# Introduction to Materials Management

Chapter 9 – Inventory Fundamentals


## Aggregate Inventory Management

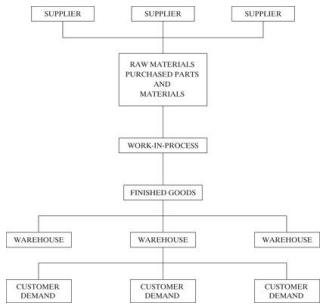
- Flow and types of necessary inventory
- Supply and demand patterns
- Functions of inventory
- Objectives of inventory management
- Costs associated with inventories




## 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)x($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

| Part Number | Unit Usage | Unit Cost $ | Annual $ Usage |
|---|---|---|---|
| 1 | 1100 | 2 | 2200 |
| 2 | 600 | 40 | 24,000 |
| 3 | 100 | 4 | 400 |
| 4 | 1300 | 1 | 1300 |
| 5 | 100 | 60 | 6000 |
| 6 | 10 | 25 | 250 |
| 7 | 100 | 2 | 200 |
| 8 | 1500 | 2 | 3000 |
| 9 | 200 | 2 | 400 |
| 10 | 500 | 1 | 500 |
| Total | 5510 | | $38,250 |

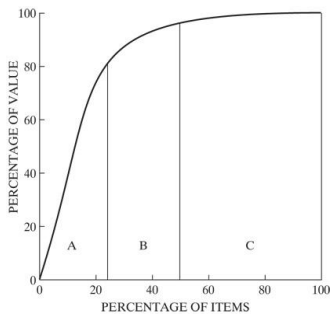



## Classifying on cumulative $ usage

| Part Number | Annual $ Usage | Cumulative $ Usage | Cumulative % $ Usage | Cumulative % of Items | Class |
|---|---|---|---|---|---|
| 2 | 24,000 | 24,000 | 62.75 | 10 | A |
| 5 | 6000 | 30,000 | 78.43 | 20 | A |
| 8 | 3000 | 33,000 | 86.27 | 30 | B |
| 1 | 2200 | 35,200 | 92.03 | 40 | B |
| 4 | 1300 | 36,500 | 95.42 | 50 | B |
| 10 | 500 | 37,000 | 96.73 | 60 | C |
| 9 | 400 | 37,400 | 97.78 | 70 | C |
| 3 | 400 | 37,800 | 98.82 | 80 | C |
| 6 | 250 | 38,050 | 99.48 | 90 | C |
| 7 | 200 | 38,250 | 100.00 | 100 | C |




## 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