Willingness-To-Learn \(\uparrow\) Willingness-To-Earn
Introduction

What is supply chain management?
Significance of supply chain management
Push vs. Pull processes

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A Generic Supply Chain

Sources: plants, vendors, ports

Regional Warehouses: stocking points

Field Warehouses: stocking points

Customers, demand centers, sinks

Supply

Inventory

Purchase

Transportation

Inventory
Cost Breakdown of A Manufactured Good

- Profit 10%
- Supply Chain Cost 20%
- Marketing Cost 25%
- Manufacturing Cost 45%

Effort spent for supply chain activities are invisible to the customers.
## Supply Chains in US Economy

- Logistics related activity 11%, 10.5%, 10.1% of GDP in 1990, 1996, details for **2007** are below.

### Inventory Carrying Costs – 2,026 B inventory
- Interest 103 B
- Taxes, Obsolescence, Depreciation, Insurance 273 B
- Warehousing 111 B

### Transportation Costs
- Truck – Intercity 455 B
- Truck – Local 216 B
- Railroads 58 B
- Water (International 33 + Domestic 5) 38 B
- Oil pipelines 10 B
- Air (International 16 + Domestic 25) 41 B
- Forwarders 30 B

- Shipper Related Costs 8 B
- Logistics Administration 54 B

**Total** 1397 B

### Inventory vs. Transportation

<table>
<thead>
<tr>
<th>Inventory Carrying Costs</th>
<th>Transportation Costs</th>
</tr>
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<tbody>
<tr>
<td>487 B</td>
<td>671 B</td>
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</table>

Inventory vs. Transportation

487 vs. 671
**Importance of Supply Chain Management**

- In 2000, the US companies spent $1 trillion (10% of GNP) on supply-related activities (movement, storage, and control of products across supply chains).
  
  Source: State of Logistics Report

- Eliminating inefficiencies in supply chains can save millions of $.

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<table>
<thead>
<tr>
<th>Tier 1 Supplier</th>
<th>Manufacturer</th>
<th>Distributor</th>
<th>Retailer</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequent Supply shortages</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Inefficient logistics</strong></td>
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<tr>
<td><strong>Low order fill rates</strong></td>
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<tr>
<td><strong>High stockouts</strong></td>
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</tbody>
</table>

- Glitch-Wrong Material, Machine is Down – effect snowballs
- High inventories through the chain
- Ineffective promotions
- High landed costs to the shelf
What can Supply Chain Management do?

- P&G (Proctor & Gamble) estimates it saved retail customers $65 M (in 18 months) by collaboration with retailers resulting in a better match of supply and demand.

- Estimated that the grocery industry could save $30 billion (10% of operating cost) by using effective logistics and supply chain strategies
  - A typical box of cereal spends 104 days from factory to sale
  - A typical car spends 15 days from factory to dealership
  - Faster turnaround of the goods is better?

- Laura Ashley (retailer of women and children clothes) turns its inventory 10 times a year five times faster than 3 years ago
  - inventory is emptied 10 times a year, or an item spends about 12/10 months in the inventory.
  - To be responsive, it relocated its main warehouse next to FedEx hub in Memphis, TE.

- National Semiconductor used air transportation and closed 6 warehouses, 34% increase in sales and 47% decrease in delivery lead time.
Top 25 Supply Chains

AMR research [http://www.amrresearch.com](http://www.amrresearch.com) publishes reports on supply chains and other issues.

The Top 25 supply chains report comes out in Novembers.

The table on the right-hand side is from *The Second Annual Supply Chain Top 25* prepared by Kevin Riley and Released in November 2005.
SCM Generated Value

Minimizing supply chain costs
   while keeping a reasonable service level
       customer satisfaction/quality/on time delivery, etc.

This is how SCM contributes to the bottom line

SCM is not strictly a cost reduction paradigm!
A picture is better than 1000 words! How many words would be better than 3 pictures?

- A supply chain consists of

    Supplier  Manufacturer  Distributor  Retailer  Customer

    Upstream  Downstream

- aims to Match Supply and Demand, profitably for products and services

- achieves

  The right Product  The right Price  The right Store  The right Quantity  The right Customer  The right Time  =  Higher Profits
An example: Detergent supply chain

Customer wants detergent

Albertson’s Supermarket

Third party DC

P&G or other manufacturer

Plastic cup Producer

Chemical manufacturer (e.g. Oil Company)

Tenneco Packaging

Paper Manufacturer

Chemical manufacturer (e.g. Oil Company)

Timber Industry

Producer

Chemical manufacturer (e.g. Oil Company)
Cycle View of Supply Chains

Customer Order Cycle

1. Customer triggers an order
2. Supplier fulfils the order
3. Customer receives the order

Replenishment Cycle

1. Customer triggers an order
2. Supplier fulfils the order
3. Customer receives the order

Manufacturing Cycle

1. Customer triggers an order
2. Supplier fulfils the order
3. Customer receives the order

Procurement Cycle

1. Customer triggers an order
2. Supplier fulfils the order
3. Customer receives the order
Flows in a Supply Chain

The flows resemble a chain reaction.

Supplier -> Customer

Material

Information

Funds
Push vs Pull System

What does instigate the movement of the work in the system?

- In **Push** systems, work release is based on downstream demand forecasts
  - Keeps inventory to meet actual demand
  - Acts *proactively*
    » e.g. Making generic job application resumes today (e.g.: exempli gratia)

- In **Pull** systems, work release is based on actual demand or the actual status of the downstream customers
  - May cause long delivery lead times
  - Acts *reactively*
    » e.g. Making a specific resume for a company after talking to the recruiter
Push/Pull View of Supply Chains

Typically, Procurement, Manufacturing and Replenishment cycles

Typically, Customer Order Cycle

Customer Order Arrives

Push-Pull boundary

PUSH PROCESSES

PULL PROCESSES
Examples of Supply Chains

- **Dell / Compaq, computer (assembly) industry**
  - Dell buys some components for a product from its suppliers after that product is purchased by a customer. Extreme case of a pull process.

- **Amazon / Barnes and Noble, bookstores**
  - Amazon is strictly an online store. Amazon uses more pull processes.

- **Zara / Benetton, apparel (=clothing) industry**
  - Zara is a Spanish company selling apparel with a short design-to-sale cycle to avoid markdowns. Zara uses relatively more pull.

- **Toyota / GM / Volkswagen, car manufacturers**
  - Toyota provides reasonable quality at reasonable cost. Car manufacturing is mostly done as push process.
Summary

- Components of supply chains.
- Significance of supply chain management.
- Push vs. Pull processes.