# Multi-Objective Optimization of Airport Gate and Aircraft Assignments

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**Abstract**

As the world recovers from the pandemic, the demand for air travel is also slowly recovering to pre-pandemic levels. However, complaints are filed here and there regarding the inefficiencies in different aspects of the aviation industry. One of them is the hassle in the proximity of the boarding gate assignments. There are several factors that affect boarding gate assignments in airports, such as availability, capacity, location, turnaround time, departure and arrival time, operating costs, etc. When mistakes happen, delays and difficulties follow, also causing a domino effect in the airlines' flight schedule as a whole. In this study, a mixed integer linear programming model is developed to minimize waiting or idle times for the airplanes, as well as passenger walking distance. In decreasing these idle times, associated costs can also be lowered and flight schedules can be made more stable and efficient. This could increase the customer satisfaction from the passengers, which eventually leads to customer loyalty, good word-of-mouth, and returning customers. An hypothetical case study is solved to demonstrate the capabilities of the proposed model. A goal programming approach is used to efficiently optimize the system's objectives simultaneously. Finally, a scenario analysis is performed to understand the behavior of the system under varying conditions.

**Keywords**
Optimization , air[port gate, airport assignment, availability, capacity