Learning Objectives

• Describe supply chain coordination and the bullwhip effect, and their impact on supply chain performance.

• Identify obstacles to coordination in a supply chain.

• Discuss managerial levers that help achieve coordination in a supply chain.

• Understand the different forms of collaborative planning, forecasting, and replenishment possible in a supply chain.
Lack of Supply Chain Coordination and the Bullwhip Effect

• Supply chain coordination – all stages of the chain take actions that are aligned and increase total supply chain surplus

• Requires that each stage share information and take into account the effects of its actions on the other stages

• Lack of coordination results when:
  ☞ Objectives of different stages conflict
  ☞ Information moving between stages is delayed or distorted
Bullwhip Effect

- Fluctuations in orders increase as they move up the supply chain from retailers to wholesalers to manufacturers to suppliers
- Distorts demand information within the supply chain
- Results from a loss of supply chain coordination
Demand at Different Stages

Figure 10-1
The Effect on Performance

- Supply chain lacks coordination if each stage optimizes only its local objective
- Reduces total profits
- Performance measures include
  - Manufacturing cost
  - Inventory cost
  - Replenishment lead time
  - Transportation cost
  - Labor cost for shipping and receiving
  - Level of product availability
  - Relationships across the supply chain
The Effect on Performance

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Impact of the Lack of Coordination</th>
</tr>
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<tbody>
<tr>
<td>Manufacturing cost</td>
<td>Increases</td>
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<tr>
<td>Inventory cost</td>
<td>Increases</td>
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<tr>
<td>Replenishment lead time</td>
<td>Increases</td>
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<td>Transportation cost</td>
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<td>Level of product availability</td>
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<tr>
<td>Profitability</td>
<td>Decreases</td>
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Table 10-1
Obstacles to Coordination in a Supply Chain

• Incentive Obstacles
• Information Processing Obstacles
• Operational Obstacles
• Pricing Obstacles
• Behavioral Obstacles
Incentive Obstacles

• Occur when incentives offered to different stages or participants in a supply chain lead to actions that increase variability and reduce total supply chain profits.

• Local optimization within functions or stages of a supply chain:

• Sales force incentives: sell in and sell through (Barilla pasta)
Information Processing Obstacles

- When demand information is distorted as it moves between different stages of the supply chain, leading to increased variability in orders within the supply chain.
- Forecasting based on orders, not customer demand.
- Lack of information sharing (Walmart’s Promotion).
Operational Obstacles

- Occur when placing and filling orders lead to an increase in variability.
- Ordering in large lots
- Large replenishment lead times
- Rationing and shortage gaming
Operational Obstacles

Figure 10-2
Pricing Obstacles

- When pricing policies for a product lead to an increase in variability of orders placed
- Lot-size based quantity decisions
- Price fluctuations
Pricing Obstacles

Figure 10-3

[Graph showing the relationship between manufacturer shipments and retailer sales over weeks.]

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Behavioral Obstacles

- Problems in learning within organizations that contribute to information distortion
  - Each stage of the supply chain views its actions locally and is unable to see the impact of its actions on other stages
  - Different stages of the supply chain react to the current local situation rather than trying to identify the root causes
  - Different stages of the supply chain blame one another for the fluctuations
  - No stage of the supply chain learns from its actions over time
  - A lack of trust among supply chain partners causes them to be opportunistic at the expense of overall supply chain performance
Managerial Levers to Achieve Coordination

- Aligning goals and incentives
- Improving information accuracy
- Improving operational performance
- Designing pricing strategies to stabilize orders
- Building strategic partnerships and trust
Aligning Goals and Incentives

- Align goals and incentives so that every participant in supply chain activities works to maximize total supply chain profits
- Align goals across the supply chain
- Align incentives across functions
- Pricing for coordination
- Alter sales force incentives from sell-in (to the retailer) to sell-through (by the retailer)
Improving Information Visibility and Accuracy

- Sharing point of sale data
- Implementing collaborative forecasting and planning
- Designing single-stage control of replenishment
  - Continuous replenishment programs (CRP)
  - Vendor managed inventory (VMI)
Improving Operational Performance

- Reducing replenishment lead time
- Reducing lot sizes
- Rationing based on past sales and sharing information to limit gaming
Designing Pricing Strategies to Stabilize Orders

• Encouraging retailers to order in smaller lots and reduce forward buying

• Moving from lot size-based to volume-based quantity discounts

• Stabilizing pricing

• Building strategic partnerships and trust
Continuous Replenishment and Vendor-Managed Inventories (VMI)

- A single point of replenishment
- CRP – wholesaler or manufacturer replenishes based on POS data
- VMI – manufacturer or supplier is responsible for all decisions regarding inventory
- Substitutes
Collaborative Planning, Forecasting, and Replenishment (CPFR)

• Sellers and buyers in a supply chain may collaborate along any or all of the following:
  1. Strategy and planning
  2. Demand and supply management
  3. Execution
  4. Analysis

• Retail event collaboration
• DC replenishment collaboration
Achieving Coordination in Practice

- Quantify the bullwhip effect
- Get top management commitment for coordination
- Devote resources to coordination
- Focus on communication with other stages
- Try to achieve coordination in the entire supply chain network
- Use technology to improve connectivity in the supply chain
- Share the benefits of coordination equitably
THE END