

# Module 02 – Transportation Modeling

## 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:*

- *The locations involved in the analysis (id -> name) and specify if they are a source or a destination*
- *A table of the average cost between source and destination (for the sake of this assignment, we are dealing with sugar-miles similar to the bushel-mile example from the textbook)*

## 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*

### Constraints:

- **AverageIF= Destination ID, Location ID, Unit Cost**

**Objective function= 55.19**

- **Sumproduct=(C4:F9,C12:F17) (add up the constraints)**

## Model Optimized for Profit

*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*
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|             | Source               |                    |                   |                      |                      |
|-------------|----------------------|--------------------|-------------------|----------------------|----------------------|
|             |                      | Lava Lollipop Land | Fruit Chew Fjords | Fruity Gusher Geyser | Caramel Corn Caverns |
| Destination | Vanilla Valley       | 0.140000058        | 0.13000002        | 0.139999953          | 0.149999968          |
|             | Peanut Butter Parlor | 0.114102564        | 0.170000004       | 0.070000033          | 0.09774772           |
|             | Vanilla Chai Vortex  | 0.070000038        | 0.070000046       | 0.089999988          | 0.07999995           |
|             | Meringue Mountains   | 0.140000086        | 0.159999995       | 0.05000001           | 0.137075236          |
|             | Sour Patch Prairie   | 0.100000008        | 0.10075           | 0.11794353           | 0.080000016          |
|             | Tartberry Thicket    | 0.139999988        | 0.16999998        | 0.081280259          | 0.132468193          |
|             |                      |                    |                   |                      |                      |

|                      | Lava Lollipop Land | Fruit Chew Fjords | Fruity Gusher Geyser | Caramel Corn Caverns | Sum | Demand |
|----------------------|--------------------|-------------------|----------------------|----------------------|-----|--------|
| Vanilla Valley       | 0                  | 105               | 0                    | 0                    | 105 | 105    |
| Peanut Butter Parlor | 100                | 0                 | 0                    | 4                    | 104 | 104    |

## Valeria Santoni

|                     |     |     |     |     |     |     |
|---------------------|-----|-----|-----|-----|-----|-----|
| Vanilla Chai Vortex | 58  | 62  | 0   | 0   | 120 | 120 |
| Meringue Mountains  | 0   | 0   | 110 | 0   | 110 | 110 |
| Sour Patch Prairie  | 0   | 0   | 0   | 118 | 118 | 118 |
| Tartberry Thicket   | 12  | 0   | 58  | 0   | 70  | 111 |
|                     | 170 | 167 | 168 | 122 |     |     |
| Capacity            | 170 | 167 | 168 | 122 |     |     |

55.18551

### ***Optimal cost is 55.18551***

- Vanilla Valley is the source provider Fruit Chew Fjords (105)
- Peanut butter Parlor is the source provider of both Lava Lollipop Land (100) and Caramel Corn Cavers (4)
- Vanilla Chai Vortex is the source provider for both Lava Lollipop Land(58) and Fruit Chew Fjords (62)
- Meringue Mountains provides Fruity Gusher Geyser (110)
- Sour Patch prairie is the source provider for Caramel Corn Cavers (118)
- Tartberry Ticket is the source provider for both Lava Lollipop Land (12) and Fruity Gusher Geyser (58)

### **Model with Stipulation**

***Please copy the tab of your original model before continuing with the next part to avoid messing up your original solution. What happens if you add an additional constraint to the model such that all demand MUST be met. Is the solution still feasible? If not, please explain why.***

If a new constraint is added that requires all demand to be met exactly, the feasibility of the solution depends on whether the total supply and total demand are perfectly balanced. Since total demand exceeds total supply, it is not possible to meet all demand under this additional constraint. To make the model feasible under this new constraint, either additional supply would need to be introduced, or demand would need to be reduced.