

## **Multiple Objective Optimization of the Fleet Sizing Problem for Road Freight Transportation**

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A fleet sizing problem (FSP) in a road freight transportation company with heterogeneous fleet and its own technical back-up facilities is considered in the paper. The mathematical model of the decision problem is formulated in terms of multiple objective mathematical programming based on queuing theory. Technical and economical criteria as well as interests of different stakeholders are taken into account in the problem formulation. The solution procedure is composed of two steps. In the first one a sample of Pareto-optimal solutions is generated by an original program called MEGROS. In the second step this set is reviewed and evaluated, according to the Decision Maker's (DM's) model of preferences. The evaluation of solutions is carried out with an application of an interactive multiple criteria analysis method, called Light Beam Search (LBS). Finally, the DM selects the most desirable, compromise solution.

**Keywords:** Fleet sizing problem, Transportation, Multiple objective programming (optimization), Multiple criteria analysis.

### **1. Introduction**

Road freight transportation, frequently denominated by vehicle freight transportation, is a very important industry in many countries. The specific feature of this kind of transportation is that it carries goods (freight) on existing road networks by motor-vehicles (trucks, tractor-trailer units, tractor-semitrailer units, vans). In the European Classification of Activities (ECA, 2001) road freight transportation is assigned to section I, subsection 60 and group 602. Compared with other transportation modes/types, road transportation is characterized by high: accessibility, flexibility, operational efficiency, timeliness, reliability and speed.

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