Computer Laboratory Session 3

Aims

1. To be able to offer transportation solutions to businesses and organisations

Objectives

1. To offer a Transportation solution to a grain distributor
2. To minimise the costs in a supply chain

Challenge 1 – Grain Distributor

How many tons of wheat must be transported from each grain elevator to each mill on a monthly basis in order to minimize the total cost of transportation?

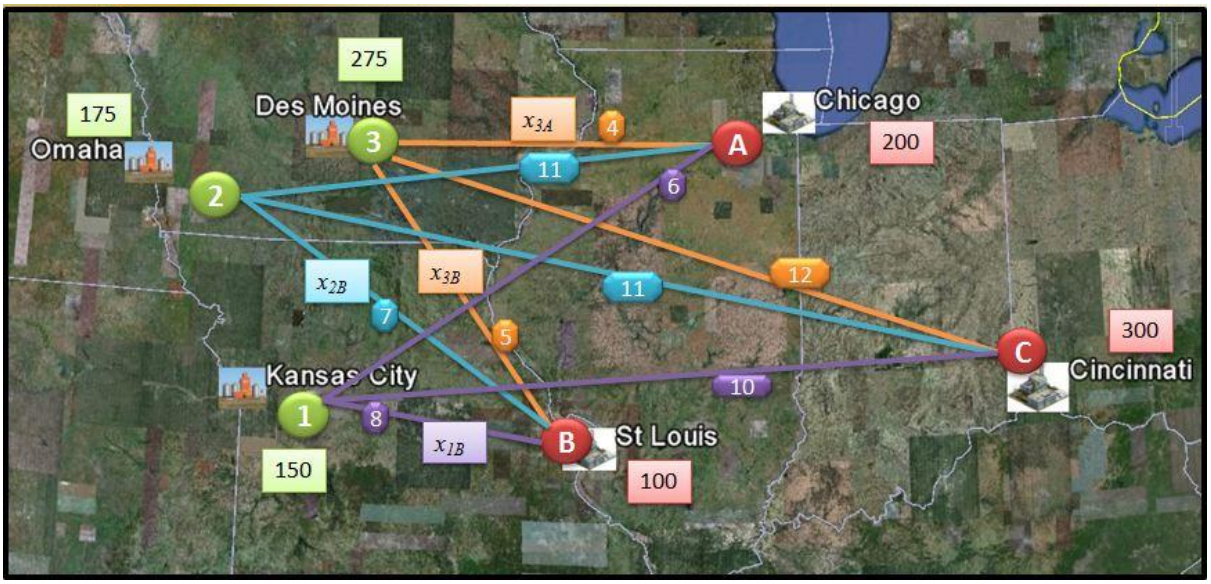

Figure 1 Network of Grain Distributor .

Maximum monthly supply of grain elevators and required demand at mills are shown in the table below.

Supplier			Demand Tier		
#	Grain Elevator	Quantity	#	Mill	Quantity
1	Kansas City	150 tons	1	Chicago	200 tons
2	Omaha	175 tons	2	St. Louis	100 tons
3	Des Moines	275 tons	3	Cincinnati	300 tons
	Total	600 tons		Total	600 tons

Table 1 Maximum supply and required demand.

A rail transportation enterprise gave you the following cost matrix per ton of grain.

COSTS	Mill 1	Mill 2	Mill 3
Grain Elevator 1	$ 6.00	$ 8.00	$ 10.00
Grain Elevator 2	$ 7.00	$ 11.00	$ 11.00
Grain Elevator 3	$ 4.00	$ 5.00	$ 12.00

Table 2 Transportation costs per ton.

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Fundamental Tasks

1. Enter the data into Excel
2. Create a decision matrix (with arbitrary values)
3. Compute total quantity per mill
4. Compute total supply per elevator

Intermediate Tasks

1. Define Objective Function (use the function "sumproduct")
2. Use Add-In solver to determine optimal solution
    a. Activate solver (Data >> Analysis >> Solver)
    b. Define objective
    c. Specify decision variables (cells that change)
    d. Enter constraints

Challenge 2 – Supply Chain Logistics

Your task is to find the optimal shipment allocations between suppliers and demand tiers. Extend the network from task 1 to a supply chain. The grain elevator will become transhipment nodes which are supplied by two farms (Nebraska, Colorado).

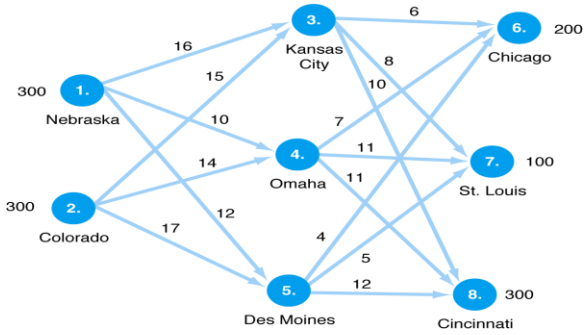

Figure 2 Supply Chain Network.

	Kansas C	Omaha	Des Moine
Nebraska	$ 16.00	$ 10.00	$ 12.00
Coloardo	$ 15.00	$ 14.00	$ 17.00

Table 3 Costs between Farms and Grain Elevators.

Tasks

1. Enter the data into Excel
2. Create decision matrices
3. Solve Problem

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