MODELING RUNWAY CAPACITY USING MIXED INTEGER PROGRAMMING BASED ON FCFS AND AROT POLICIES

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ABSTRACT

Air transportation is often used between islands and countries which have economic advantages over other types of transportation. Technology in aircraft enables an increase in demand from year to year. demand density creates a queue of aircraft on the runway. Airport faced challenges within a key bottleneck in the air transport system and runway scheduling. This study focuses on modeling runways using mixed integer programming with empirical studies at Juanda International Airport, Surabaya. We use runway capacity management based on scheduling approach, runway configuration and aircraft separation standard. This study is to minimize aircraft waiting time on the runway before departure and landing in the air with considerable reduction in delays and minimize fuel cost. The model seeks the optimal aircraft sequence over each individual runway to assign to the runway and determine an optimal aircraft considering separation time standard and runway configuration. We proposed a heuristic sequential approach based on FCFS and AROT policies. The heuristic resulted in substantial savings of fuel burn and reduced delay in the runway which indicate that aircraft runway decisions are often overlooked in aircraft scheduling problems. By conducting research using these methods, it is expected to obtain near-optimal results to facilitate decision making in daily operations.

Keywords: Air Transportation, Runway Capacity, Mixed Integer Programming, Aircraft Scheduling.