> Thursday, September 22nd, 2022
14:30 - 16:00

OPERATIONS MANAGEMENT

IÉSEG SCHOOL OF MANAGEMENT

EMPOWERING CHANGEMAKERS FOR A BETTER SOCIETY

‘BUFFERING VARIABILITY IN STOCHASTIC CYCLIC INVENTORY ROUTING’

BIRGER RAA - GHENT UNIVERSITY

ABSTRACT

We study the cyclic inventory routing problem in which a geographically dispersed set of retailers with stochastic demand rates is replenished from a single depot. An infinite horizon is considered, and a fixed-partition policy is adopted that partitions the retailers into subsets that are always replenished together in the same route. Thus, routes must be designed, and their cycle times chosen such that routing costs and inventory costs are balanced. Furthermore, the retailer demand variability must be buffered to obtain a certain service level. A complication occurs when the cumulative demand per cycle of the retailers in a route exceeds the limited vehicle capacity. This results in shortfall because retailers are not fully replenished, which affects the service level and cost balance. We deal with the demand variability and the resulting shortfall by providing a combination of buffers during the route design: slack vehicle capacity, backup vehicle capacity, and safety stock at the retailers. An approximate method is presented for determining the safety stock levels and is integrated into a state-of-the-art metaheuristic solution approach for cyclic inventory routing. Computational experiments show that demand variability can be buffered cost efficiently in a cyclic planning approach and that demand variability and shortfall should be taken into account during the route design rather than in a postprocessing step.

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