

**MANAGING OPERATIONS**  
Across the Supply Chain

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McGraw-Hill/Irwin

**CHAPTER SEVEN**

**Understanding Inventory Fundamentals**

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Where We Are Now

		Relationships	Sustainability	Globalization	Organizational Culture/Ethics	Change Management	Measurement
<b>Chapter</b>							
<b>Part 1 Supply Chain: A perspective for Operations Management</b>							
1. Introduction to Managing Operations Across the Supply Chain	X	X	X				
2. Operations and Supply Chain Strategy	X	X	X	X	X	X	X
<b>Part 2 Foundations of Operations Management</b>							
3. Managing Processes and Capabilities	X						X
4. Product/Process Innovation	X	X	X			X	
5. Manufacturing and Service Process Structures	X	X	X	X	X	X	X
6. Managing Quality	X	X	X	X	X	X	X
<b>7. Understanding Inventory Fundamentals</b>	<b>X</b>	<b>X</b>	<b>X</b>				<b>X</b>
8. Lean Systems	X		X	X	X	X	X
<b>Part 3 Integrating Relationships Across the Supply Chain</b>							
9. Customer Management	X						X
10. Supplier Management	X	X	X	X			X
11. Logistics Management	X	X	X				
<b>Part 4 Planning of integrated Operations Across the Supply chain</b>		X					
12. Demand Planning: Forecasting and Demand Management	X		X				X
13. Sales and Operations Planning	X		X				X
14. Independent Demand Inventory Planning	X						X
15. Materials and Resource Requirements Planning	X		X				X
<b>Part 5 Managing Change in Supply Chain Operations</b>							
16. Project Management	X	X	X	X	X	X	X
17. Evolving Business Models and Change Drivers in the Supply Chain	X	X	X	X	X	X	X

7-2

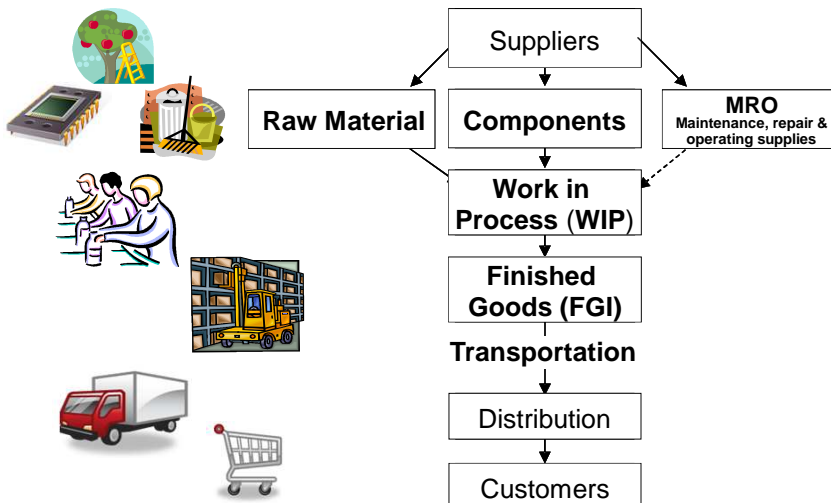
## Learning Objectives

1. Define the different types and roles of inventory
2. Explain the financial impact of inventory
3. Explain and compute measures of performance
4. Describe ABC analysis and information systems in inventory management
5. Explain inventory value in relation to SC position
6. Describe the bullwhip effect and how to combat it

7-3

## Types of Inventory

- **Inventory:** supply of items held to meet demand



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## Activity

- Think of the various stages of inventory for the following products:
  - A piece of furniture
  - A pair of shoes
  - A grocery product



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## Roles of Inventory

- Balancing supply and demand: decouples differences in supply and demand requirements
- Buffers against uncertainties: variation in supply and demand are managed with **buffer (safety) stock**
- Economies: price discounts or reduced shipping costs
- Geographic Specialization: supply and demand locations vary



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## Financial Impact of Inventory

- **Carrying (Holding) Costs**

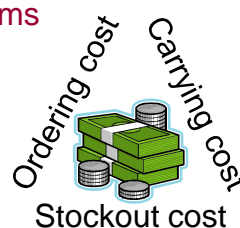
- Opportunity cost (including cost of capital)
- Storage and warehouse management
- Taxes and insurance
- Obsolescence, spoilage, & shrinkage
- Material handling, tracking and management

- **Ordering and Set-up Cost**

- Purchased items: placing and receiving orders
- Make items: change-over between items

- **Stockout Cost**

- Lost sales or customer loyalty
- Expediting
- Schedule disruption



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## Measures of Inventory Performance

- **Inventory turnover:** ratio of average inventory on-hand and level of sales

= Cost of goods sold / Average inventory at cost

= Net sales / Average inventory at selling price

= Unit sales / Average inventory in units

With an annual cost of goods sold of \$500M and average inventory of \$80M.

Inventory turns =  $\$500/\$80 = 6.25$  turns

Example 7-1

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## Measures of Inventory Performance cont'd

- Advantages of high turn over:
  - 'Fresh' inventory from high sales
  - Reduced risk or mark down from obsolescence
  - Reduced total carrying costs
  - Lower asset investment and higher productivity
- Dangers of high turnover:
  - Stockouts may mean lower sales
  - Increased costs from missing quantity requirements
  - Increased ordering costs



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## Measures of Inventory Performance cont'd

- **Days of Supply:** length of time operations can be supported with inventory on-hand
  - Days of supply = Inventory/Daily demand
  - If inventory is 2M and daily demand is 25,000 day
  - Days of supply =  $2M/25,000 = 80$  days
- **Service Level:** ability to meet customer demand without a stock out
- **Stock out:** no inventory is available

Figure 7-2

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## Managing Inventory – ABC Analysis

- **ABC analysis:** ranking inventory by importance
- **Pareto's Law:** small percentage of items have a large impact on sales, profit or costs

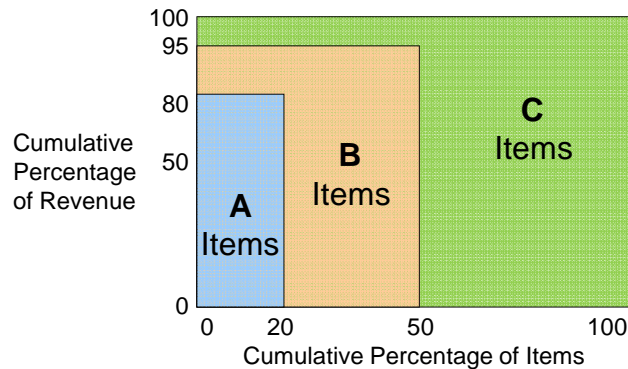


Figure 7-1

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## Inventory Information Systems and Accuracy

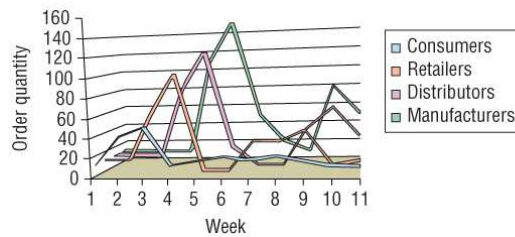
- Identification Systems:
  - **Global Trade Item Number (GTIN):** identification system for finished goods sold to consumers
  - **Part Number:** unique identifier used by a specific firm
- Inventory Record Accuracy
  - **Cycle Counting:** inventory is physically counted on a routine schedule



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## Managing Inventory Across the Supply Chain

- **Bullwhip Effect:** variation increases upstream in the supply chain (from consumer to manufacturers)



**FIGURE 7-2**  
The Bullwhip Effect:  
An Example

Figure 7-2

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## Managing Inventory Across the Supply Chain

- **Vendor-managed Inventory (VMI):** the vendor is responsible for managing inventory for the customer
  - Vendor monitors and replenishes inventory balances
  - Customer saves holding costs
  - Vendor has higher visibility of inventory usage
- **Collaborative planning, forecasting and replenishment (CPFR):** supply chain partners sharing information

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## Inventory Fundamentals Summary

1. Multiple types of inventory
2. Multiple roles of inventory
3. Inventory is an asset, and has multiple costs
4. Multiple performance metrics
5. ABC analysis determine relative importance of inventory items
6. Each item must have a unique identifier
7. Bullwhip describe increasing upstream variation
8. VMI and CPFR help supply chain partners better manage inventory

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