Inventory Management

Lecture 4 ESD.260 Fall 2003

Caplice

Background

- Inventory is largest component of logistics
 - \$1.44 Trillion in 2002
- Used as the metric for a 'healthy' firm
 - Inventory Turnover
 - Inventory Days of Sale
 - Inventory/Sales Ratio
 - Inventory / COGS

 Source of many programs and initiatives to reduce total inventory investment
 VMI, JIT, MRP, DRP, CFRP

But what has been the result?



© Chris Caplice, MIT

Bottomline

Inventory is not bad. Inventory is good.

Inventory is an important tool which, when correctly used, can reduce total cost and improve the level of service performance in a logistics system.

Background

Questions to answer

- What items to carry as inventory?
- Where should these be maintained?
- In what form should they be maintained?
- How much of each should be held?
- Things to consider in the inventory decision
 - Benefit of having inventory
 - Total cost of inventory
 - Potential alternatives for inventory

Classification of Inventory

Value added

Cycle Stock versus Safety Stock

6

Multi-Echelon

Multi-Indentured

MIT Center for Transportation & Logistics – ESD.260

Why hold inventory?

- Cover process time
- Allow for the uncoupling of processes
 Economies of scale
 Dealing with uncertainty / buffer
- Anticipation & Speculation

Minimize control costs

Fundamental Purpose of Inventory

To Reduce Total System Cost

- To buffer uncertainties in:
 - supply,
 - demand, and/or
 - transportation
 - the firm carries safety stocks.
- To capture scale economies in:
 - purchasing,
 - production, and/or
 - transportation
 - the firm carries cycle stocks.

Cycle Stock & Safety Stock



Relevant Costs

- What makes a cost relevant?
- Components
 - Purchase Cost
 - Ordering Cost
 - Holding Cost
 - Shortage Cost

Dimensions of Inventory Modeling

- Demand
 - Constant vs Variable
 - Known vs Random
 - Continuous vs Discrete
- Lead time
 - Instantaneous
 - Constant or Variable (deterministic/stochastic)
- Dependence of items
 - Independent
 - Correlated
 - Indentured
- Review Time
 - Continuous
 - Periodic

Discounts

- None
- All Units or Incremental
- Excess Demand
 - None
 - All orders are backordered
 - Lost orders
 - Substitution
- Perishability
 - None
 - Uniform with time
- Planning Horizon
 - Single Period
 - Finite Period
 - Infinite