Module 03 – Production 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:*

* *Make a table of average demand, production capacity, and costs for each quarter, are there differences between quarters?*
  + *Yes, there are differences between quarters because of the fluctuation in capacity, demand, safety stock, and production cost*
* *Since we have temporal data (i.e. year and quarter), see if you can make a yearly and/or quarterly chart showing these metrics over time.*
  + *Attached on Excel*

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*

Decision Variable

P1,2,3,4 is the Units Produced

B1,2,3,4 is the Beginning Inventory

Objective Function

525P1 + 546P2 + 278P3+ 218P4 +

1.87(B1+B2)/2 + 1.87 (B2+B3)/2 + 1.87 (B3+B4)/2

Constraints

P1 <= 525

P2 <= 546

P3 <= 606

P4 <= 471

B1+P1 – 548 >= 55

B2+P2 – 279 >= 28

B3+P3 – 656 >= 66

B4+P4 – 258 >=26

Model Optimized for Cost Reduction

*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*

*The model is recommending to produce 525 units in Q1, 546 units in Q2, 278 units in Q3, and 218 units in Q4 to minimize costs. Based on the constraints of maximum production and minimum inventory, the ending inventory in Q1 should be 177 units, in Q2 444 units, in Q3 66 units, and in Q4 26 units*

A table with numbers and a number of items

AI-generated content may be incorrect.

Model with Stipulation

*Please copy the tab of your original model before continuing with the next part to avoid messing up your original solution. If we remove the production capacity constraint from the model & we removed the carrying cost, what do you think will happen? Try it out and see if it matches your expectation. Try to explain what is happening and talk a bit about fallbacks of models.*

*When production capacity constraints and carrying cost is removed, unrestricted production occurs with the goal to push production towards the most cost efficient quarters. With no carrying cost, the ending inventory has no maximum boundary, allowing for higher ending inventory. The fallback of the model with the stipulation is the limited constraints does not align with real-world business limitations as it disregards the limitation of storage in production plants and warehouses.*

*A table with numbers and a yellow line

AI-generated content may be incorrect.*