

## Do Costs and Team-building Conflict in Airline Crew Scheduling? An Individual Crew Pairing Approach

**Xin Wen**

Department of Industrial and Systems Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong

### Abstract

Recognizing the importance of team spirit for cabin crew, airlines used to schedule cabin crew members in teams. In recent years, airlines have operated with increasingly diversified types of aircraft with heterogeneous manpower demands. Thus, many airlines have started to adopt the individual approach to construct itineraries for each cabin crew member to better characterize manpower demand heterogeneity. Due to improved flexibility, the individual approach can better utilize crews to enhance cost efficiency, but it may lead to reduced team spirit. To mitigate the drawbacks of the individual approach, we introduce the concept of pairing similarity (both flight-based similarity and duty-based similarity), which represents the scenarios that crew members work together on the same flights or duties. Based on the new concepts, we propose a novel individual crew pairing model that aims to promote the development of pairing similarity. A column generation-based algorithm is constructed to efficiently solve the model. Computational results demonstrate that our proposed model is able to improve team-building opportunities when the individual approach is adopted. However, this benefit is accompanied by an increased operations cost. Our experiments suggest that there exists a range in which the team-building opportunities are improved with a relatively small increase in operations costs. Thus, airlines are suggested to carefully determine the team-building enhancement level while enjoying the cost-efficiency of the individual approach. Besides, through a comparative analysis of the two pairing similarity measures, it is found that the duty-based similarity measure shows a stronger ability to improve team spirit.

### Keywords

Crew pairing, Team spirit, Individual approach, Similarity, Column generation.