
Location and Selective Routing Problem with Profits in Reverse Logistics Networks

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Abstract

One of the key concerns of the companies involved in product recovery management is used product (core) collection. In this paper, we consider the scenario where a company engaged in reverse logistics wants to locate facilities with limited capacity which will serve as collection centers (CCs) for the cores to be collected from service locations (SLs). The SLs as well as the amount of cores at each SL are known. Moreover, each SL has a reservation price and it will only return them if the offered acquisition price is less than this reservation price. Each SL can only be visited by a single vehicle, hence split pickups are not permitted. All vehicles are identical with respect to load capacity and speed. They must start and end their routes at the same CC without visiting any other CC in the route. The objective of the company is to maximize its profit by determining the locations of the CCs, SLs to be visited, the acquisition price offered for each unit of core collected, the number of vehicles allocated to each opened CC, and the route of each vehicle. The source of the revenue is the cost savings resulting from using the components of the cores in remanufacturing like-new products. We devise very effective and efficient Tabu search heuristic to solve this problem. The results obtained on randomly generated test instances shows that the TS heuristic is very effective and efficient when compared with the solutions of a mathematical model obtained by GUROBI.

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