Module 06 – Transshipment Problem

Exploratory Data Analysis

*In this section, you should perform some data analysis on the data provided to you. Please format your findings in a visually pleasing way and please be sure to include these cuts:*

* *Make a visual graph of your data like what we saw for the sample problem*
  + <https://excalidraw.com>
  + <https://mermaid.live>
  + <https://dreampuf.github.io/GraphvizOnline>
  + Powerpoint

A diagram of a network

AI-generated content may be incorrect.

Model Formulation

*Write the formulation of the model into here prior to implementing it in your Excel model. Be explicit with the definition of the decision variables, objective function, and constraints.*

*Hint: This one differs a bit from the sample problem in terms of Balance-of-Flow*

*min=26x04​+48x06​+27x14​+30x15​+44x26​+47x27​+40x43​+38x47​+28x48​+45x67​+41x68​+47x73​+49x75​+31x76​+39x83​+48x87​*

Net flow <= supply/demand

Ship >= 0

x04​+x06​≤350

x14​+x15​≤300

x26​+x27​≤250

x43​+x73​+x83​=152

x04​+x14​=x43​+x47​+x48​=101

x15​=220

x06​+x26​=x67​+x68​

x27​+x47​+x67​=x73​+x75​+x76​+x78​

x48​+x78​+x68​=172

Model Optimized for Minimal Transportation Cost

*Implement your formulation into Excel and be sure to make it neat. This section should include:*

*A screenshot of a document

AI-generated content may be incorrect.*

* The model suggests following the shipping plan achieve a total transportation cost of **$29,113.00** while meeting all supply and demand requirements efficiently.

A diagram of numbers and points

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Model with Stipulation

*Please copy the tab of your original model before continuing with the next part to avoid messing up your original solution.*

*Follow these steps to complete this section:*

The total inflow must equal the total outflow. To see the correct movement of goods, resources, or information through the network. The net flow at each node must match its specified supply or demand. Outflow exceeds inflow by the supply amount. Inflow exceeds outflow by the demand amount. Having balance helps minimize transportation costs while meeting supply and demand constraints.

1. *What happens when you change your model to make Total Supply > Total Demand (i.e. add 115 units to one of the sources)*
   1. Demand is greater than Supply
2. *What happens when you rerun your model?*
   1. Solver cannot find a feasible solution due to demand being greater than supply
3. *What do you need to change to make your model work again?*
   1. In order for our model to work again we need to change the constraints to adapt to demand being greater than supply.

Net flow >= supply/demand

1. *Make the changes and report on your findings.*
   1. PS there is a small chance that the source you added 115 to may make your model infeasible. If so, add the 115 units to a different source.

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* Transportation cost increases, when the sign is swapped to greater than to adapt to demand being greater than supply.