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 white table with a diagram on it

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 = +49X03 + 27X04 + 34X06 + 40X13 + 49X23 + 42X25 + 32X28 + 46X35 + 32X38 + 28X53 + 26X57 + 42X58 + 42X65 + 27X85

Constraints

1. -X03-X04-X06 >= -337
2. -X13>=-337
3. -X23-X25-X28>=-224
4. X03+X13+X23+X53>=214
5. X04>=107
6. X25+X35+X65+X85>=160
7. X06>=214
8. X57>=214
9. X28+X38>=91

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 your optimized final model (formatted nicely, of course)*
* *A text explanation of what your model is recommending*
* *Update your graph from the EDA section to bold/color the links being used (and show how much is going through that link)*

A screenshot of a spreadsheet

AI-generated content may be incorrect.

The Model is showcasing that the minimum cost would be $41,565 if all constraints were to be filled. The number shipped is highlighted which is the amount of the product should be shipped.

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:*

1. *Describe the necessity of the Balance-of-Flow for this problem type*
   1. *The necessity of the Balance-of-Flow is to calculate the Supply & Demand of the shipments, ensuring there is no stockouts or surplus inventory.*
2. *What happens when you change your model to make Total Supply > Total Demand (i.e. add 115 units to one of the sources)*
   1. *The Supply becomes larger than the demand, making the balance of flow invalid, needing to change the equations for net flow.*
3. *What happens when you rerun your model?*
   1. *The model becomes infeasible.*
4. *What do you need to change to make your model work again?*
   1. *The net flow equations and constraints need to be changed.*
5. *Make the changes and report on your findings.*
   1. *The report shows that once the constraints are fixed, the model is feasible and the number of shipments decreases as well as the quantity from 1129 to 840.*