

Profitable Tour Problem for Home-Refill Considering Optional Customers

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Abstract. Environmental awareness among individuals and organizations has increased worldwide, leading to the consideration of sustainable living. One ongoing issue is the amount of plastic waste threatening the sustainability of the environment. Home-refill, which provides refillable household products, is a sustainable option for this problem. Unlike the conventional retail chain, a homerefill service company buys goods in bulk and then delivers them directly to customers' containers. The main objective is to reduce household product plastic waste and product price since packaging accounts for 15% of the cost.

This research attempts to optimize the daily distribution operation of the home-refill service company. The company utilizes motorbikes carrying multiple dispensers (compartments) to deliver various household products. Each motorbike can perform multiple trips in a day. We also take into account the optional customers located in the countryside whose demand does not have to be satisfied. This problem is referred to as the Multi-Trip Multi-Compartment Profitable Tour Problem (MTMC-PTP). We formulate a mathematical programming model for the problem. We conducted extensive computational experiments to analyze various problem parameters including compartment type, compartment size, and composition of customers.

Keywords: Flexible Discrete Compartment Size, Home-Refill, Multi-Compartment Vehicle Routing Problem, Multi-Trip Vehicle Routing Problem, Optional Customer.