1. Various inputs were set to begin with the 28-day demand forecast to determine the optimal order quantity and reorder points.

Inputs	
Lead time in days (Discrete Uniform Distribution)	1 to 3
Current stock	7
Store Operational Days/Months	28
Costs	
Fixed order cost	$ 20.00
Holding cost (daily)	$ 0.02
Stockout cost	$ 8.00

Fig 1. Inputs of the inventory management optimization model

2. Probabilistic assumptions of the demand were set to conduct a 28-day demand forecast.

Demand	Probability	RN Lower Limit	RN Upper Limit
0	0.05	0	0.05
1	0.1	0.05	0.15
2	0.2	0.15	0.35
3	0.4	0.35	0.75
4	0.15	0.75	0.9
5	0.1	0.9	1

Fig 2. The probabilistic assumptions of the demand

3. An initial order quantity and reorder points were set

Order Quantity, Q	14
Reorder Point, R	5

Fig 3. The order quantity and reorder points

4. The calculations of the holding cost, stockout cost, order cost, and the total cost for each day were calculated by using the following formulas:
   $\boldsymbol{holding\ cost} =$ ending inventory in day i $\times$ holding cost
   $\boldsymbol{stockout\ cost} =$ stockout in day i $\times$ stockout cost
   $\boldsymbol{order\ cost} =$ order cost, if order is placed in day i
   $\boldsymbol{total\ cost} =$ holding cost $+$ stockout cost $+$ order cost

5. The total cost of the 28-day period was calculated to determine the effectiveness of the order quantity and reorder points that were set.

$$\boldsymbol{total\ cost\ of\ the\ 28-day\ period} = \sum_{i=1}^{28} \text{total cost}_i$$

6. A Monte Carlo simulation was run 300 times to determine the average total cost of the model. To elaborate, steps 4 and 5 were simulated 300 times.

Run	Holding Cost	Stockout Cost	Order Cost	Total Cost
1	$ 10.14	$ 24.00	$ 120.00	$ 154.14
2	$ 11.50	$ 32.00	$ 140.00	$ 183.50
3	$ 12.08	$ 56.00	$ 120.00	$ 188.08
4	$ 9.40	$ 8.00	$ 120.00	$ 137.40
5	$ 8.10	$ -	$ 140.00	$ 148.10
6	$ 10.98	$ 16.00	$ 120.00	$ 146.98
7	$ 9.22	$ 32.00	$ 120.00	$ 161.22
8	$ 11.30	$ 40.00	$ 140.00	$ 191.30
9	$ 8.18	$ -	$ 160.00	$ 168.18
10	$ 10.42	$ 88.00	$ 140.00	$ 238.42

7. A scenario analysis was conducted to compare the results of different order quantity and reorder points, with the scenario resulting in the lowest cost considered the most optimal.

Scenario Summary	Current Values:	Q12R5	Q8R5	Q14R7	Q12R7	Q14R5
Changing Cells:						
Order Quantity, Q	14	12	8	14	12	14
Reorder Point, R	5	5	5	7	7	5
Result Cells:						
Holding Cost	$ 9.36	$ 7.69	$ 5.14	$ 10.04	$ 8.59	$ 9.42
Stockout Cost	$ 36.64	$ 40.72	$ 44.52	$ 23.96	$ 25.88	$ 33.80
Order Cost	$ 134.50	$ 145.50	$ 207.20	$ 134.60	$ 152.20	$ 131.00
Total Cost	$ 178.73	$ 190.99	$ 265.87	$ 171.45	$ 183.29	$ 175.66

8. A bar chart was constructed to visually compare the scenarios