

# 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:*

## 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*

Carry cost: 1.70

Safety stock: 0.1

Starting inventory: 350

Units produced  $\leq$  max production

Ending inventory  $\geq$  min inventory

## 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

	1	2	3	4
Beginning Inventory	350	71	71	50
Units Produced	268	516	446	536
Units Demanded	547	516	467	536
Ending Inventory	71	71	60	60
Maximum Production (capacity)		487	516	467
Minimum Inventory(safety stock)	55	71	44	50
Average Inventory	211	71	61	50
Unit Production Cost	\$53.19	\$49.02	\$52.30	\$51.89
Unit Carrying Cost	1.7%	\$1.70	\$1.70	\$1.70
Monthly Production Cost	\$14,255	\$25,294	\$23,326	\$27,813
Monthly Carrying Cost	\$358	\$121	\$103	\$85
			Total	\$91,354

- Seeing that the production cost varies, the company might consider producing more when the cost is lower (e.g., month 2) and carrying more inventory strategically.
- Make sure that the ending inventory doesn't drop below safety stock to avoid shortages.
- Since carrying costs are proportional to inventory, maintaining optimal levels reduces unnecessary expenses.

## 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.

Row Labels	Average of capacity	Average of demand	Average of production_cost	
1	487	547	\$	53.19
2	516	706	\$	49.02
3	467	441	\$	52.30
4	536	500	\$	51.89
<b>Grand Total</b>	<b>501</b>	<b>549</b>		<b>51.6</b>

  

Quarter	Capacity	Demand	Safety Stock	Production Cost
1	487	547	55	53
2	516	706	71	49
3	467	441	44	52
4	536	500	50	52

  

- Production will become more flexible, we won't need an inventory buffer, savings incurred by no longer having to pay for carrying or holding costs.
- The color coded cells highlight variations in capacity and demand
  - o Green= higher values; red = lower values
  - o Q3 shows capacity fall short compared to demand which can cause stock issues
- Fallbacks can include an inaccuracy to predict future trends and if there is any sort or seasonal fluctuation a static model would not be as sufficient