CIRRELT

Soutenance de thèse de doctorat de

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Multi-Attribute Deterministic and Stochastic Two-Echelon Location Routing Problems

Résumé: The Two-Echelon Location-Routing Problem (2ELRP) is a significant combinatorial optimization problem with wide application in transportation, logistics, and supply chain management. The problem involves making simultaneous decisions concerning the location of one or two levels of facilities (platforms and/or satellites) and creating echelon-specific sets of routes to efficiently serve customer demand. One observes a recent growing interest in addressing more realistic problem settings, which require more comprehensive, /rich,/ problem representations and the development of appropriate solution methods. Our objective is to contribute to this research effort by focussing on rich 2ELRP variants known as Two-Echelon Multi-Attribute Location-Routing Problems (2E-MALRPs) involving time-dependent multicommodity demand, time windows, and fleet synchronization. Deterministic and stochastic variants are explored to study the influence of uncertainty on optimal solutions and decision-making processes as well as to gain insights into the behaviour of these complex problem settings.

The dissertation is articulated in three research articles. The first addresses the deterministic 2E-MALRP, focussing on time and synchronization modelling and proposing a dynamic discretization discovery algorithm. The second involves demand uncertainty and correlations among the origin-destination pairs, while the third combines multiple interacting attributes with stochastic travel times. Two-stage stochastic formulations are proposed in both cases, addressed through tailored Progressive Hedging metaheuristics introducing several algorithmic enhancements. The three articles showcase the efficiency and quality of the proposed methods, addressing challenges in operations research, as well as in logistics and transportation.

MARDI

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