A large neighborhood search heuristic for supply chain network design

Majid Eskandarpour, Pierre Dejax, Olivier Péton

PII: S0305-0548(16)30275-1
DOI: 10.1016/j.cor.2016.11.012
Reference: CAOR 4125

To appear in: *Computers and Operations Research*

Received date: 28 August 2014
Revised date: 2 November 2016
Accepted date: 12 November 2016

Please cite this article as: Majid Eskandarpour, Pierre Dejax, Olivier Péton, A large neighborhood search heuristic for supply chain network design, *Computers and Operations Research* (2016), doi: 10.1016/j.cor.2016.11.012

A large neighborhood search heuristic for supply chain network design

Majid Eskandarpour [1,2], Pierre Dejax[1], Olivier Péton[1]

[1] *IMT Atlantique, 4 rue Alfred Kastler, F-44307 Nantes Cedex, France*
[2] *Department of Mathematics, Centre for Operational Research and Logistics, University of Portsmouth, Lion Gate Building, Lion Terrace, Portsmouth PO1 3HF,UK*

Abstract

Many exact and approximate solution techniques have been used to solve facility location problems and, more generally, supply chain network design problems. Yet, the Large Neighborhood Search technique (LNS) has almost never been suggested for solving such problems, although it has proven its efficiency and flexibility in solving other complex combinatorial optimization problems. In this paper, we propose an LNS framework for solving a four-layer single period multi-product supply chain network design problem. One important feature of the model is that it includes inter-modality: the itinerary followed by the cargo from origin to destination may take several transportation modes. Moreover, several modes may compete on some arcs. Location decisions for intermediate facilities (e.g. plants and distribution centers) are determined by the LNS while transportation modes and product flow decisions are determined by a greedy heuristic. As a post-optimization step, linear programming is used to optimize product flows once the structure of the logistics network is fixed. Extensive experiments, based on randomly generated instances of different sizes and characteristics, show the effectiveness of the method compared with a state-of-the-art solver.

Keywords: Supply chain network design, facility location, Large Neighborhood Search

*Corresponding author. Olivier Péton, IMT Atlantique, 4 rue Alfred Kastler, 44300 Nantes, France. olivier.peton@mines-nantes.fr, +33 251 858 313