APEM journal

Advances in Production Engineering & Management
Volume 17 | Number 2 | June 2022 | pp 183–192
https://doi.org/10.14743/apem2022.2.429

ISSN 1854-6250
Journal home: apem-journal.org
Original scientific paper

A bi-objective optimization of airport ferry vehicle scheduling based on heuristic algorithm: A real data case study

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ABSTRACT

The optimization of ferry vehicle scheduling is the key factor to improve the punctuality of flights and passenger satisfaction at airports. Based on the airport reality, a bi-objective mixed integer linear programming model for airport ferry vehicle scheduling is proposed in this paper, in which the first objective is to minimize the number of vehicles used, and the second objective is to minimize the maximum number of flights per ferry vehicle serving under the constraint that the first objective takes the optimal value. For the optimization model of the second objective, this paper designs three heuristic algorithms: strict equalization algorithm, relaxed equalization algorithm and transplantation algorithm, and integrates them into a main algorithm. The actual flight data of Beijing Capital International Airport are used for numerical examples, and all the examples tested can obtain the exact solution or high-quality approximate solution using the designed algorithm, which verifies the effectiveness of the algorithm. This study can be used to inform decisions on the efficient and balanced use of airport ferry vehicles. Despite the system presented in the paper is designed for airport, it can be applied to solve similar vehicle scheduling problems.

ARTICLE INFO

Keywords:
Ferry vehicle;
Vehicle routing;
Bi-objective optimization;
Heuristic algorithm;
Strict equalization algorithm;
Relaxed equalization algorithm;
Transplantation algorithm

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Article history:
Received 10 May 2022
Revised 9 August 2022
Accepted 16 August 2022

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