

Transportation Logistics - Homework 2 (5 points)

Exercise 1 (2 pts)

A relief organization wishes to determine the location of distribution centers to satisfy the immediate needs of those affected by a quick-onset disaster.

The aim is to determine the number and location of distribution centers such that the number of people that can be supplied from the distribution centers within a maximum response time D is maximized.

The relief organization has a given budget B to invest in operating distribution centers. Let the set of potential facilities be denoted by J and the cost to operate distribution center j by c_j . The set I denotes the demand points which are likely to be affected by a natural disaster and a_i the number of persons affected by a disaster at demand point i ; d_{ij} gives the travel time between demand point i and potential DC location j .

1. Formulate the problem.
2. Assume now that each facility j has a maximum capacity q_j in terms of the number of people that can be served within the minimum response time D . How does your model change?

Exercise 2 (3 pts)

A furniture retailer has to deliver one table to each customer. The customers are at locations B to G. The furniture retailer himself is located at A. Since all six tables fit into a single truck only one delivery tour shall be made. The distances between the different locations are given in the following matrix:

d_{ij}	A	B	C	D	E	F	G
A	0	6	7	8	8	10	14
B	6	0	11	10	9	11	18
C	7	11	0	2	7	6	8
D	8	10	2	0	5	4	8
E	8	9	7	5	0	3	14
F	10	11	6	4	3	0	13
G	14	18	8	8	14	13	0

- a) What type of problem has to be solved? Formulate it in general terms and explain the meaning of each constraint.
- b) Determine a solution using Christofides' algorithm.