MBA-550 Supply Chain Optimization Inventory

pg 2 Inventory - the largest asset on the balance sheet

pg 3 Aemekin - HOPS cut inventory in the system - 16 to 18 weeks to 4 to 6 weeks.

more accurate forecasts - could concentrate more on customer service.

* increase inventory order cycle, increase accuracy of forecast.

"liquidity"

pg 4 inventory system - policies and controls that monitor levels of inventory

raw materials, finished products, component parts, supplies WIP.

pg 5 inventory analysis ① when to order items ② quantity

JIT, or supply stock if vendor shortages.

JIT reduces inventory levels.

What factors will effect inventory size? holding costs, setup costs, ordering costs (managerial and clerical costs)

(storage, insurance)

Shortage costs (difficult to estimate)

pg 9a Independent vs. dependant demand.

(cars) (tires)

single period (one time) and multiple period systems (or restocking periodic)

* Determining needed inventory

Marginal opportunity cost for not stocking enough

ex: cost = .20 price is .50 so profit = .30 (opportunity cost if not enough)

optimal stocking level

C_o = cost of overestimating demand (.20)

C_u = cost of underestimating demand (.30) opportunity cost.

$$P \leq \frac{C_u}{C_o + C_u} = \frac{.3}{(.2 + .3)} = .6$$

P = probability

* use this then

Marginal Analysis

then

use NORMSINV to get std. deviations (Z-score)

found .253 = or 3 extra papers

MBA-550 Supply Chain Optimization

pg 12

Q-model AKA fixed order quantity models — focuses on quantity and re-order points

(perpetual inventory) records must be updated.

R = inventory point to re-order.

Q = quantity

pg 14

Inventory position - stock plus on order minus back orders.

pg 15

Total annual cost = purchase cost + ordering cost + holding cost

Optimal order quantity

$$Q_{opt} = \sqrt{\frac{2DS}{H}}$$

D = annual demand units

S = ordering cost per order

H = Holding cost (per unit per year)

Re-order point

$$R = \bar{d}L$$

$\bar{d}$ = average daily demand

ex: 1,000 / 365

L = lead time (days)

pg 19

Safety stock - amount of additional inventory.

"Setting the safety stock" so there is a low level of stocking out.

best to capture the variability in demand.

probability approach = expected demand 100 units for next month.

Std dev. 20 units

50% stock out

50% greater stock

Moving one std. deviation to the right of the mean

if std dev. is 20 units

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Inventory

Fixed Order Quantity - reorders are placed at time of review. Inventory is counted at a specified time.

$$q = \bar{d}(T + L) + z\sigma_{T+L} - I$$

z = # of standard deviations for a specified probability. *

pg 25 & 26

$z\sigma_{T+L}$ = Safety stock

I = inventory in stock (plus on order)

$\bar{d}(T + L)$

T = # of days between reviews

L = time between placing an order & receiving it

$\bar{d}$ = average daily demand.

pg 27 "inventory control logic directly relates to the financial performance of the firm"

$$\text{inventory turnover} = \frac{\text{Cost of goods sold}}{\text{Average inventory value}}$$

"Safety stock is needed to manage the risk created by demand variability"

pg 29 **price break models** - inventory price varies with order size

Q_{opt} for each possible price. (check if quantity is feasible) choose lowest price.

MBA - 550 Inventory

pg 32 2 major problems for inventory - ① control over inventory.
② accuracy of records!

3 systems often used

① Optional Replenishment System - fixed frequency ex: weekly
re-order if level has dropped below a certain amount.

pg 32 $q = M - I$

M = maximum inventory level
I = inventory position

② Two Bin System - bin one - inventory
bin two - contains inventory equal to amount needed at re-order point.

pg 33

③ ABC inventory planning - analyzing inventory based on dollar value. *

A = High value ← to be closely monitored
B = Med. value
C = low value

pg 36, 37

Inventory accuracy ad cycle counting

every storage room should have a record keeping mechanism.

pg 38 SKU # - stock keeping unit