

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?*
- *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.*

Row Labels	Production Capacity	Production Cost	Production Demand	Safety stock
1	519.00	51.23	481.00	48.1
2	518.00	51.66	605.00	60.50
3	608.00	51.32	646.00	64.60
4	483.00	55.75	603.00	60.30
Grand Total	532.00	52.49	583.75	58.37

This is the pivot table I created off of the data we were given in order to sort the different data by the month, and then using the information given to me in the CSV I found in the safety stock

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

In this I created an LP solver model in which I set the constraints that the units produced must be less than the max inventory and the ending units must be greater than min inventory. After this I put in the necessary variables and solved the model, adding in the total as the objective function.

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		300	338	251	213		
Units Produced		519	518	608	450		
Units Demanded		481	605	646	603		
Ending Inventory		338	251	213	60		
Minimum Production	10.0%						
Maximum Production		519	518	608	483		
Minimum Inventory	1500	48.10	60.50	64.60	60.30		
Maximum Inventory	6000						
Average Inventory		319	295	232	137		
Unit Production Cost		\$51.23	\$51.66	\$51.32	\$55.75		
Unit Carrying Cost	1.34%	\$ 1.34	\$ 1.34	\$ 1.34	\$ 1.34		
Monthly Production Cost		\$26,588	\$26,760	\$31,203	\$25,104		
Monthly Carrying Cost		\$427.46	\$394.63	\$310.88	\$183.11		
			TOTAL	\$110,971			

My model is recommending 519, 518, 608, 450 in quarters 1 2 3 and 4 respectively.

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.