Analyzing the Effect of Delta Airlines' Fleet Upgrade on Operations at Atlanta-Hartsfield Jackson International Airport

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Abstract

Commercial aviation has seen a growth in terms of passengers traveled and flights operated in the past decade (BTS, 2020). To cope up with this growth, airlines adopt various strategies such as network expansion and fleet upgrades. Airlines adopt fleet upgrade strategies to modernize their fleet, reduce costs, expand network coverage, and improve customer loyalty and experience. Research suggests that change in wake turbulence categorization and aircraft performance can directly impact the movements and delays at an airport. For this study, Delta Airline's fleet upgrade program and its effect on operating parameters at Atlanta-Hartsfield Jackson International Airport was analyzed. The operating parameters analyzed for this study included runway delays, take-off delays, and runway movements. The traffic schedule of 11th November 2019 was simulated for the analysis with a total of 2,538 flights. A change in the fleet configuration would lead to a change in the wake turbulence categories of the aircraft that would directly impact operating parameters such as runway movement and delays. The results of the simulation indicate that operating Delta's upgraded fleet would lead to an increase in runway delays and take-off delays and a decrease in runway movement for all five runways at Atlanta. The consistent results across all parameters indicate that Delta's upgraded fleet and the corresponding change in aircraft performance and wake turbulence categorization would lead to a decrease in airport efficiency at Atlanta Airport.

Introduction

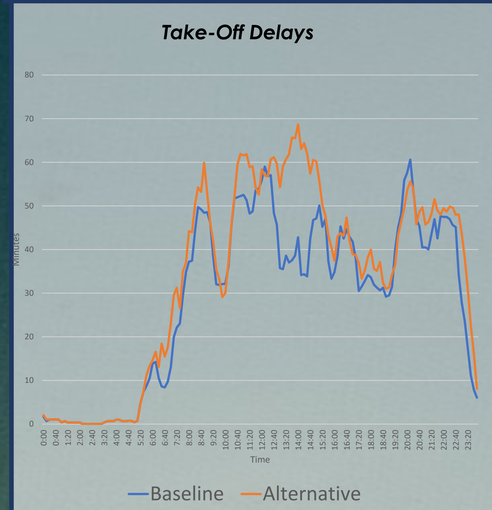
There is a lack of literature analyzing the impact of a large-scale fleet upgrade on the operations of an airport. Delta Airlines is undergoing a large-scale fleet upgrade program that will result in a significant change in the fleet composition of the airline (CAPA, 2018). Atlanta is Delta Airlines' largest operating base where Delta operated more than 260,000 flights in 2019 (Cirium, 2020). Some of the factors that were analyzed in the study were changes in aircraft speed, performance profile, and wake turbulence category. Literature suggested that change in wake turbulence category can significantly impact the delays and operations at an airline as a change in wake turbulence category leads to a change in separation minimums in the terminal airspace. There is a lack of literature to study the impact of such factors on the operations at Atlanta Airport. There needs to be research conducted to forecast the impact of fleet upgrades on the long-term operations of an airport. While the study was focused on Delta Airlines at KATL, the results of this study lay a theoretical foundation for further research on fleet upgrades, airport operations, and wake turbulence categorization.

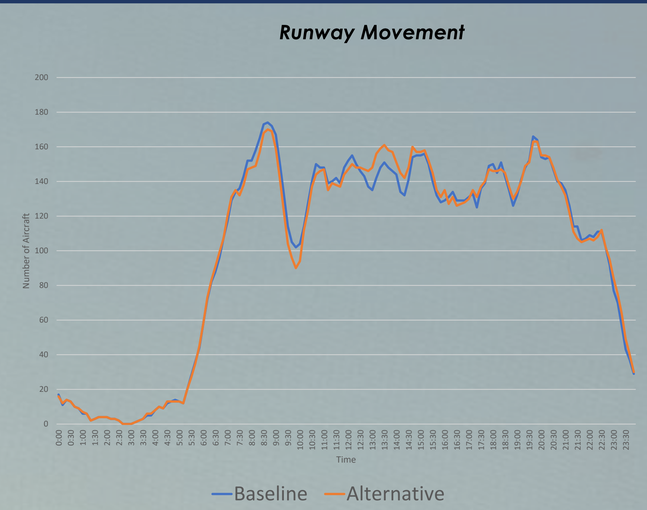
Method

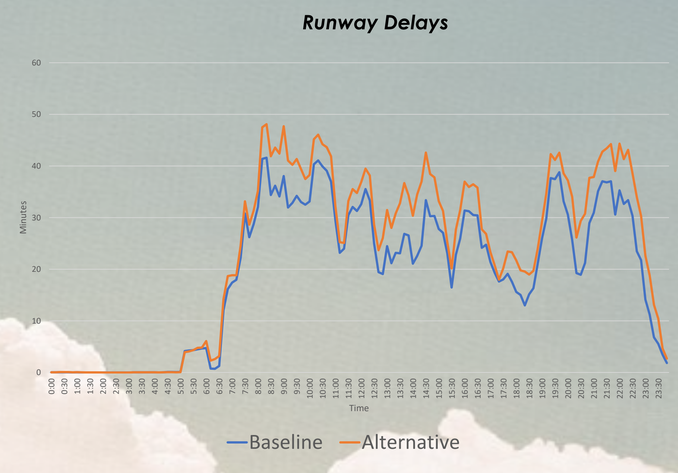
The study utilized a quantitative methodology with a simulation research design. Jeppesen Total Airspace and Airport Modeler (TAAM) was utilized for modeling and simulation. As reviewed in the literature, the traffic data for 11th November 2019 was simulated to replicate the most recurring traffic data at KATL for 2019. The traffic data for 2019 was collected from the NextGen ERAU Applied Research Laboratory (NEAR Lab) at Embry-Riddle Aeronautical University, Daytona Beach. To gather the data for the analysis in the study, two simulations were conducted by the researcher. Each simulation was conducted for 48 hours and started from 12 PM Local on 10th November 2019 and ended at 12 PM Local on 12th November 2019. A baseline simulation on TAAM is used to simulate the airport conditions without any modifications or upgrades. The alternative simulation was created to test the effect of a change on the operations at an airport. For the alternative simulation, the Delta Airlines fleet was updated as per the reviewed literature.

Aircraft	Number	Upgrade Details
A220-100	44	• 33% of CRJ900s operated by Endeavor Air • 5% of the Boeing 717-200s
A220-300	50	• 55% of the Boeing 717-200s
Airbus 321-200	127	• 40% of the Boeing 717-200s • 100% of the MD-88s 100% of the MD-90s • 24% of the Boeing 757-200s
Airbus 321NEO	100	• 76% of the Boeing 757-200s • 100% of the Boeing 757-300s
Airbus 330-900NEO	37	• 100% of the Boeing 767-300s • 64% of the Boeing 767-300ERs
Airbus 350-900	35	• 36% of the Boeing 767-300ERs • 100% of the Boeing 767-400s

Results







Conclusion

The results of the simulation indicate that operating Delta's upgraded fleet would lead to an increase in runway delays and take-off delays and a decrease in runway movement for all five runways at Atlanta. The consistent results across all parameters indicated that Delta's upgraded fleet and the corresponding change in aircraft performance and wake turbulence categorization would lead to a decrease in airport efficiency at Atlanta Airport. The study only considered the Consolidated Wake Turbulence (CWT) separation minimums. As the FAA implements Phase 3 of the RECAT program and introduces further technologies under the FAA NextGen program, the results of this study could vary. However, the results provide a theoretical framework for further research and evaluation into the effects of fleet changes on airport operations.

References

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