The Airport Shuttle Problem: A Formulation and Metaheuristic Algorithm

Cağrı Koç[*†1], Nihat Öner[2], and Hakan Gültekin[3]

[1]Department of Business Administration, Social Sciences University of Ankara (ASBU) – Turkey
[2]Department of Industrial Engineering, TOBB University of Economics and Technology (TOBB ETU)
– Turkey
[3]Department of Mechanical and Industrial Engineering, Sultan Qaboos University (SQU) – Oman

Abstract

Airport shuttle services transfer passengers from or to the airport and city center which must be completed in a specific time. After the service, new passengers can be assigned to the vehicle or the vehicle can return to the next location with no passenger for the next service. The vehicle services, which has no service for a while, can wait in a location which was determined before. All transfer operations continue in accordance with the constraints until the accepted passenger demands are satisfied during the day. Transportation of some customers can be rejected which brings no extra cost. Hence, the demand of some passengers cannot be satisfied. Each passenger transfer must begin within the time window. We may group passengers and assign them to the same vehicle. These passengers can be in different flights and are ready to transfer in different times. The main objective is to maximize the profit while satisfying the limited seat capacity, the predefined flight times, and the number of passengers constraints. Such considerations give rise to a people transportation variant of the pickup and delivery problems. This study introduces the airport shuttle problem, presents a mixed integer programming formulation, and develops a metaheuristic for its solution. Extensive computational experiments have shown that the metaheuristic is highly effective on the problem.

Keywords: Airport shuttle service, vehicle routing problem, scheduling, metaheuristic

---

[*]Speaker
[†]Corresponding author: cagri.koc@asbu.edu.tr