A Study on the Mixed Fleet Multi-temperature Common Distribution: Heuristics and Computational Analysis

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Abstract

This paper considers two special methods of operation for the multi-temperature common distribution in the ‘cold-chain’ logistics. The first is that carriers utilize the engine-driven frozen truck divided into three parts to hold goods of different temperatures. The second is that carriers utilize the multi-temperature storage box, found in a general truck, to hold those goods. We transferred the previous operations into two Heterogeneous Multi-temperature Fleet Vehicle Routing Problems, HMFVRP1 and HMFVRP2. A set of 168 instances, created by modifying VRP and VRPTW benchmark instances, is used to compare the performance of HMFVRP1 and HMFVRP2. In addition, real costs and the capacities of different sized trucks are set for these test instances. Then, we also develop a simple heuristic algorithm to solve these HMFVRPs. Computational results present that, in average, HMFVRP2 performs superior to HMFVRP1 in both of vehicle usage cost and travel distance. Such a finding could offer an alternative toward improving the performance and efficiency of the practical multi-temperature common distribution.

Keyword：Multi-temperature Common Distribution, Heterogeneous Fleet, Vehicle Routing Problem