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:*

The seasonality of this graph is there is a change in salary nearly every 3 months with Months 4 and 10 being the peaks.

The mean is 5109

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: 14674X1+ 12140X2 + 18771X3 + 16080X4 + 16665X5 + 20694X6 + 61308X7*

*Constraints:*

*0X1 + 0X2 + 0X3 + 1X4 + 1X5 + 0X6 + 0X7 + 0X8 + 0X9 +0X10 + 0X11 + 0X12 >=65*

*1X1 + 0X2 + 0X3 + 0X4 + 0X5 + 0X6 + 0X7 + 0X8 + 0X9 +0X10 + 0X11 + 1X12 >=0*

*0X1 + 0X2 + 0X3 + 0X4 + 0X5 + 0X6 + 0X7 + 1X8 + 1X9 +1X10 + 0X11 + 0X12 >=157*

*1X1 + 0X2 + 0X3 + 0X4 + 0X5 + 0X6 + 0X7 + 0X8 + 0X9 +0X10 + 1X11 + 1X12 >=112*

*0X1 + 0X2 + 0X3 + 0X4 + 0X5 + 1X6 + 1X7 + 1X8 + 0X9 +0X10 + 0X11 + 0X12 >=0*

*1X1 + 1X2 + 1X3 + 0X4 + 0X5 + 0X6 + 0X7 + 0X8 + 0X9 +0X10 + 0X11 + 0X12 >=0*

*1X1 + 1X2 + 1X3 + 1X4 + 1X5 + 1X6 + 1X7 + 1X8 + 1X9 +1X10 + 1X11 + 1X12 >=543*

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*

A grid of green and yellow squares

AI-generated content may be incorrect.

*The model is recommending scheduling the workers based on their availability to minimize costs of the wages. The available row showcases how many workers will be working at the required time to minimize cost. The Workers Schedule numbers highlighted in grey showcase the ideal number of workers from each agency.*

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.*

*The optimal value increases as more temporary employees had to be hired. The numbers increased for only some of the scheduled agency.*

1. *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.*

*$364046935 would have to be the optimal cost.*

1. *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.*

*I would recommend to factor in leave and external costs not associated with wages. Injuries and emergencies do occur to workers, so it is important to be able to factor in a second tier or “backup” employees in case an employee was to not be able to work. Also, there are other costs the incur with employees like benefits, insurance, and taxes.*