Aggregate Inventory Management

- Flow and types of necessary inventory
- Supply and demand patterns
- Functions of inventory
- Objectives of inventory management
- Costs associated with inventories

Item Inventory Management

- Relative importance of inventory items
- How to control individual inventory items
- How much to order at one time
- When to place an order
Inventory and the flow of materials

Common Inventory Classifications
- Raw materials – not yet entered into the production process
- Work-in-process (WIP)
- Finished goods
- Distribution inventories
- Maintenance, repair, and operational supplies (MRO) – item that do not become part of the product

Inventory Functions
- **Anticipation** – anticipation of future demand, such as seasonality or promotional
- **Safety Stock** (buffer inventory) – buffer against issues including
  - Quality problems
  - Lead time fluctuations
  - Equipment problems
- **Lot-size inventory** – where replenishment occurs in lots that are in excess of immediate demand
- **Transportation inventory**
- **Hedge inventory** – hedge against price changes
Objectives of Inventory Management

- Maximize customer service – have adequate inventory of the right type to meet customer demand
- Low-cost plant operation – economical inventory production, storage, and movement
- Minimize total inventory investment

Inventory Costs

- Item Cost
- Carrying Costs
  - Cost of capital
  - Storage costs
  - Risk, such as obsolescence, pilferage, or damage
- Order Costs
  - Setup and teardown cost
  - Purchase order cost
  - Lost capacity cost
  - Production control cost
- Stockout Costs
- Capacity-associated Costs

Financial Implications of Inventory

- Inventory is often a very large portion of the Asset portion of the balance sheet
- Inventory turns = (annual cost of goods sold)/(average inventory value)
  - A common measure of effectiveness of many production systems
Example – the impact of inventory turns

- In a company if the annual cost of goods sold is $24 million and the average inventory is $6 million, there are 4 (24/6) inventory turns.
- If proper production and inventory management can allow good customer service with only $2 million in average inventory (12 inventory turns), there is a $4 million reduction in inventory.
- If the average total cost of carrying inventory is 25% per year, the savings to the company is $(0.25)(4,000,000) = $1,000,000.

Methods to evaluate (“cost”) inventory

- First in, First out (FIFO) – assumes the oldest item (first in) in stock will be used first.
- Last in, First out (LIFO) – assumes the newest item (last in) in stock will be used first.
- Average cost.
- Standard cost.

ABC Inventory Analysis

- Determine the relative importance of inventory.
  - Annual monetary usage.
  - Critical/difficult items to obtain.
- Degree of control based on ABC value.
  - A items about 20% of items, 80% of value.
  - B items about 30% of items, 15% of value.
  - C items about 50% of items, 5% of value.
Given the following inventory data

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<tr>
<th>Part Number</th>
<th>Unit Usage</th>
<th>Unit Cost ($)</th>
<th>Annual $ Usage</th>
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Classifying on cumulative $ usage

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<th>Cumulative % $ Usage</th>
<th>Cumulative % of Items</th>
<th>Class</th>
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ABC curve- percentage of value versus percentage of items
Control Using ABC

- Keep large amount of “C” items on hand
  - Value of items usually not worth the extra control to keep inventory accurate
- Control “A” items with large effort
  - Financial value dictates very small inventory