
Solution techniques for the Consistent Inventory Routing Problem

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Abstract

Every year, the consumption of beer is around 400 million hectoliters in Europe. Although the consumption per capita and year is quite stable, demands and characteristics of the customers (bars, restaurants, stands...) are really diverse. Each establishment has different and independent opening hours, time windows and different inventory characteristics. Customers can also demand consistency in delivery times. Special events, such as sports events or music festivals, create, due to temporary high demands, the need of delivering commodity with more than one vehicle. Hence, the creation of efficient inventory routing plans is highly demanding. Thus, we face a Consistent Inventory Routing Problem with Time-Windows and Split Deliveries (CIRPTWSD). This problem integrates two core logistics decisions in supply chains that are typically investigated independently or sequentially: the optimization of inventories and transportation routing. We present a model which includes time windows, inventory and consistency management as well as split deliveries to create delivery routes. This model also includes some other characteristics as a given planning horizon and a given and constant demand in the time periods. Besides modeling the problem and solving small instances with CPLEX, we also propose a metaheuristic to obtain efficient solutions in large real world instances. It consist in a constructive phase with some local searches followed by an adaptive large neighborhood search applied to the obtained solution. Preliminary results on test instances which were derived from real world data with up to 400 customers show that our method obtains good solutions in a short amount of time.

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