Vehicle Routing Problem with Public Transportation and Delivery Options

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Abstract. This study investigates a rising phenomenon that adopts public transportation for goods delivery, named Vehicle Routing Problem with Public Transportation and Delivery Options (VRP–PT–DO), taking Mass Rail Transit (MRT) in Taiwan as the public transportation. In this work, customers have three options for goods delivery: home delivery using truck, collecting goods at their preferred station during travel shipped by MRT staffs, or either option. All home delivery is tackled with a unique time window, where the time windows for MRT delivery are bounded by the system's working hours. Normally, each customer has a specific demand, however, for MRT delivery option and mixed options, customers' demand is limited by the size of the boxes in the parcel lockers set up at the delivered station, and customers are prohibited from picking up their delivered packages at terminal stations. This problem aims at finding the minimum total routing cost by both delivery methods, truck delivery or MRT delivery, using a mixed integer programming model. The proposed model is solved using CPLEX and provides promising results.

Keywords: public transportation, city logistics, pure delivery vehicle routing, delivery options