

Discrete bi-level facility location models with competing customers

A. Karakitsiou & A. Migdalas

Industrial Logistics, ETS Institute
Luleå University of Technology
971 87 Luleå

email: {athkar, athmig}@ltu.se

World Congress on Global Optimization WCGO 2015
Gainesville, Florida - USA,
Feb 22-25, 2015
<http://www.caopt.com/WCGO>

Abstract

The research work dealing with the bi-level formulation of location problems is limited only to the competition among the locators, that is it is supposed that either both the locator and the allocator are the same or the customer (i.e., the user as a whole) knows the optimality criterion of the locator and agrees passively with it. Customers' preferences as well as externalities (such as road congestion, facility congestion, emissions etc) caused by the location decisions are either ignored or controlled by incorporating constraints in order to ensure the achievement of a predetermined target. However, this approach treats customers as irresolute beings. Thus, if, for example, the customers travel to the facilities to obtain the offered service, then there is no compulsion or intensive for them to attend the designated facility. This means that, once the facilities are open, what the locator wishes the customers to do may not coincide with their own wish and behavior. We suppose that the customers are involved in a Nash game

in order to ensure what they conceive as the best level of services for themselves. In order to take into consideration the effects of such competition in the facilities location decisions we propose a bi-level programming approach to the problem.

Keywords: facility location, discrete, bi-level, competition