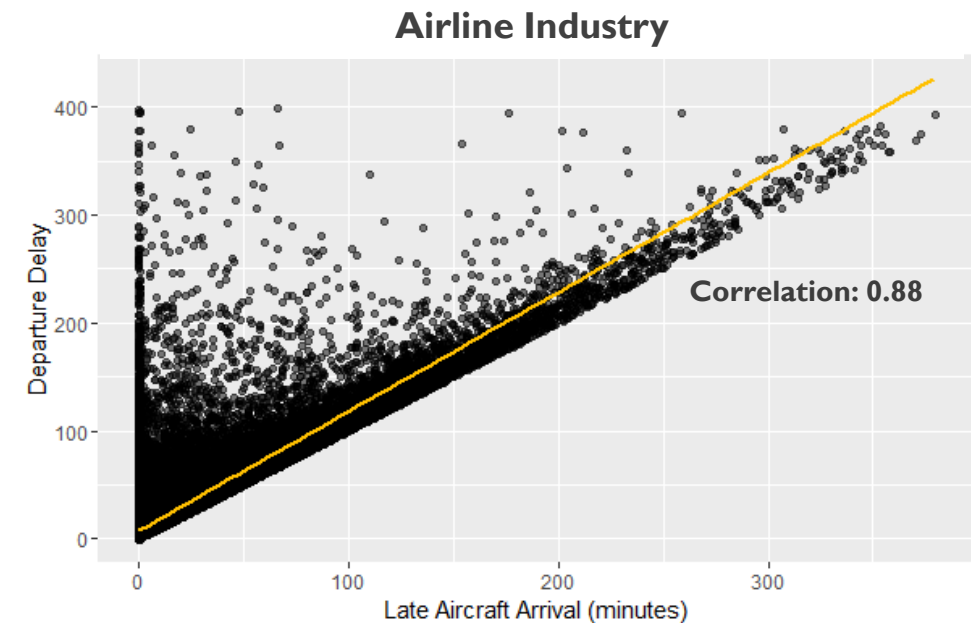
■ Late Aircraft Arrival

*Departure delays as the total amount of minutes.

*Point-to-Point are carriers that did over 3.68 flights per day on average

Correlation with Late Aircraft Arrivals

- There is a **strong correlation** between **departure delays** and **late aircraft arrivals** for all carriers.

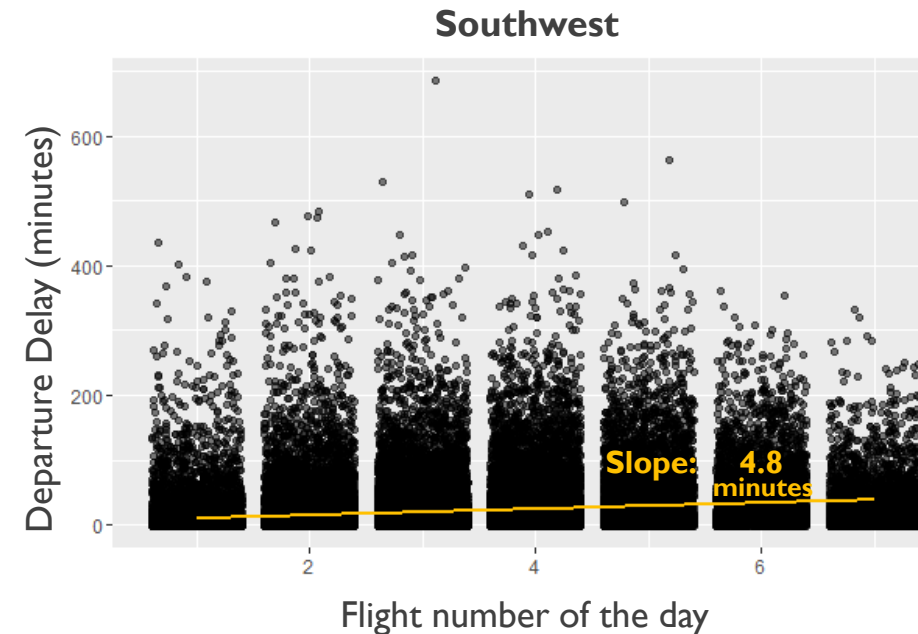
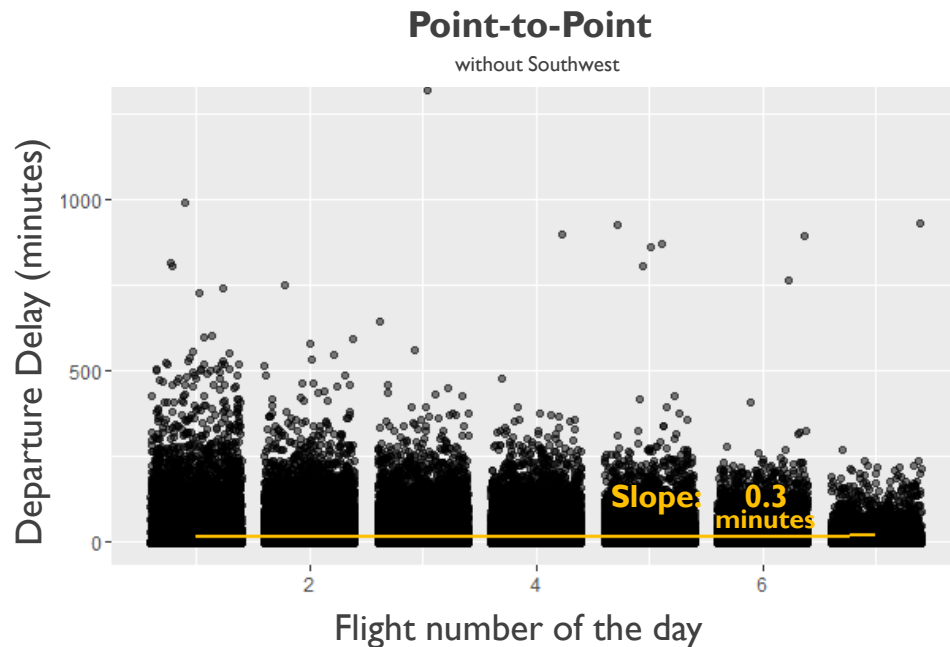


*All flights with late aircraft arrivals or departure delays <400 minutes

Cascading Delays

Between the 1st and 7th flight of the day

- For **other Point-to-Point** airlines there is **no relevant impact** on departure delays.
- For **Southwest** each **extra flight adds 4.8 minutes** to the following departure delay.



Turnaround Time Differences

Actual vs Scheduled turnaround times

- The difference between **scheduled** and **actual** turnaround times for Southwest is **35%**.

	Hub-and-Spoke	Point-to-Point without Southwest	Southwest
Scheduled Turnaround time	56 minutes	42 minutes	31 minutes
Actual Turnaround time	64 minutes	46 minutes	42 minutes
Difference	14%	10%	35%

*Considering flights with scheduled turnaround times between 0 to 120 minutes.

*Point-to-Point are carriers that did over 3.68 flights per day on average

Scheduled Turnaround Times

Flight with turnaround times <30 minutes

- **Southwest** has more than **triple** the flights under **30-minute turnaround time** vs. other point-to-point Airlines.

Point-to-Point
without Southwest

11%

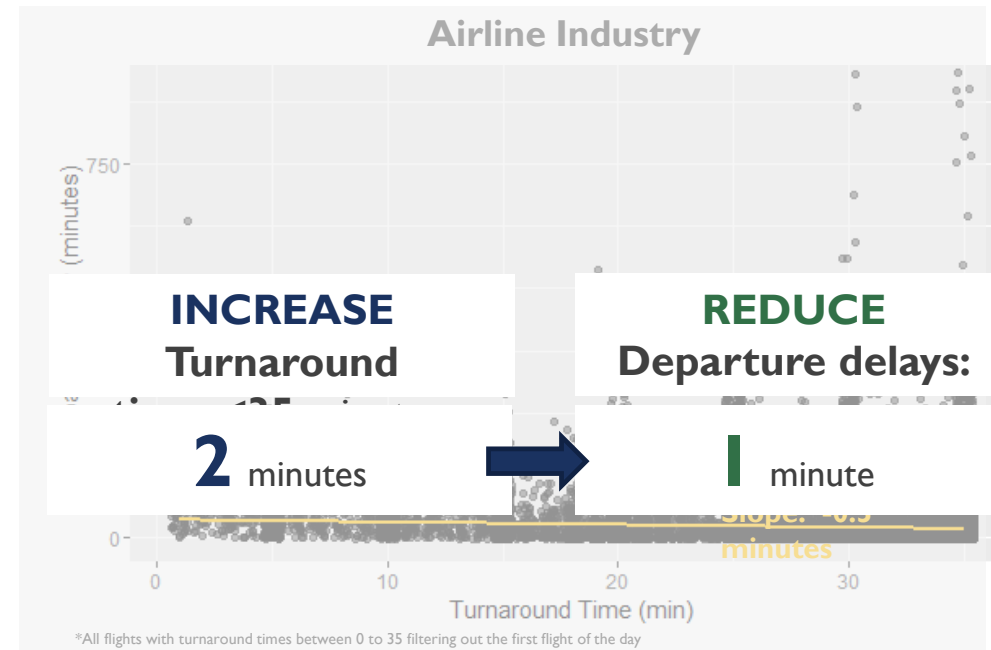
Flights with
turnaround times <30
minutes

Southwest

37%

Flights with
turnaround times <30
minutes

Increasing turnaround times



Scheduled Turnaround Times

Recommendation

- Increase **turnaround times <35 minutes** (47,000 flights) to at least **35 min.**

Southwest **Current**
On-Time Performance

62%



Southwest **Afterward**
On-Time Performance

72%

Trade-Offs

- Southwest's average turnaround time from **31** to **37** min.
 - The **difference** with **actual turnaround times** will be **14%** (in line with industry).
- **Increase in 45** minutes on average the **block times** for a day with all flights modified.
- ~ **3** months
- ~**20** million USD

APPENDIX – TURNAROUND TIME & TRADE-OFFS

Turnaround times effect

- **Southwest** has **4x** flights under 30-minute turnaround time vs. other point-to-point Airlines.

Number of flights (in %)	Scheduled Turnaround Time					Total
	<20 min	20-29 min	30-39 min	40-60 min	>60 min	
Point-to-Point without Southwest	2%	9%	41%	28%	20%	100%
Southwest	2%	35%	45%	15%	3%	100%

*Point-to-Point are carriers that did over 3.68 flights per day on average

Investment

Work-hours to re-schedule	\$ 15.279.537
Time to fix 1 flight (hours)	0,7
Price per workforce hour (USD)	\$ 30
Time frame (hours)	504.067
Employees Assigned	250
Months to do it	2,8
Call-Center Costs (USD)	\$ 5.456.978
Price per Ticket	\$ 5
Time to solve 1 ticket (minutes)	10
Call-center tickets	1.080.144
Call-center tickets (in % of total passengers)	5%
Passenger per plane	150
Flight bought already	20%
Flights in 8 month window	720.096
Aircrafts	577
Flights per day	5,2
Days	240
Total Cost	\$ 20.736.515

APPENDIX – DATA CLEANSING CONSIDERATIONS

FILTERED OUT

- **First flights of the day** (outliers in turnaround times)
- **Diverted, Cancelled or whenever the previous arrival airport <> current departure airport**
 - **8.496 (1.9%)** flights have mismatched flights and have been filtered out (sorting by actual departure time gave 2.2%)
 - **N102UW** 3rd - 5th of January: Ghost flight not in data.
 - **N590NW** 2nd of February: Two flights with the same airplane at the same time.
 - **N443WN** 2nd of February: Got diverted first and then cancelled. Generated a mismatch in the scheduling for a few flights.
 - **N215WN** 5th of February: Not diverter nor canceled and have a mismatch in flights because of the same timeframe.
- **Flights with negative turn-around time**
 - 8.725 flights (2%) with negative turnaround time.
 - **N905FR** 3rd of January: Not diverter nor canceled and flight scheduled to arrive 20 minutes later than their departure.

CARRIER	Flights / day
UA	2,71
VX	3,12
AA	3,15
AS	3,35
B6	3,44
DL	3,49
US	3,63
FL	3,68
F9	4,00
EV	4,41
MQ	4,80
WN	5,18
OO	5,31
HA	5,78