



IIT ROORKEE



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CERTIFICATION COURSE

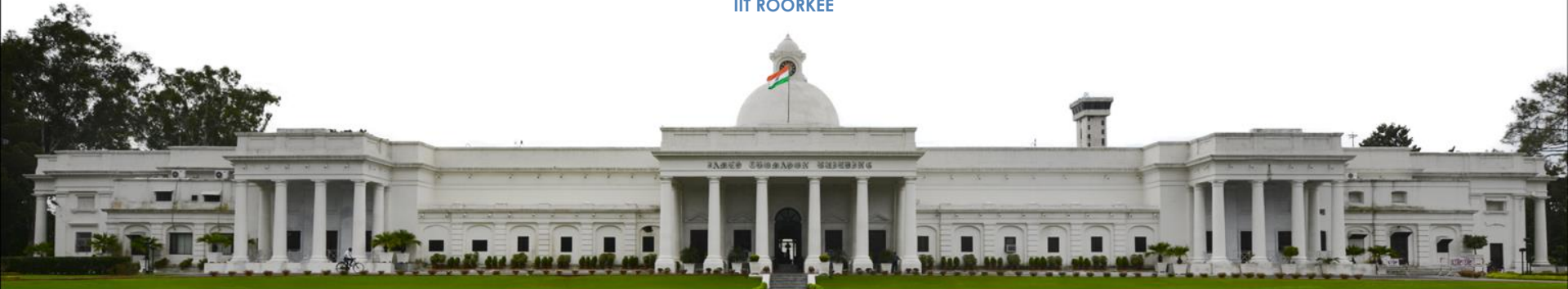
SUPPLY CHAIN ANALYTICS

Multi echelon Inventory Management

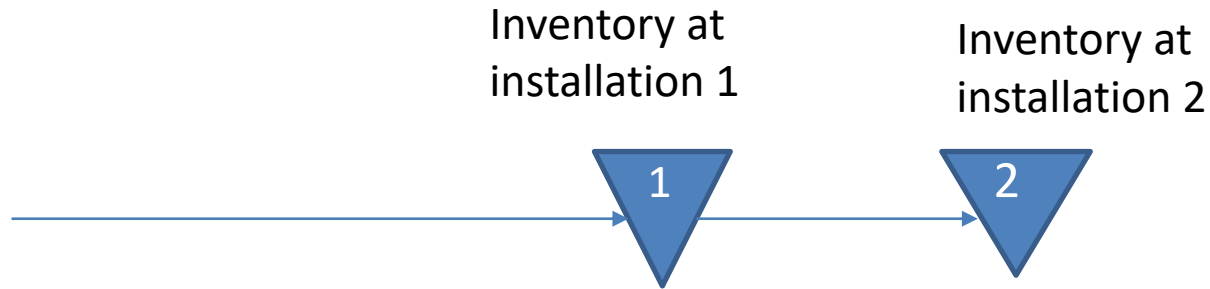
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Case of Two – Echelon System



Assumptions

1. The assumptions of “The Basic EOQ Model” hold at installation 2.
2. Installation 1 uses its inventory to provide a batch of Q_2 units to installation 2 immediately each time an order is required.
3. An order quantity of Q_1 units is placed in time to replenish inventory at installation 1 before a shortage would occur.
4. The units increase in value when they are received and processed at installation 2, so $h_1 < h_2$.



Relevant Parameters

Demand at last installation is d units per unit time.

	Order Quantity	Setup Cost	Installation holding Cost	Echelon holding Cost
Installation 1	Q_1	k_1	h_1	e_1
Installation 2	Q_2	k_2	h_2	e_2

- In inventory management of supply chains, it is important to differentiate between installation holding cost (h) and echelon holding cost (e).
- The echelon stock of a particular item at any installation in a multi echelon inventory system consists of the stock of the item that is physically on hand at the installation plus the stock of the same item that already is downstream at subsequent echelons of the system.



Optimizing the Two installations separately

$$Q_2 = \sqrt{2dk_2/h_2}$$

and $Q_1 = n Q_2$

where, $n = \sqrt{k_1 h_2 / k_2 h_1}$

n is either 1 or more than 1.



Optimizing Two installations simultaneously

$e_1 = h_1$ = echelon holding cost for installation 1.

$e_2 = h_2 - h_1$ = echelon holding cost for installation 2.

Now,

$$n = \sqrt{k_1 e_2 / k_2 e_1}$$

$$Q_2 = \sqrt{2d(k_1/n + k_2)/(n e_1 + e_2)}$$

and $Q_1 = n Q_2$



THANK YOU

