
The Vehicle Routing Problem with Private and Shared Delivery Locations

Simona Mancini*¹

¹University of Cagliari – Italy

Abstract

In this work a new Rich Vehicle Routing Problem arising in parcel delivery for e-commerce, the VRP with Private and Shared Delivery Locations (VRP-PSDL) is introduced and formalized. In the VRP-PSDL deliveries can be performed directly at customer location within a short time-windows provided by the customer or, with a small compensation for the customer, they can be carried out at shared delivery locations (SDL) accessible 24/7 where customers may pick-up their goods at anytime. Each SDL can receive a limited number of deliveries. Each customer gives a list of the SDL in which he is willing to collect its order. The goal of the problem is to minimize total cost given by the sum of vehicle usage fixed costs, travel costs and compensations. A mathematical model and an effective Iterative Local Search based matheuristic are proposed. The matheuristic works as follows. Firstly, an initial solution is computed by running the model with a short timelimit. Then, at each iteration of the local search, p customers are randomly selected and they are assigned to the same SDL they were assigned in the current solution (or they are directly served if they were directly served in the current solution). This overconstrained version of the model is run for a short timelimit. The best solution obtained is kept as current best. After k nonimproving iterations a perturbation is applied randomly closing one of the SDL. Computational test show how this delivery system is strongly more cost effective respect to traditional delivery systems.

Keywords: Shared Delivery Locations, Ecommerce, Matheuristic, Iterated Local Search

*Speaker