Module 08 – Scheduling 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 table (similar to the textbook example) showing the temporary agency data*
- *Run summary statistics on the sample of Full-Time employee salaries. Record the Mean to use in our model*
- *Make a line graph showing foot traffic over the next 12 months. Call out any seasonality or trend you may see.*

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: 21,885X1 + 27,300X2 + 15,166X3 + 28,236X4 + 22,209X5 + 78,551X6

Constraints:

Month 1: 0X1 + 0X2 + 1X3 + 0X4 + 0X5 + 0X6 + 1X7 = 281
Month 2: 0X1 + 0X2 + 1X3 + 0X4 + 0X5 + 0X6 + 1X7 = 385
Month 3: 0X1 + 0X2 + 1X3 + 0X4 + 1X5 + 0X6 + 1X7 = 532
Month 4: 0X1 + 0X2 + 0X3 + 0X4 + 1X5 + 0X6 + 1X7 = 595
Month 5: 0X1 + 1X2 + 0X3 + 0X4 + 1X5 + 0X6 + 1X7 = 522
Month 6: 0X1 + 1X2 + 0X3 + 0X4 + 0X5 + 0X6 + 1X7 = 385
Month 7: 0X1 + 0X2 + 0X3 + 0X4 + 0X5 + 1X6 + 1X7 = 321
Month 8: 1X1 + 0X2 + 0X3 + 0X4 + 0X5 + 1X6 + 1X7 = 404
Month 9: 1X1 + 0X2 + 0X3 + 0X4 + 0X5 + 1X6 + 1X7 = 574
Month 10: 0X1 + 0X2 + 0X3 + 1X4 + 0X5 + 0X6 + 1X7 = 685
Month 11: 0X1 + 0X2 + 0X3 + 1X4 + 0X5 + 0X6 + 1X7 = 641
Month 12: 0X1 + 0X2 + 0X3 + 1X4 + 0X5 + 0X6 + 1X7 = 486

Model Optimized for Min Costs to Cover Store Foot Traffic

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

Agency	1	2	3	4	5	6	7	8	9	10	11	12	Workers Schedule	Wages Per
Peppermint Peekaboo	0	1	1	1	0	0	0	0	0	0	0	0	73	21,885.00
WigglePop Wonders	1	0	0	0	0	0	0	0	0	0	1	1	119	27,300.00
Candyfloss & Co.	1	1	0	0	0	0	0	0	0	0	0	0	0	15,166.00
Gumdrops & Giggles	0	0	0	0	1	1	1	0	0	0	0	0	0	28,236.00
The Fudge Fable	0	0	0	0	0	0	0	1	1	1	0	0	163	22,209.00
Full Time	1	1	1	1	1	1	1	1	1	1	1	1	522	78,551.97
Available	641	595	595	595	522	522	522	685	685	685	641	641		
Required	281	385	532	595	522	385	321	404	574	685	641	486		49,470,499.30

Model with Stipulation

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

Please do both of the following:

1. *Unfortunately, leadership wishes to have a reduction in workforce. While the monthly salary for full time employees is cheaper than temporary workers, there are other costs associated with full time employees that they wish to cut. Add a constraint to your model that takes your first model's recommended number of full-time employees and constrains it to be only 80% of it. Add a text explanation of the change in the optimal value as well as any other changes noticed between the models.*

Workers Schedule	Wages Per
73	21,885.00
119	27,300.00
0	15,166.00
0	28,236.00
163	22,209.00
522	62,841.57
	41,269,673.84

80% Stipulation

Workers Schedule	Wages Per
73	21,885.00
119	27,300.00
0	15,166.00
0	28,236.00
163	22,209.00
522	78,551.97
	49,470,499.30

Original

Based off this stipulation the total decreased by roughly 8,000,000

2. *Alternatively, leadership would like to see what the average monthly salary for an employee would need to be to cut out all temporary workers as they believe that will help negate excess spending. Convert your model (or do the math out yourself) to figure out what monthly salary you would need to pay your full-time employees to only have full-time workers at the same optimal cost as the original model.*

*Taking the total cost of 49,470,499.30 and dividing it by how many full time employees (522) and then multiplying that by months (12) – 49,470,499/522*12 = 7,897 for every full time employee*

3. *Considering trends and seasonality of this business, what would you recommend leadership to do? Feel free to play with the model and recommend something else.*

One thing you could do rather than cutting full-time employers pay down (which I think could lower moral) is to hire more temporary workers for busy seasonal trends. And understanding when they would fit best.