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.*

shift	months worked	wages
Snap & Crackle Sweets	march-april	$18,768
Sweetie Spell	july-aug	$24,910
Gumdrop Grotto	may-july	$28,980
Bubblegum Bungalow	feb-march	$20,814
Tingle Tangle Treats	sept-nov	$33,291
The Chewy Charm	nov-jan	$31,773
full time	jan-dec	$100,452

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.

$$18786X_1 + 24910X_2 + 28980X_3 + 20814X_4 + 33291X_5 + 31773X_6 + 100452X_7 =$$

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:
- *A screenshot of your optimized final model (formatted nicely, of course)*
- *A text explanation of what your model is recommending*

Shift	Days On = 1, Days Off = 0												Workers Scheduled	Wages per Worker
	1	2	3	4	5	6	7	8	9	10	11	12		
Snap & Crackle Sweets	0	0	1	1	0	0	0	0	0	0	0	0	199	$18,768
Sweetie Spell	0	0	0	0	0	0	1	1	0	0	0	0	16	$24,910
Gumdrop Grotto	0	0	0	0	1	1	1	0	0	0	0	0	129	$28,980
Bubblegum Bungalow	0	1	1	0	0	0	0	0	0	0	0	0	0	$20,814
Tingle Tangle Treats	0	0	0	0	0	0	0	0	1	1	1	0	287	$33,291
The Chewy Charm	1	0	0	0	0	0	0	0	0	0	1	1	94	$31,773
full time	1	1	1	1	1	1	1	1	1	1	1	1	374	$100,452
Available	468	374	573	573	503	503	519	390	661	661	755	468		
Required	271	371	512	573	503	371	309	390	554	661	617	468	Total ->	$ 57,982,039

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.*

   New full-time cap = 80% of 468 = 374.4 cap at 374 full-time workers

   Update model with:

   $$X_7 \leq 374$$

   My wages went up when I added the new constraint

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.*

   I would need to raise the full time employees monthly salary to $120,560 this would help remove all temps and meet the demand as well as not change the cosr

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.*

   Maintain a core full-time team (around 374–400)
   Use temporary hires during peak days (Day 10–12)