MSIS 638

Case 2.2a

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a)

Research the newsvendor model (e.g., watch a video about it).

b)

When should this model be used to manage inventory?

When it comes to the problem of reserve, to judge whether the order makers are greater than expected demand or less than expected demand. This model can help determining the optimal inventories reserves to satisfy random demand or withdraw from customers.

c)

What are the parameters of the newsvendor model?

(expected leftover inventory, expected profit, expected lost sales, expected sales, price, cost, salvage value, order quantity, marginal cost, marginal revenue)

d)

List about 10 examples in which the newsvendor model can be used to find the optimal order quantity.

Bank - The demand of cash withdrawal.

Coffee shop - optimal order of coffee beans and dairy products.

Newspapers - The demand of copies of newspaper.

Oil purchase in company - optimal order quantity for usage.

Smartphone purchase - optimal order quantity for sale.

Industries related to agriculture - optimal order quantity for cereals.

Car importer and seller - optimal order quantity for cars

Beverage shop and seller - optimal order quantity for materials

Semi-conductor chips - optimal order for exports

Milk production - optimal order for those dairy processing plants to reduce costs and waste.

e)

Calculate the cost of overage (C0) and the cost of underage (Cu) for the following example:

Retail price: p =$20

Purchase price: r = $14

Salvage value: s = $5

C0: p-r = $20 - $14 = $6

Cu: r-s = $14 - $5 = $9

f)

Calculate the critical fractile.

CR= F(Q) = Cu / (Cu + Co) = 6/15 = 39.6% = 0.4

g)

Assuming demand follows a uniform distribution between Dmin = 80 and Dmax = 150. Find the optimal order quantity.

Uniform distribution

CR =0.4; Dmin+ (Dmax - Dmin)\* 0.4= 80 + 70\*0.4 = 108 (units)

h)

Assume the demand follows a normal distribution with mean Dmean = 115 and sd. = 15. Find the optimal order quantity.

Normal Distribution

Mean + sd. (20 - 14/20) = 115 + 20\*0.4 = 115 + 8 = 123 (units)

i)

Assume the demand follows a normal distribution with mean Dmean = 115 and sd. = 5. Find the optimal order quantity.

Lognormal Distribution

115\* <0.2\*5\*Z> = 115\*<1\*0.253> = 1150.253 = 3.3 (units)

j)

The difference between h and I is their sd., by comparing that we can use different formula (e.g., Normal and Lognormal distribution)