Solutions for Supply Chain Logistics Management 6th Edition by Bowersox

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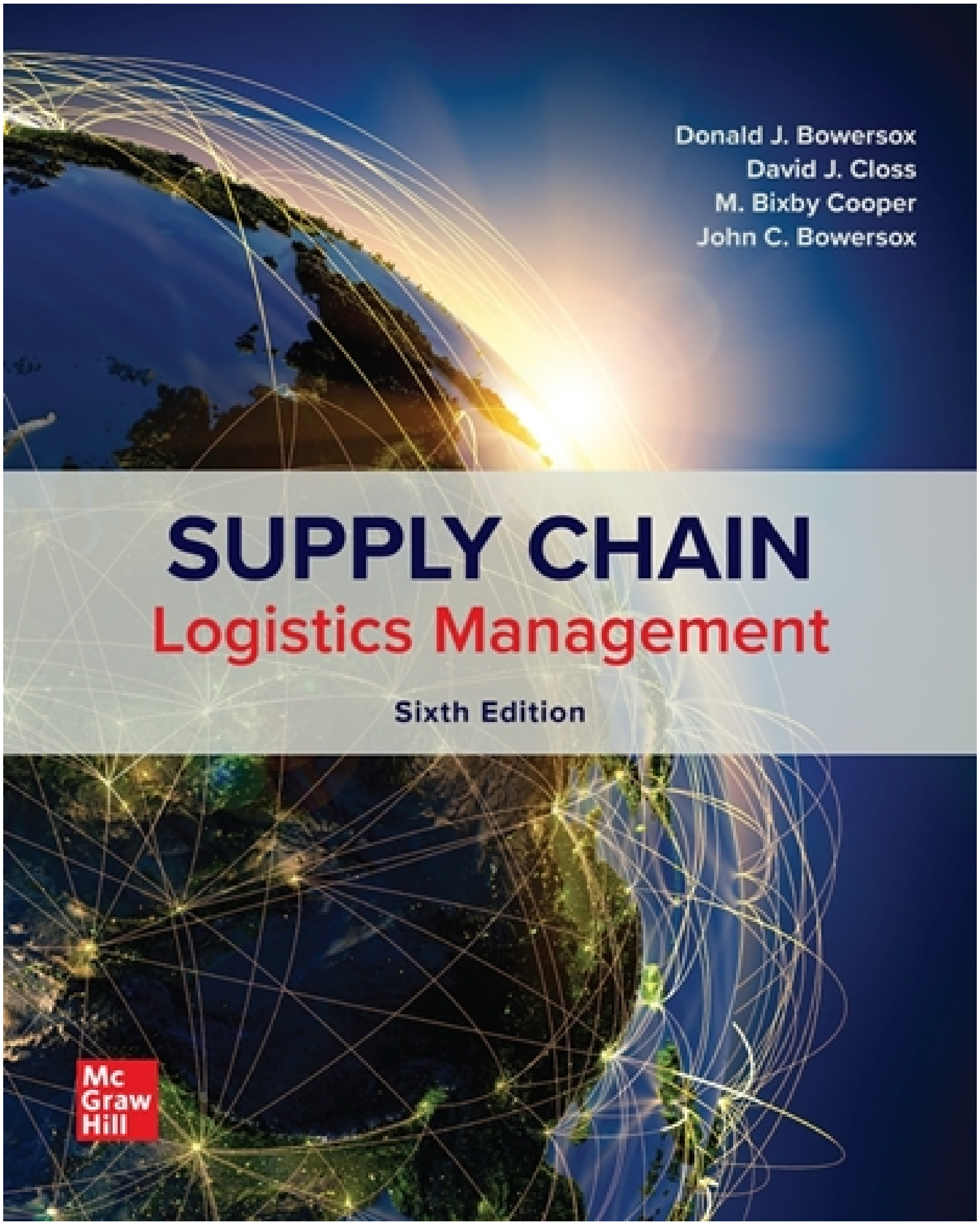

Solutions

SCLM 5th Edition
End of Book Questions Solution Set

1a. To determine if EDI will pay for itself within the first five years, we must begin by determining the annual costs associated with the current, manual system over this period:

Yr.	(Order volume × cost / order)	+ (errors × cost / error)	= Annual Cost
1	(22,000 × $2.75) = $60,500	+ ((22,000 × 0.012) × $7.00)	= $ 62,348
2	(25,000 × $2.75) = $68,750	+ ((25,000 × 0.012) × $7.00)	= $ 70,850
3	(27,000 × $2.75) = $74,250	+ ((27,000 × 0.012) × $7.00)	= $ 76,518
4	(32,000 × $3.25) = $104,000	+ ((32,000 × 0.012) × $7.00)	= $ 106,688
5	(38,000 × $3.25) = $123,500	+ ((38,000 × 0.012) × $7.00)	= $126,692
	The cumulative total cost of the manual system is		$443,096

Now calculate the cost of EDI over the same period

EDI System Costs

Yr.	(Order volume × cost / order) + (errors × cost / error) + salary	= Annual Cost
0	Upfront implementation cost	= $125,000
1	(22,000 × $.35)+((22,000 × 0.003) × $9)+($40,000)	= $ 48,294
2	(25,000 × $.35)+((25,000 × 0.003) × $9)+($41,200)	= $ 50,625
3	(27,000 × $.35)+((27,000 × 0.003) × $9)+($42,436)	= $ 52,615
4	(32,000 × $.35)+((32,000 × 0.003) × $9)+($43,709)	= $ 55,773
5	(38,000 × $.35)+((38,000 × 0.003) × $9)+($45,020)	= $ 59,346
	The cumulative cost of the EDI system is:	$ 391,653

By comparing the two total five-year costs, we can see that EDI would pay for itself within the specified period.

Note: This problem, like most other cost comparison problems in the textbook, does not consider the time value of money.

1b. This is a creative thinking question. Responses might include but are not limited to: improved customer service through increased productivity, higher order accuracy, and better order tracking. Mr. McNealy might also expect improved relations with all channel members through better coordination and cooperation in the order process and delivery.

2. Order placement as orders wait to be bundled for processing. However, the decision should consider customer service requirements. Batch processing better enables a supplier to allocate current inventory, yet real-time processing is more responsive.

3. This is a creative thinking question. Responses may include but are not limited to: Point-of-Sale applications can help Fast Stop track sales, reducing inventory uncertainty and the need for buffer stock, and readily provide strategic marketing information. Material handling and tracking applications provide valuable information regarding the movement, storage, shipment and receipt of product. All of these benefits may have cost and customer service implications.

4a. June's anticipated demand at each DC is show below:

DC location	**Historical %**	**×**	**Aggregate Demand**	**=**	**DC Demand**
Los Angeles	(25%	×	12,000)	=	3,000 pairs
Memphis	(30%	×	12,000)	=	3,600
Cleveland	(35%	×	12,000)	=	4,200
Overland Park	(10%	×	12,000)	=	1,200
TOTAL		×		=	**12,000 pairs**

4b. The aggregate forecast for July is 12,720 pairs of socks (12,000 × 1.06). July's anticipated demand at each DC is shown below:

DC location	**Historical %**	**×**	**Aggregate Demand**	**=**	**DC Demand**
Los Angeles	(25%	×	12,720)	=	3,180 pairs
Memphis	(30%	×	12,720)	=	3,816
Cleveland	(35%	×	12,720)	=	4,452
Overland Park	(10%	×	12,720)	=	1,272
TOTAL		×		=	**12,720 pairs**

5a. To find the forecasted sales for the third quarter of 2016 under the moving averages technique, sum the actual sales from quarter 4 or 2015 and quarters 1 and 2 of 2016 and divide by 3:

$$F_{Qtr3,00} = \frac{900 + 1600 + 900}{3} = 1{,}133 \text{ Units}$$

5b. The forecasts of 2016 quarterly sales by exponential smoothing ($\alpha = 0.10$) are:

F_t :
2016, Qtr. 1 = 0.10 (900) + 0.90 (900) = 910
2016, Qtr. 2 = 0.10 (1600) + 0.90 (910) = 949
2016, Qtr. 3 = 0.10 (900) + 0.90 (949) = 934
2016, Qtr. 4 = 0.10 (300) + 0.90 (934) = 866

5c. The revised forecasts for the 2016 sales by exponential smoothing (α = 0.20) are:

F_t : 2016, Qtr. 1 = 0.20 (900) + 0.80 (900) = 920
2016, Qtr. 2 = 0.20 (1600) + 0.80 (920) = 996
2016, Qtr. 3 = 0.20 (900) + 0.80 (996) = 957
2016, Qtr. 4 = 0.20 (300) + 0.80 (957) = 816

Students should note that higher alpha values place more emphasis on the previous period's actual results and less on the previous period's forecast. In our case it appears to have made the forecasts more sensitive to actual fluctuation though not necessarily more accurate.

5d. The moving averages and simple exponential smoothing techniques do not work well in Ms. Boyd's situation. Ms. Boyd's product experiences a seasonal fluctuation that is ineffectively represented in both simple techniques. Adding a seasonality factor would help. Regression analysis with seasonal dummy variables and ratio-to-moving averages techniques more adequately perform forecasts with seasonal variations.

6a. Compare costs associated with the two alternative plans:

	Old system	New System
Monthly Inventory Carrying Cost:	$3,500	$2,275*
Additional systems costs (monthly):	0	1,500
Total associated monthly costs:	$3,500	$3,600

*Found by reducing the old system's monthly cost by 35% ($3,500 × (1.0-.0.35)) = 2,275

By Mr. Gregory's estimations, he should not implement the system improvements for a monthly loss of $100 ($3,500 − $2,600).

6b. This is a creative thinking question. Reponses may include but are not limited to: Evaluation of lower cost systems that product a higher reduction rate to monthly inventory carrier cost

7. Determine the the reorder point for spatulas

$$R = D \times T + SS$$

$$= 500 \times 21 + 750$$

$$= \mathbf{11{,}250\ spatulas}$$

8a. The economic order quantity (EOQ) is the square root of the product of the numerator (two times order cost and demand) divided by the product of the denominator (inventory carrying cost times unit cost):

$$\textbf{EOQ} = \sqrt{\frac{2C_0D}{C_U}} = \sqrt{\frac{2(8)(50,000)}{(.12)(.75)}} = \sqrt{\frac{704,000}{.09}} = 2,797\ \textbf{cups}$$

8b. Annual total cost with order quantities of 2,797 cups (calculated in part (a)):

$$\text{Inventory Carrying Costs} = \frac{2,797}{2} \times .75 \times .12 = \$\,125.87$$

Order Costs: determine the number of whole orders/yr.

$$\frac{50,000}{2,797} = 15.73 \text{ or } \textbf{16 whole orders / yr.}$$

16 orders × \$8 per order	=	128.00
Transportation Costs = 50,000 units × \$.05 / unit	=	2,200.00
Total Cost (q_e = 2,797 units)		**\$ 2,453.87**

Annual total cost with order quantities of 4,000 cups:

$$\text{Inventory Carrying Costs} = \frac{4,200}{2} \times (.75) \times (.12) = \$\,180.00$$

Order Costs : determine the number of whole orders/yr.

$$\frac{44,000}{4,000} = 11 \text{ whole orders /yr}$$

11 orders × \$8 / order	=	88.00
Transportation Costs = 44,000 units × (\$.04 / unit)	=	1,760.00
Total Cost (q_e = 4,000 units)		**\$ 2,028.00**

The order quantity of 4,000 units costs (\$2,453.87 – 2,028.00) **\$425.87** less annually than 2,797 order quantity found in part (a) when transportation costs are considered.

8c. We found that the low cost alternative in part (b) was the order quantity of 4,000 units. Therefore, the number of orders per year required to meet demand can be calculated as follows:

$$\text{Orders per year} = \frac{44,000}{4,000} = \textbf{11 orders}$$

From the number of orders we can find the order interval:

$$\text{Order interval} = \frac{12 \text{ months}}{11} = \textbf{1.1 months}$$

-or-

$$\text{Order interval} = \frac{365 \text{ days}}{11} = 33.18 = \textbf{33 days}$$

9a. Reorder point under perpetual review:

$$R = D \times T + SS$$
$$= 100 \times 8 + 0 = \textbf{800 watches}$$

9b. Average inventory = $Q/2 + SS = 1{,}200 + 0 =$ **600 watches**

9c. Reorder point under weekly review:

$$R = D(T + P/2) + SS$$
$$= 100(8 + 7/2) + 0 = 100(11.5) = \textbf{1,150 watches}$$

9d. Average inventory $= Q/2 + (P \times D)/2 + SS$

$$= (1{,}200/2) + (7 \times 100)/2 + 0$$
$$= 600 + 350$$
$$= \textbf{950 units}$$

10a. Common days' supply of chocolate chewies:

$$DS = \frac{A + \sum I_i}{\sum D_i} = \frac{(47{,}000 - 9{,}000) + 18{,}500}{4{,}500}$$
$$= \textbf{12.55 days}$$

10b. Fair Share Allocation Logic:

Allocation = (Days' Supply × Daily Requirements) − Inventory

$$\mathbf{A}_{\text{Cincinnati}} = (12.55 \times 2{,}500) - 12{,}500 = \mathbf{18{,}875} \text{ units}$$

$$\mathbf{A}_{\text{Phoenix}} = (12.55 \times 2{,}500) - 6{,}000 = \mathbf{25{,}375} \text{ units}$$