

XYZ CARGO INC. is a large company serving throughout Turkey. Its head office is in Istanbul, and it has 40 regional provincial directorates throughout Turkey and many branches in each region. You are an engineer working at the headquarters of this company.

The administration wants to serve 25 predetermined regions. Some of these regions will be designated as cross-docks.

A. Such an assignment has no additional costs. Explain with justification what appropriate site selection model should be used to determine the locations of cross-docks. Build the decision model by defining the decision variables and parameters. Select 25 different provinces from Turkey and generate cross-docking data using actual distance values between provinces. Solve the problem with the help of the excel solver for 4 different coverage distances (for example, 100, 150, 200, 250), and show and discuss the results with the help of a graph.

B. Unit transportation costs from cross-docks to regions and establishment costs of cross-docks are different and known. The money that can be spent on assigning a region as a cross-dock is also limited. Cross-docks have limited capacities. Write the relevant decision model for the case where the maximum number of cross-docking nodes is known. Define the parameters and decision variables you deem necessary, and assign the numerical values of parameters. Parameters that exist in question (A) must be used with their current values. The populations of provinces should be used as demands of nodes. Solve the problem with the help of excel for 4 different coverage distances used in question (A) and for 4 different P values (maximum number of cross-docks), and show and discuss the results with the help of a graph.

C. Suppose management wants to meet as many demands as possible in the regions. Define the parameters and decision variables you deem necessary, and assign the numerical values of parameters. Parameters that exist in questions (A) and (B) should be used with their current values. Solve the problem with the help of excel for 4 different coverage distances used in question (A) and for 4 different P values (maximum number of cross-docks) used in question (B), and show and discuss the results with the help of a graph.

D. Use the 10 nodes reduced version of the problem you generated above. Develop a vertex p-center formulation of the problem. Solve it with the help of excel and report the solutions.