MSIS 638

Case 4.1a

Jia Liang Ma

1. Search the internet for “how to calculate safety stock?” (a good tutorial can be found here: <https://www.logiwa.com/blog/safety-stock>).

Note: the fill rate is sometimes referred to as *service level*.

References:

<https://www.youtube.com/watch?v=4jdtjn1fLUg>

<https://www.logiwa.com/blog/safety-stock>

<https://virtocommerce.com/glossary/how-to-calculate-safety-stock>

1. Write the formula for the safety stock and explain it *in your own words*. This is a mathematical model.

In supply chain management, safety stock can help solve the problem of delaying shipment and well inventory management. The main purpose of safety stock is accounts for the emergency circumstances, preventing the retailers or companies can run out of the products. Otherwise, unexpected incidents might cause a heavy loss due to the sales of unavailable items. So, the function of safety stock is an inventory formula that retailers use to determine the emergency stock with balanced numbers of goods.

The formulation of safety stock, there has two different criterions I found on Internet.

The first one (Average-Max Method):

Safety stock Equation 1= (Maximum daily usage \* Maximum lead time in days) – (Average daily usage \* Average lead time in days).

The second one (Normal Distribution Method):

Safety Stock Equation 2= Z (desired service level) \* σLT (the standard deviation of lead time) \* D avg (the demand average)

For the first equation, the safety stock is based on retailer’s inventory formula. In this way, we can use the daily usage and lead time in days to evaluate the safety stock. Taking lead time and demand into account, navigating the business avoided fluctuations loss.

The second equation, we can use the Excel function called NORM.S.INV with the service rate to determine the coefficient of desired service level. For the average time, we use it as month because the standard deviation of sales we used is counted by month. The last one is demand average, it will depend on the units sold and we will get the D avg by dividing units sold by 30 days.

1. Determine the parameters of the model you developed in part (b).

For the parameters in part b, I will choose the second equation.

The normal distribution method model will combine with three components.

Z (desired service level) \* σLT (the standard deviation of lead time) \* D avg (the demand average)

The parameters are including monthly sales, average of monthly lead time and the demand average (per month)

1. Come up with an example with uncertain demand and lead time and calculate the corresponding safety stock. You can use made-up numbers for the model parameters.

By focusing the uncertainty on demand and lead time, we assume that a random sales numbers from Jan to Dec; Calculate the service rate (Z) and demand average. Then, we assume there are 10 deliveries for the sales to find out the lead time (by month). In this way, we can have the SD of lead time. With all the parameters above, we can calculate the safety stocks.

1. Develop an Excel spreadsheet model that calculates the safety stock for any set of parameter values.

