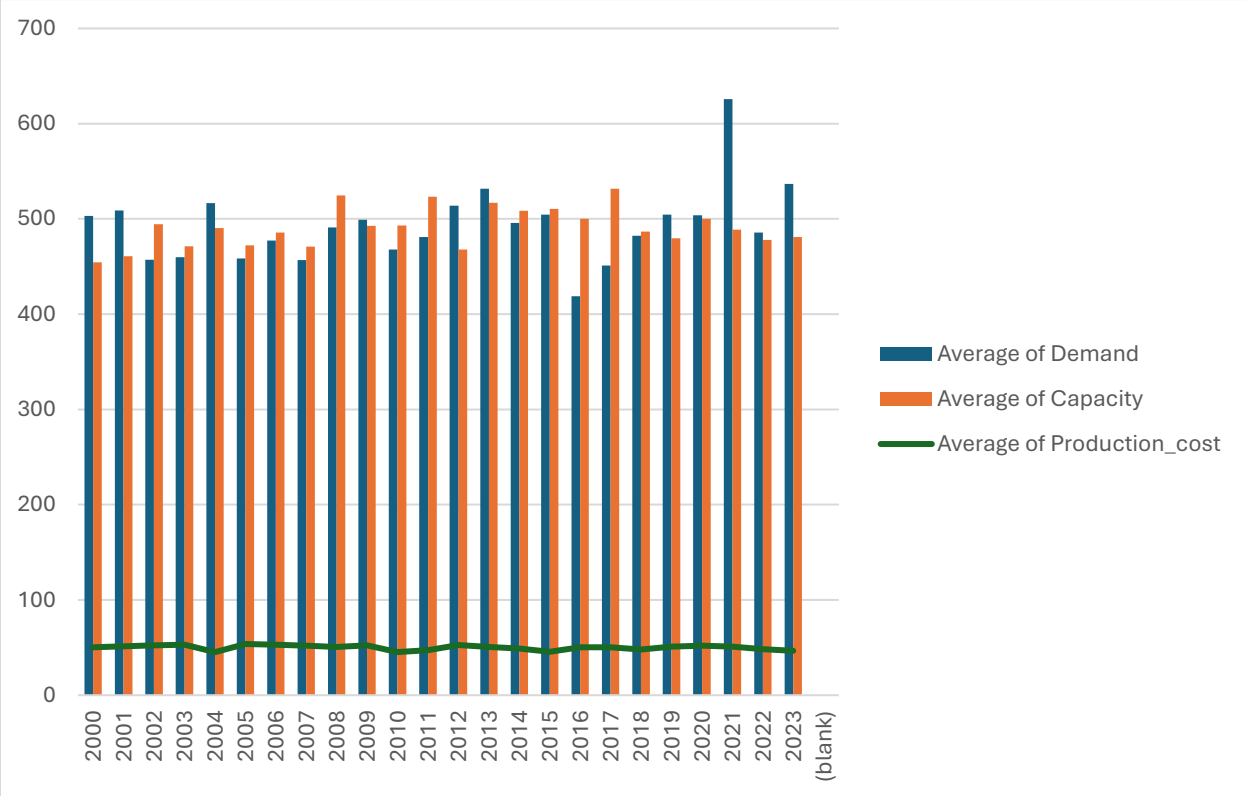
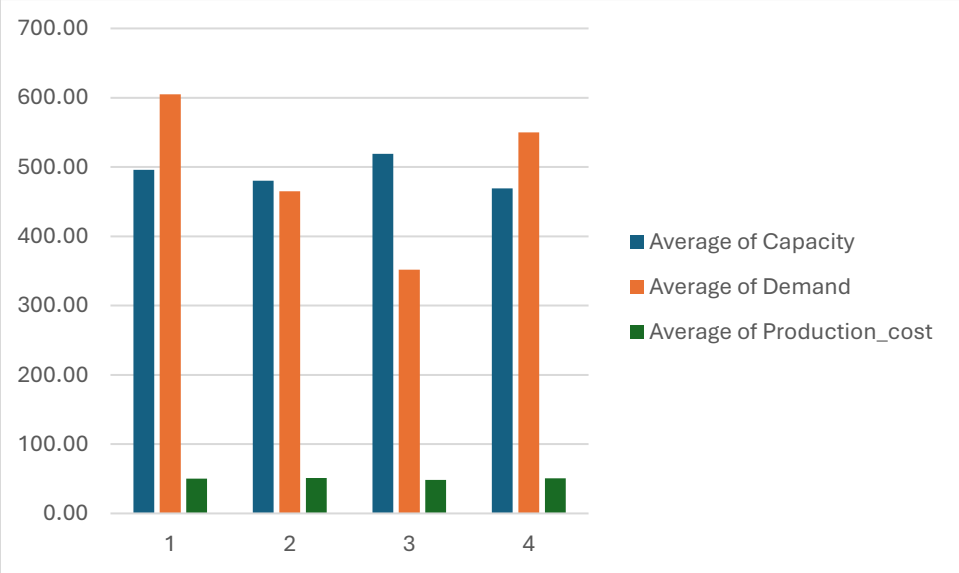
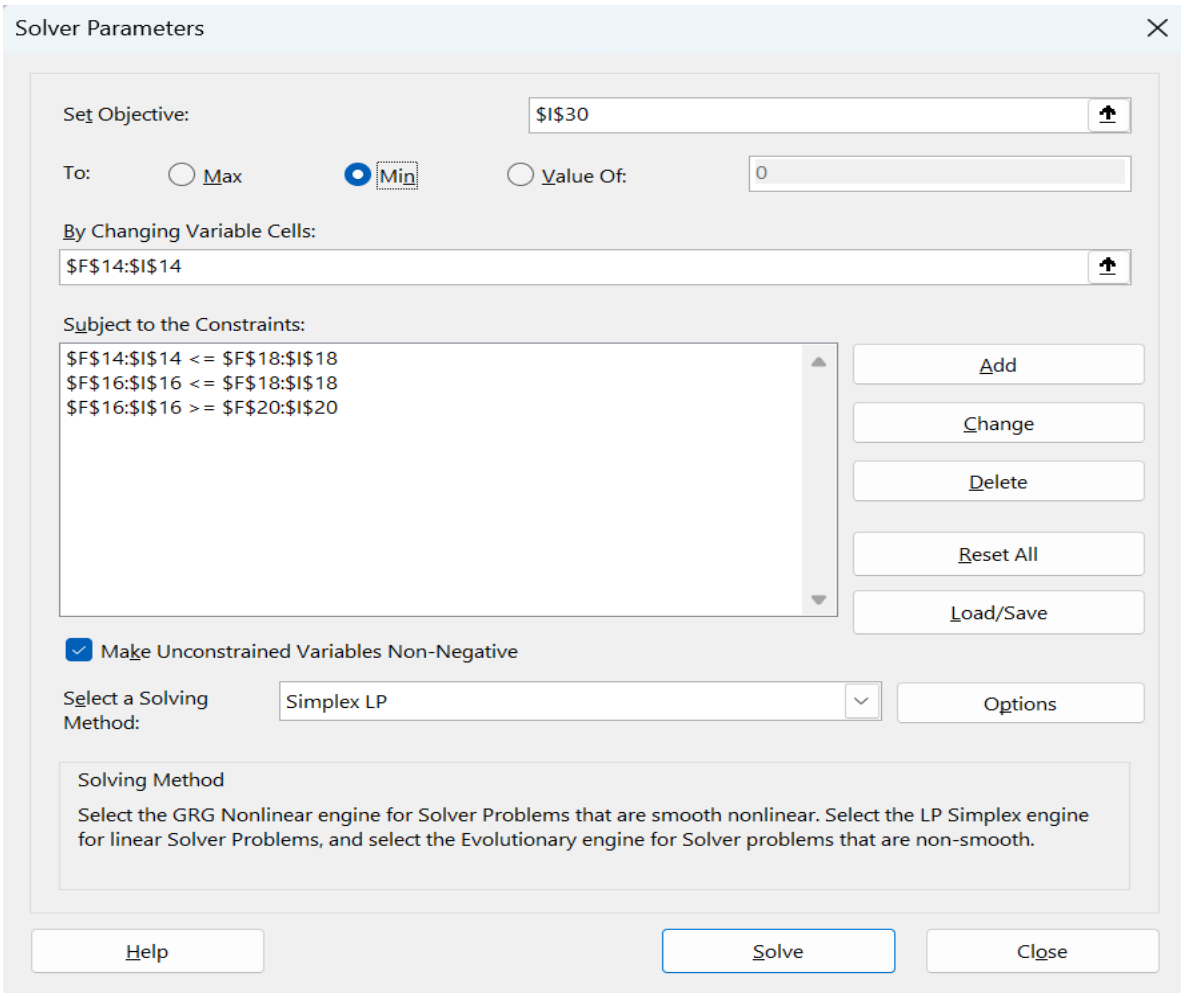
Module 03 – Production Modeling

Exploratory Data Analysis





Model Formulation



Model Optimized for Cost Reduction

		1	2	3	4
Beginning Inventory		**2,750**	2,246	-1,774	-7,255
Units Produced		496	480	519	469
Units Demanded		**1,000**	**4,500**	**6,000**	**5,500**
Ending Inventory		2,246	-1,774	-7,255	-12,286
Maximum Production		**496**	**480**	**519**	**469**
Minimum Inventory		49.60	48.00	51.90	46.90
Average Inventory		2,498	236	-4,515	-9,771
Unit Production Cost		**$50.02**	**$51.06**	**$48.56**	**$50.55**
Unit Carrying Cost	$ 1.58	$1.58	$1.58	$1.58	$1.58
Monthly Production Cost		$24,810	$24,509	$25,203	$23,708
Monthly Carrying Cost		$3,947	$373	-$7,133	-$15,437
				Total Cost	**$79,979**

The following model suggests that in order to optimize the amount of units produced while limiting the costs in doing so, 496 units must be produced in Q1, 480 units in Q2, 519 units in Q3, & 469 units in Q4. Additionally, the inventory across all quarters must be no more than 519 but no less than 46.90. Finally, the total cost is $79,979 as evaluated by contrasting the monthly production cost and monthly carrying cost.

Model with Stipulation

If both the production capacity constraint and carrying cost are removed from the model the total will increase significantly, probably by double digits. This is due to the lack of a ceiling or target for how much should be produced during the period of time we are taking into account.

		1	2	3	4
Beginning Inventory		**2,750**	4,548	48	5,547
Units Produced		2,798	0	11,499	0
Units Demanded		**1,000**	**4,500**	**6,000**	**5,500**
Ending Inventory		4,548	48	5,547	47
Maximum Production		**496**	**480**	**519**	**469**
Minimum Inventory		49.60	48.00	51.90	46.90
Average Inventory		3,649	2,298	2,797	2,797
Unit Production Cost		**$50.02**	**$51.06**	**$48.56**	**$50.55**
Unit Carrying Cost	$ -	$0.00	$0.00	$0.00	$0.00
Monthly Production Cost		$139,956	$0	$558,387	$0
Monthly Carrying Cost		$0	$0	$0	$0
				Total Cos	**$698,343**

As seen in the model above, my hypothesis was correct. The unit carrying cost no longer has an effect on the ending inventory and holding of each unit making the costs rise in return. Additionally, the maximum production constraint is null in this model example making the number of units produced to reach a certain goal potentially boundless without the help of the minimum inventory. The fallbacks of models are important to consider as real time data is being produced before our eyes in a way that is instant and requires little effort. The model also acts as a forecasting tool in a way of predicting the costs of production given certain constraints and conditions. Without models, companies are led to see what happens with the results of important decisions rather than knowing ahead of time where actions might lead.