Supply Chain Weekly Blast

#004 : Benefits of multi-period optimization

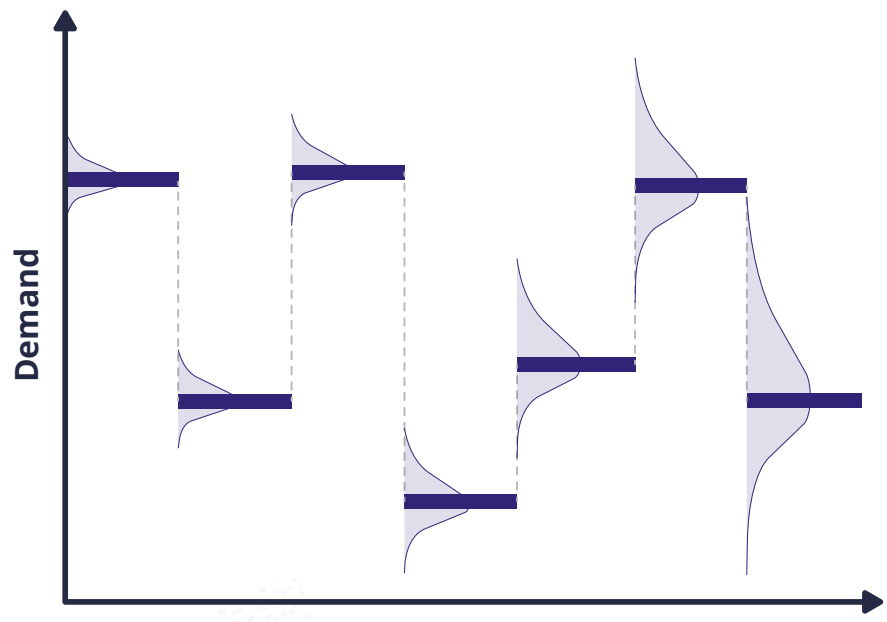
vekia
The Enhanced Forecasting & Replenishment

What is multi-period planning?

Ordering decisions can be taken considering the demand during future periods.

If we consider the demand for just one period – Single-period planning.
Else, if we consider the demands for multiple future periods – Multi-period planning.

In practice, the demand information farther in future is more and more uncertain.



What makes multi-period planning necessary ?

Presence of fixed order cost
Non-unit lot size/pack size (pack size > 1)
Quantity discounts
Capacity constraints
...

Costs involved in replenishment planning

h : Inventory holding cost

It is the inventory storage cost paid per unit item per unit time.

k : Fixed order cost

It is the cost involved during placing an order, that is irrespective of the order quantity. It may arise due to administrative cost, transportation cost etc.

p : Backorder/ Lost sale cost

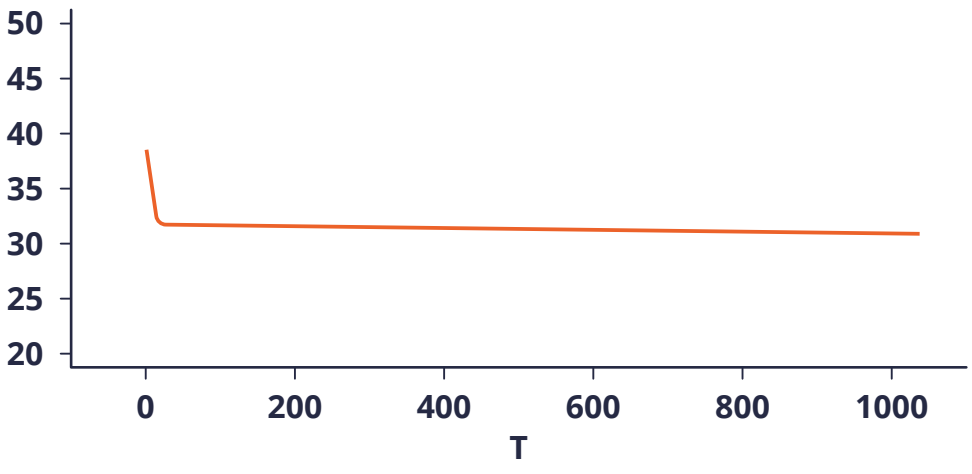
When demand for an item cannot be fulfilled, it is either backordered or the demand is lost completely. In both cases, penalties are paid in terms of lost revenue and perceived loss to brand value.

c : Purchase price

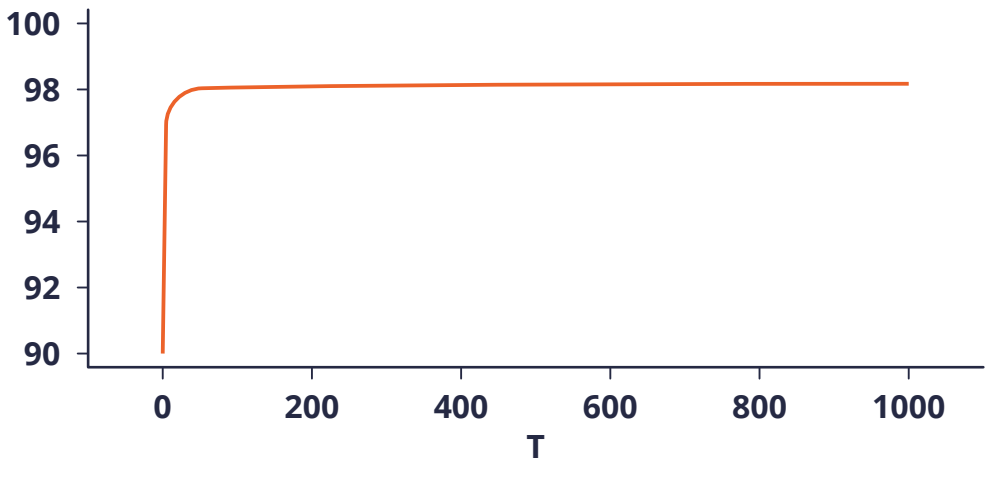
It is the price paid to the supplier per unit item purchase.

Cost/Day

(Problem: h = 1, p = 10, K = 50, Demand = 10, Lot = 20)



Service Level (%)



Examples

(Poisson demand, T = Number of periods)

Problem: h = 1, p = 10, **K = 0**, Demand = 10, **Lot = 1**

Time	T=1	T=5	T=10
Opt. Inv.	14	14	14
Cost/Day	100%	100%	100%

Problem: h = 1, p = 10, **K = 50**, Demand = 10, **Lot = 1**

Time	T=1	T=5	T=10
Opt. Inv.	14	30	36
Cost/Day	100%	68.7%	65.3%

Problem: h = 1, p = 10, **K = 50**, Demand = 10, **Lot = 20**

Time	T=1	T=5	T=10
Opt. Inv.	20	40	40
Cost/Day	100%	90.9%	86.5%

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