

- Green Thumb, a manufacturer of lawn mowers and snow blowers, has historically purchased a thousand bearings per week from a local supplier who charges \$1.00 per bearing.
- The purchasing manager has identified another potential source willing to supply the bearings at \$0.97 per bearing.
- Before making his decision, the purchasing manager evaluates the performance of the two suppliers.
- The local supplier has an average lead time of two weeks and has agreed to deliver the bearings in batches of 2,000. Based on past on-time performance, the purchasing manager estimates that the lead time has a standard deviation of one week.
- The new source has an average lead time of six weeks with a standard deviation of four weeks. The new source requires a minimum batch size of 8,000 bearings.
- Green Thumb has a holding cost of 25 percent.
- It currently uses a continuous review policy for managing inventory and aims for a cycle service level of 95 percent.
- Weekly demand has a mean of 1,000 and a standard deviation of 300.
- Which supplier should the purchasing manager go with?

### Local Supplier

Annual Material Cost:  $1000 \cdot \$1.00 = \$1000$  dollar

Average Cycle Inventory:  $\frac{2000}{2} = 1000$  bearings

Annual Cost of Holdings Cycle Inventory:  $1000 \cdot 1 \cdot (0.25) = 250$  dollar

$$\sigma_{LT} = \sqrt{2 \cdot 300^2 + 1000^2 \cdot 1^2} = 1086.28$$

$$\text{Safety Stock} = F^{-1}(0.95) \cdot 1086.28 = 1787 \text{ bearings}$$

$z = 1.645$

Annual cost of holding safety stock =  $1787 \cdot 1 \cdot (0.25) = \$446.75$

Total Annual Cost =  $1000 + 250 + 446.75 = \$1696.75$

### New Supplier

Annual Material Cost =  $1000 \cdot \$0.97 = \$970$  dollar

Average Cycle Inventory =  $\frac{8000}{2} = 4000$  bearings

Annual cost of Holding Cycle Inventory =  $4000 \cdot (0.97) \cdot (0.25) = 970$  dollar

$$\sigma_{LT} = \sqrt{6 \cdot 300^2 + 1000^2 \cdot 4^2} = 4066.94$$

Safety Stock =  $(1.645) \cdot (4066.94) = 6690$  bearings

Annual cost of holding stock =  $6690 \cdot (0.97) \cdot (0.25) = \$1622.325$

Total Annual Cost =  $970 + 970 + 1622.325 = \$3562.325$

The manager should go with the local supplier.

$$\sigma_{LT} = \sqrt{L \cdot \sigma_D^2 + D^2 \cdot \sigma_L^2}$$

↳ Standard deviation of demand during lead time

L: Average lead time  
 $\sigma_D$ : Std. dev. of demand  
 D: Average demand  
 $\sigma_L$ : Std. dev. of lead time

$$\text{Safety Stock} = F^{-1} \left( \text{Customer service level} \right) \cdot \sigma_{LT}$$