
A strategic and tactical facility location problem with mobile equipment

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Abstract

A large majority of facility location problems in industry aim at locating production plants or logistics facilities over a strategic time horizon. Sizing decisions determine the overall capacity installed at each capacity. One strong characteristic is that the installed capacity is generally not very flexible.

In this research, we model the problem of locating logistics platforms and planning a set of tasks. A characteristic feature is that some tasks require the use of mobile equipment, i.e. some machines that can be moved from one logistics platform to another. The problem includes strategic decisions (select a subset of candidate platforms to be opened) and tactical decisions (locate the mobile equipment).

We consider a time horizon of a few months, decomposed into several time periods, typically weeks. The company has a large set of intermittent customers, with a deterministic but variable demand during a subset of time periods. The objective function to be minimized is the sum of the fixed set-up cost of platforms, production, inventory and delivery costs and the cost of moving the mobile resources from one platform to another.

The model the problem as a mixed integer linear program (MILP). We first solve it with IBM Ilog Cplex 12.6. Then, for large-sized instances, we develop a Large Neighborhood Search metaheuristic. We present numerical experiments for a case study in the sector of civil engineering.

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