

ABSTRACT**An Algorithm for the Facility Location Problem with Consideration to the Constructing Period — A Case for Two Construction Periods**

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The facility location problem which is one of the typical combinatorial optimization problems has been well-studied, and relatively large size problems can now be solved. However, the ordinary model of the facility location problem often cannot be applied to the real-life problem because of the simplicity of the model.

Demands for each customer are given deterministically in the traditional model. However, demands are not constant, but rather change with time. Therefore, the capacity of the facility as well as the suitable location has to be determined with consideration given to the demand.

This paper investigates the facility location problem with consideration to the constructing period of the candidate facilities. The facility location problem is first formulated as a mixed integer programming problem. A branch and bound algorithm is presented for two periods model. An efficient procedure is proposed for obtaining the lower bound and the penalty. For calculating the lower bound, a network problem with the special structure is solved by an out-of-kilter method. Moreover, a procedure for obtaining another lower bound is proposed. The lower bound is obtained by solving the Lagrangean relaxation problem. Computational experiment is presented, and it shows the effectiveness of the algorithm proposed.