

## Comparison of Fixed Order Interval and Reorder Point with the same safety stock

A Sporting Goods store has an average demand of 100 basketballs per day, with a standard deviation of 10. For many years, the practice has been to place an order for basketballs every 12 days, varying the size of the order depending on the number that are on hand when the order is placed. Enough are ordered to maintain a safety stock of 40 basketballs beyond the expected need. The lead time for the basketball truck is 4 days, and is very consistent.

With a fixed order interval, what is the probability the store will run out of basketballs in a given order cycle?

What is the expected average number short per cycle for the FOI model?

The owner of the Sporting goods store is concerned about how often they run out of basketballs (He was tired of hearing employees cry out from the storeroom, "Hoops, we're out!!) and so has instituted a basketball tracking scheme to keep continuous count of the number remaining in stock. Under this system, an order will be placed any time the stock gets to the point where there is enough to cover demand during the lead time and an extra 40 for safety stock.

Under the ROP program with a safety stock of 40, what is the probability of running out of basketballs in an order cycle?

What is the expected average number short per cycle for the FOI model?

If the same safety stock is held, what is the benefit of the ROP over FOI in this case? Be specific. What has the manager gained by having the employees jump through these hoops?



## With FOI:

$$SS_{FOI} = Z_{SL} * \sqrt{(OI+LT)} * \sigma_d$$

$$Z_{SL} = \frac{40}{\sqrt{OI+LT} * \sigma_d} = \frac{40}{\sqrt{12+4} * 10} = 1.0 \implies P = 0.84 \implies P_{stockout} = 16\%$$

$$E_{(n)} = E_{(z)} * \sigma_{dLT} = E_{(z)} * \sqrt{(OI+LT)} * \sigma_d = 0.083 * \sqrt{12+4} * 10 = 3.3$$



## With ROP:

$$SS_{ROP} = Z_{SL} * \sqrt{LT} * \sigma_d$$

$$Z_{SL} = \frac{40}{\sqrt{LT} * \sigma_d} = \frac{40}{\sqrt{4} * 10} = 2.0 \implies P = 0.977 \implies P_{stockout} = 2.3\%$$

$$E_{(n)} = E_{(z)} * \sigma_{dLT} = E_{(z)} * \sqrt{LT} * \sigma_d = 0.083 * \sqrt{4} * 10 = 0.83$$

The result is lower P stockout and fewer lost sales without carrying any more excess inventory than in the FOI case.

The benefit is reduction in lost sales .

The cost is whatever it costs additional to keep continuous track of inventory so that they can tell when to reorder.