

Principles of Transportation – Terminal Mgt Game

In-Class Assignment #2 (Homework #8)

OBJECTIVE:

To improve student skills by managing trans. and inventory in an uncertain environment.

INFORMATION:

You must schedule orders, hire transportation, and manage inventory levels so that all weekly customer demands are satisfied while inventories and costs are minimized and profits maximized.

Demand:

Product demand for each week is *highly* uncertain. Weekly demand has varied from 58,000 units to 142,000 units per week. The past six months of data is presented below (4 weeks per month). Also, your sales force gets monthly bonuses for meeting certain sales levels. Therefore, it is likely there is a slight bump at the end of each month.

Month	Week 1	Week 2	Week 3	Week 4
1	111,000	83,000	103,000	120,000
2	92,000	117,000	97,000	136,000
3	64,000	86,000	142,000	124,000
4	73,000	89,000	108,000	127,000
5	106,000	58,000	76,000	131,000
6	69,000	94,000	114,000	90,000

Demand for each week will be determined by selection one of the above amounts at random. Any amount selected will be replaced immediately. As a result, this amount could be selected again!!

POSSIBLE REVENUES & COSTS:

1. Order Change Cost	Each change in order level is \$7,000
2. Ending Inventory Cost	\$18 for each 1,000 units of Ending Inventory each week (including amounts over 160,000)
3. Excess Inventory Storage Cost	\$40 penalty for each 1,000 units over 160,000 units of Ending Inventory. This cost occurs because the warehouse capacity is 160,000 units. Inventory over this amount must be stored in a rented warehouse. This \$40 is in addition to the \$18 you are already paying.
4. Stock Out Cost	\$750 for each 1,000 units that are out of stock. This represents the profit lost on these units. If you stock, record a zero for Ending Inventory and a Zero (0) Beginning Inventory in the next week (i.e., there are no back-orders).
5. Transportation Costs	You will pay \$150 per truck that can carry 1,000 units.
6. Revenues	You will make \$250 per 1,000 units your trucks deliver to the customer each week.

Changing Order:

Production/order decisions are made two weeks ahead of demand. For example, a production decision made during week 1 goes into effect in week 4. It takes time to make changes in the production schedule (extra workers must be hired or released workers must be given a two week notice). Order level changes must be made one thousands of units. The ordering of trucks is down one week in advance. Therefore, in week 1, you place an order for trucks for week 2. If either or both numbers change from the previous week, there is a \$2000 charge paid immediately.

APPLICATION:

To start:

Beginning Inventory in week 1 is 180,000 units for all companies (see attached worksheets). Also, your predecessor has placed orders for weeks one and two.

Next:

The production level for weeks 1, 2, and 3 must be determined (line 2 on worksheet). This initial production level can be any amount, but it must be the same for all 3 weeks. Production capacity is unlimited. After setting production, calculate the total amount available for sale (add lines 1 and 2). At this point, a demand amount will be drawn for the week and used by all teams. Subtract the demand amount from the inventory available for sale (line 3 minus line 4 or 5) to get the Ending Inventory for the week (line 6). If you were unable to make deliveries due to having too few trucks, you must calculate your stockout costs. Finally, the Ending Inventory becomes the Beginning Inventory (line 1) for week 2.

Finally:

Calculate the costs for week 1. Then, your team must set production for week 4. Once this production amount is determined, a demand figure will be drawn for week 2. Then the entire process is repeated.

An unknown number of weeks will be simulated. You will have until the next class to total out your costs for the week and choose your production level. The objective is to maintain the lowest total cost possible.

You will be ranked and bonus points will be awarded in place of the annual cash bonuses successful managers receive. Poor performance will be overlooked since you are “interns” to the company. None performance will not be accepted and will be dealt with by the “swift sword of logistics justice!!!”

Name(s):

Week #	1	2	3	4	5
1. Beginning Inventory Higher of last week's Ending Inv. or zero	180,000				
2. Order	70,000	55,000			
3. Total for Sale (1+2)					
4. Demand					
5. Truck Capacity Each Truck carries 1,000 units					
6. Ending Inventory (larger of 3-4 or 3-5)					
Order Change \$7,000 if 2 or 5 changes	(set week 3)	(set week 4)	(set week 5)	(set week 6)	(set week 7)
Ending Inventory \$18 per 1,000					
Excess Inv. \$40 per 1,000 for units > 160k					
Truck Costs \$150 per Truck					
Stock Out Cost \$500 per 1,000 if 6<0 or 4>5					
Weekly Revenue \$250 per 1,000 units					
Weekly Total Cost All costs					
Weekly Profit Revenue minus Costs					
Cumulative Total Profit Running Total of all weeks to this point					

Name(s):

Week #	6	7	8	9	10
1. Beginning Inventory Higher of last week's Ending Inv. or zero					
2. Order					
3. Total for Sale (1+2)					
4. Demand					
5. Truck Capacity Each Truck carries 1,000 units					
6. Ending Inventory (larger of 3-4 or 3-5)					
Order Change \$7,000 if 2 or 5 changes	(set week 8)	(set week 9)	(set week 10)	(set week 11)	(set week 12)
Ending Inventory \$18 per 1,000					
Excess Inv. \$40 per 1,000 for units > 160k					
Truck Costs \$150 per Truck					
Stock Out Cost \$500 per 1,000 if 6<0 or 4>5					
Weekly Revenue \$250 per 1,000 units					
Weekly Total Cost All costs					
Weekly Profit Revenue minus Costs					
Cumulative Total Profit Running Total of all weeks to this point					

Name(s):

Week #	11	12	13	14	15
1. Beginning Inventory Higher of last week's Ending Inv. or zero					
2. Order					
3. Total for Sale (1+2)					
4. Demand					
5. Truck Capacity Each Truck carries 1,000 units					
6. Ending Inventory (larger of 3-4 or 3-5)					
Order Change \$7,000 if 2 or 5 changes	(set week 13)	(set week 14)	(set week 15)	(set week 16)	(set week 17)
Ending Inventory \$18 per 1,000					
Excess Inv. \$40 per 1,000 for units > 160k					
Truck Costs \$150 per Truck					
Stock Out Cost \$500 per 1,000 if 6<0 or 4>5					
Weekly Revenue \$250 per 1,000 units					
Weekly Total Cost All costs					
Weekly Profit Revenue minus Costs					
Cumulative Total Profit Running Total of all weeks to this point					

Name(s):

Week #	16	17	18	19	20
1. Beginning Inventory Higher of last week's Ending Inv. or zero					
2. Order					
3. Total for Sale (1+2)					
4. Demand					
5. Truck Capacity Each Truck carries 1,000 units					
6. Ending Inventory (larger of 3-4 or 3-5)					
Order Change \$7,000 if 2 or 5 changes	(set week 18)	(set week 19)	(set week 20)	(set week 21)	(set week 22)
Ending Inventory \$18 per 1,000					
Excess Inv. \$40 per 1,000 for units > 160k					
Truck Costs \$150 per Truck					
Stock Out Cost \$500 per 1,000 if 6<0 or 4>5					
Weekly Revenue \$250 per 1,000 units					
Weekly Total Cost All costs					
Weekly Profit Revenue minus Costs					
Cumulative Total Profit Running Total of all weeks to this point					

Name(s):

Week #	21	22	23	24	25
1. Beginning Inventory Higher of last week's Ending Inv. or zero					
2. Order					
3. Total for Sale (1+2)					
4. Demand					
5. Truck Capacity Each Truck carries 1,000 units					
6. Ending Inventory (larger of 3-4 or 3-5)					
Order Change \$7,000 if 2 or 5 changes	(set week 23)	(set week 24)	(set week 25)	(set week 26)	(set week 27)
Ending Inventory \$18 per 1,000					
Excess Inv. \$40 per 1,000 for units > 160k					
Truck Costs \$150 per Truck					
Stock Out Cost \$500 per 1,000 if 6<0 or 4>5					
Weekly Revenue \$250 per 1,000 units					
Weekly Total Cost All costs					
Weekly Profit Revenue minus Costs					
Cumulative Total Profit Running Total of all weeks to this point					