

**Problem 13-42**

Given the information provided for *Rockland, Inc.*:

Annual Demand ( $D$ )	Price per Unit ( $P$ )	Oversight Cost per Unit ( $O$ )	Transport Cost per Unit ( $C_t$ )	Order Cost ( $C_o$ )	Cost to Store One Unit One year ( $C_h$ )	Time in Days ( $L$ )
200,000	\$7.87	\$0.40	\$4.54	\$340	\$9.00	25

If order quantity  $Q = 16,000$  unit, and the supply chain operates 250 days per year. We can calculate the following:

$$\begin{aligned}
 \text{Total procurement cost } (D \cdot P) &= 200000 \cdot 7.87 \\
 &= 1574000
 \end{aligned}$$

$$\begin{aligned}
 \text{Total management oversight cost } (D \cdot O) &= 200000 \cdot 0.40 \\
 &= 80000
 \end{aligned}$$

$$\begin{aligned}
 \text{Total annual transportation cost } (D \cdot C_t) &= 200000 \cdot 4.54 \\
 &= 908000
 \end{aligned}$$

$$\begin{aligned}
 \text{Annual order cost } \left(\frac{D}{Q} \cdot C_o\right) &= \frac{200000}{16000} \cdot 340 \\
 &= 4250
 \end{aligned}$$

$$\begin{aligned}
 \text{Annual holding cost } \left(\frac{Q}{2} \cdot C_h\right) &= \frac{16000}{2} \cdot 9.00 \\
 &= 72000
 \end{aligned}$$

$$\begin{aligned}
 \text{Average annual pipeline inventory cost } \left(\frac{D}{250} \cdot L \cdot C_h\right) &= \frac{200000}{250} \cdot 25 \cdot 9.00 \\
 &= 180000
 \end{aligned}$$

Total supply chain costs:

$$= 2818250$$

If the supplier increases the order quantity to 40,000 units for a price discount of one percent, we have  $D = 40000$ ,  $P = 7.7913$ . Using the same formulas for part (a), we have:

$$\text{Total procurement cost } (D \cdot P) = 1558,260$$

$$\text{Total management oversight cost } (D \cdot O) = 80000$$

$$\text{Total annual transportation cost } (D \cdot C_t) = 908000$$

$$\text{Annual order cost } (\frac{D}{Q} \cdot C_0) = 1700$$

$$\text{Annual holding cost } (\frac{Q}{2} \cdot C_h) = 180000$$

$$\text{Average annual pipeline inventory cost } (\frac{D}{250} \cdot L \cdot C_h) = 180000$$

$$\text{Total supply chain costs: } = 2907960$$

We can see that the total supply chain costs would increase, so you should reject the new deal.