

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)*

	Bubblegum Bay	Candy Button Bay	Cherry Cordial Cove	Cocoa Bean Crater
Mochi Metropolis	0.06	0.18	0.16	0.11
Marshmallow Meadows	0.15	0.12	0.08	0.16
Pixie Stix Plateau	0.06	0.18	0.05	0.17
Mallow Melt Mountains	0.06	0.05	0.07	0.16
Macaron Market	0.05	0.06	0.10	0.18
Lollipop Lagoon	0.10	0.15	0.06	0.07

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

Min = .06X15 + .15X16 + .06X17 + .06X18 + 0.05X19 + .10X110 + .18X25 + .12X26 + .18X27 + .05X28 + .06X29 + .15X210 + .16X35 + .08X36 + .05X37 + .07X38 + .10X39 + .06X310 + .11X45 + .16X46 + .17X47 + .16X48 + .18X49 + .07X410

Objective:

X15 + X16 + X17 + X18 + X19 + X110 + X25 + X26 + X27 + X28 + X29 + X210 + X35 + X36 + X37 + X38 + X39 + X310 + X45 + X46 + X47 + X48 + X49 + X410 ≥ 0

Constraints:

X15 + X16 + X17 + X18 + X19 + X110 = 125

X25 + X26 + X27 + X28 + X29 + X210 = 143

X35 + X36 + X37 + X38 + X39 + X310 = 115

X45 + X46 + X47 + X48 + X49 + X410 = 105

X15 + X25 + X35 + X45 ≤ 82

X16 + X26 + X36 + X46 ≤ 88

X17 + X27 + X37 + X47 ≤ 86


X18 + X28 + X38 + X48 ≤ 82

X19 + X29 + X39 + X49 ≤ 83


X110 + X210 + X310 + X410 ≤ 90

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

Set Objective: 

To: ☐ Max ☒ Min ☐ Value Of:

By Changing Variable Cells: 

Subject to the Constraints:

\$C\$14:\$F\$19 >= 0

\$C\$20:\$F\$20 = \$C\$21:\$F\$21

\$G\$14:\$G\$19 <= \$H\$14:\$H\$19

Add


Change

Delete

Reset All

Load/Save

☒ Make Unconstrained Variables Non-Negative

Select a Solving Method: 

Options

	Bubblegum Bay	Candy Button Bay	Cherry Cordial Cove	Cocoa Bean Crater					location_id	capacity	demand
Mochi Metropolis	0.06	0.18	0.16	0.11					Sfee39a4	125	
Marshmallow Meadows	0.15	0.12	0.08	0.16					Sf290089	143	
Pixie Stix Plateau	0.06	0.18	0.05	0.17					Sc6ea0d9	115	
Mallow Melt Mountains	0.06	0.05	0.07	0.16					S0c4f7e2	105	
Macaron Market	0.05	0.06	0.10	0.18	Objective	30.69			Dd599e8a		82
Lollipop Lagoon	0.10	0.15	0.06	0.07					Db55b4cc		88
									D662583f		86
									D3d03c41		82
	7	8	9	10					D3034469		83
									D2ef7866		90
	Bubblegum Bay	Candy Button Bay	Cherry Cordial Cove	Cocoa Bean Crater	SUM	Max					
Mochi Metropolis	67.00	0.00	0.00	15.00	82.00	82					
Marshmallow Meadows	0.00	0.00	65.00	0.00	65.00	88					
Pixie Stix Plateau	36.00	0.00	50.00	0.00	86.00	86					
Mallow Melt Mountains	0.00	82.00	0.00	0.00	82.00	82					
Macaron Market	22.00	61.00	0.00	0.00	83.00	83					
Lollipop Lagoon	0.00	0.00	0.00	90.00	90.00	90					
SUM	125.00	143.00	115.00	105.00							
Capacity	125	143	115	105							

The model is essentially showing how much will be produced at a certain location and where this product will be going. So for example Mochi Metropolis is the producer for Bubblegum Bay and Cocoa Bean Crater or Marshmallow Meadows is the only producer for Cherry Cordial Cove.

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.*

It Is not Feasible in this case as the demand is not able to be met with Mallow Melt mountains due to there being not enough demand for the amount of units produced in total.