

- 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. ①
- 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. ②
- 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. ③
- 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

① ②

$$\text{Annual Material Cost: } 1000 \cdot 52 \cdot 1 = \$2000 \text{ dollar}$$

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

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

↳ Standard deviation
of demand during
lead time

L: Average lead time
 σ_d : Std. dev. of demand
D: Average demand
 σ_L : Std. dev. of lead time

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

④ ② ⑤

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

$$\sigma_{LT} = \sqrt{2 \cdot 300^2 + 1000^2 \cdot 1^2} = 1086,28$$

$$\text{Safety Stock} = F^{-1}(0.95) \cdot 1086,28 = 1787 \text{ bearings}$$

≈ 1.645

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

$$\text{Total Annual Cost} = \$2000 + 250 + 446.75 = \$2696.75$$

New Supplier

$$\text{Annual Material Cost} = 1000 \cdot 52 \cdot (0.97) = \$50440 \text{ dollar}$$

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

$$\text{Annual cost of Holding cycle Inventory} = 4000 \cdot (0.97) \cdot (0.25) = 970 \text{ dollar}$$

$$\sigma_{LT} = \sqrt{6 \cdot 300^2 + 1000^2 \cdot 4^2} = 4066,94$$

$$\text{Safety Stock} = (1.645) \cdot (4066,94) = 6690 \text{ bearings}$$

$$\text{Annual cost of holding s.stock} = 6690 \cdot (0.97) \cdot (0.25) = \$1622.325$$

$$\text{Total Annual Cost} = \$50440 + 970 + 1622.325 = \$53032.325$$

The manager should go with the local supplier.