

Inventory Models:

Inventory is defined as any stock of goods, commodities or economic resources that are kept for the purpose of future business affairs.

Advantage:

Disadvantage:

Reasons for Carrying Inventories:

It is essential for any firm to have inventory because of the following reasons.

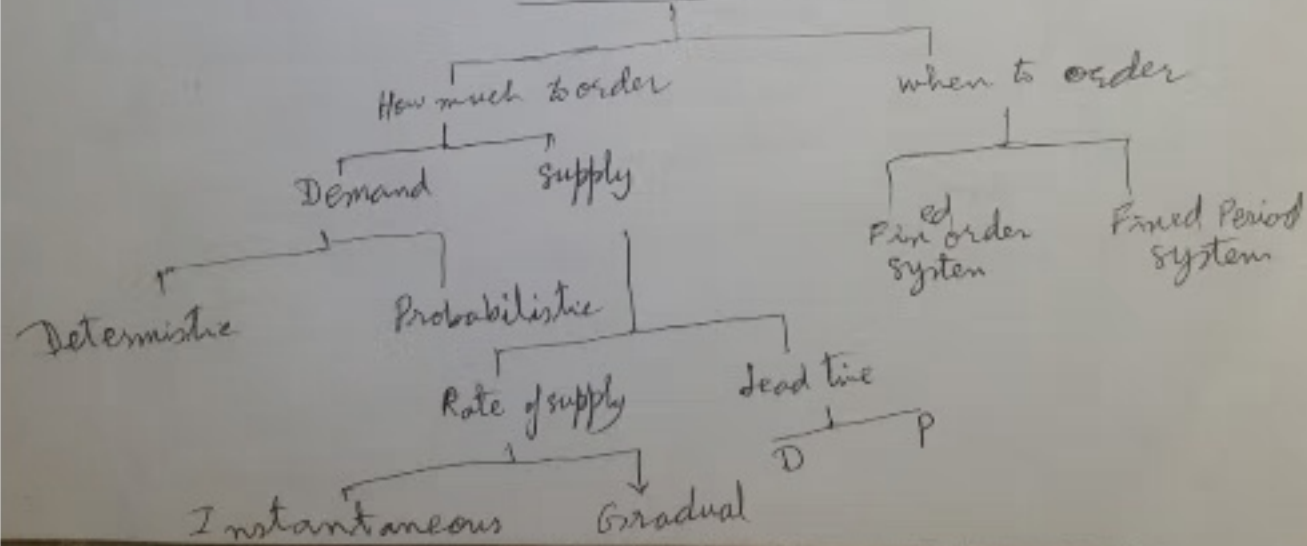
- 1- It provides adequate service to customers.
- 2- It helps in smooth and efficient running of business.
- 3- It reduces the possibility of duplicating orders.
- 4- Timely shipment of customers orders will improve cash flow.
- 5- It takes care of economic fluctuations.
- 6- It helps in minimising the loss due to deterioration and damage.
- 7- It takes advantages of price discounts by bulk purchasing.

(Reduced Quality)

Operating Decision Rules: Two types of decisions need to be made in managing inventories.

- ① How much (size) to order
- ② When to place an order

Inventory Decisions



Probabilistic Inventory Models (2)

Marginal cost of surplus/unit $c_1 = \text{Purchase Price/unit} - \text{Salvage value/unit}$

Marginal cost of shortage/unit $c_2 = \text{Selling Price/unit} - \text{Purchase Price/unit}$

Let the generalised prob. dist. of the demand of the item be a discrete dist. as

Observation	i	1	2	...	n
Demand	D_i	D_1	D_2	...	D_n
Probability	P_i	P_1	P_2	...	P_n

The optimal order size D^* is determined by the relation

$$P_{i-1} < \frac{c_2}{c_1 + c_2} < P_i ; P_i \text{ is the cumulative probability of having demand up to } D_i$$

Q. The daily demand of bread at a bakery follows a discrete dist. as follows:

S.No	1	2	3	4	5	6	7	8	9	10	11
D	25	26	27	28	29	30	31	32	33	34	35
P	.12	.11	.11	.09	.08	.12	.14	.05	.04	.04	.03

The purchase price of the bread is Rs 8 per packet. The selling price is Rs 11 per packet. If the bread packets are not sold within the day of purchase, they are sold at Rs 4 per packet to hotels for secondary use. Find the optimal order size of the bread.

Sol. Given purchase (Price/packet) = Rs 8
 Selling (") = Rs 11
 Salvage (") = Rs 4
 Marginal cost of surplus $c_1 = 8 - 4 = \text{Rs } 4$
 Marginal cost of shortage $c_2 = 11 - 8 = \text{Rs } 3$

Therefore, Cumulative Prob. $P = \frac{c_2}{c_1 + c_2} = \frac{3}{4+3} = 0.43$
 Next, we find the cumulative Prob. of demand.

S.N	D	P	Cumulative Prob. P_i
			0.2
			0.31
			0.41
			0.5
			0.58
			0.7
			0.84
			0.89
			0.93
			0.97

From the table it follows that

$$P_3 \leq \frac{c_2}{c_1 + c_2} = 0.43 < P_4$$

$$0.41 < 0.43 < 0.5$$

Therefore, the optimal order size is D_4 , which is equal to 28 breads.

S#	D	P	Cum P
1	25	0.2	0.2
2	26	0.11	0.31
3	27	0.1	0.41
4	28	0.09	0.5
5	29	0.08	0.58
6	30	0.12	0.7
7	31	0.14	0.84
8	32	0.05	0.89
9	33	0.04	0.93
10	34	0.04	0.97
11	35	0.03	1