
Using Mobile Pick-up Stations for Last-Mile Deliveries

Tino Henke^{*†}, Saba Pakdel¹, Trong Dai Pham¹, Thi Kim Nhung Phan¹, and Jan Fabian Ehmke¹

¹Otto-von-Guericke University Magdeburg – Germany

Abstract

Because of continuously growing e-commerce and increasing urbanization, many innovative last-mile delivery concepts have been introduced in recent years. One of such concepts considers the usage of mobile pick-up stations. Mobile pick-up stations contain several lockers for storing a limited number of parcels to be collected by customers. Moreover, each station can be moved to a different location on each day to enable convenient access for customers. However, for sparsely populated areas, conventional home deliveries may still be more efficient for the logistics service provider than operating with mobile pick-up stations. Thus, we regard an optimization problem in which a given set of customers needs to be partitioned into clusters served either by mobile pick-up stations or by home deliveries. Moreover, temporary locations for the pick-up stations as well as routes for home deliveries have to be determined such that total delivery costs can be minimized. In our presentation, we will discuss a sequential three-stage heuristic. Customer clusters are determined on the first stage, the best delivery option for each cluster is identified on the second stage, and a simulated annealing-based local search is performed on the last stage. Extensive numerical experiments evaluate the performance of the proposed heuristic and provide valuable managerial insights into the benefits of using mobile pick-up stations.

Keywords: Last Mile Deliveries, Location Planning, Vehicle Routing, Heuristics

*Speaker

†Corresponding author: tino.henke@ovgu.de