供应链是一个由供应商、仓库、操作和零售店组成的序列，如生产与交付系统（例如，从材料到客户）。

供应链管理是一个复杂、肮脏和繁琐的过程，通过该过程，公司移动材料、部件和产品到客户——在适当的数量和适当的时间。它涉及设施、功能和活动的生产与交付产品或服务从供应商到客户。

分销可以由许多形式完成，包括：
- 铁路
- 卡车
- 水
- 空气
- 计算机
- 邮件
- 电话
- 亲自
Uncertainty in the supply chain makes this a very difficult management challenge. Inevitably something will not go according to our plans. Contingency planning must be considered to handle the breakdowns that will surely occur. In the absence of contingency planning, “off-the-cuff” reaction could be very costly.

The effectiveness of the supply chain is dependent on:
- Forecast accuracy
- Timely deliveries
- Correct quantities
- Quality
- Personnel & Equipment performance
- Correct information

Supply Chain Design is critical to address the planned as well as the uncertain daily occurrences. Commitment to the supply chain as a Business Philosophy is a strategic issue. Top management must address the supply chain as an integral component of the effective business enterprise. To do this:
- Apply quality management principles for design & implementation
- Benchmark your company’s capabilities against competitors and other industry practices. Sometimes a concept that works well in another industry can have implications in another.
- Get commitment & support from supplier management throughout the chain
Bullwhip effect - Inventory oscillations become progressively larger looking backward through the supply chain

Purchasing involves obtaining materials, parts, and supplies needed to produce a product or provide a service. For manufacturing companies, approximately 60% of the product cost comes from purchased parts and materials. The purchasing function is responsible for:

- Quality of incoming parts, materials, or subassemblies
- Communication and timing of deliveries of goods or services
- Monitoring vendor performance on quality, delivery accuracy (time and quantity)
- Interfaces with a number of other functional areas, as well as with outside suppliers

Operating units - request for goods, changes in specifications, changes in quantity, quality problems
Legal - contract negotiations, bid specifications for non-routine purchases, interpretation pricing legislation, product liability
Accounting - receipt of goods, financial consideration for quantity discounts
Design and Engineering - prepare/modify product specifications which must be interpreted, coded, and communicated to potential suppliers
Receiving - to determine variations in order quantity versus quantity received
Quality Assurance - results of acceptance sampling or production issues with current products
Lesson 20 – Supply Chain Management

The Purchasing Cycle

Requisition
- A description of the item or material desired
- the quantity and quality required
- desired delivery date

Selection of a supplier
- Vendor ratings, past performance, who can

Place order with the supplier
- Price negotiations (annual usage, item)
- Order (covering specific item, blanket order)

Monitor
- Routine follow-up to assure delivery

Receiving
- Checks for quality, quantity (check and balance on invoice)

Value Analysis

A goal of continual improvement is to reduce costs/waste and improve productivity. Value Analysis refers to the process of evaluating purchased materials/parts for these purposes. Some typical questions include:

- Could a cheaper material/part be used
- Is the function of this part/material necessary
- Could the function of two or more parts be combined into a single part
- Can a material/part be simplified
- Can product specifications be relaxed allowing a cheaper part
- Could standard parts replace non-standard parts

Outsourcing

Outsourcing involves buying goods or services from outside sources rather than providing them in-house. There are many reasons for considering outside versus in-house capabilities.

- Make versus buy analysis (cost to produce, investment)
- Stability of demand and possible seasonality
- Quality available versus quality in-house
- The desire to maintain close control over operations
  - idle capacity
  - lead times for each alternative
  - expertise
  - stability of technology
  - compatibility with other in-house operations (skill levels, equipment, etc)
Global Sourcing

Global Sourcing is becoming a greater part of corporate strategy. Global Trade Agreements (GATT, NAFTA), improvements in technology, speed of distribution, worker skill levels and 2nd & 3rd world infrastructure have made global sourcing a valid strategic consideration.

Originally, global sourcing was considered a way to reduce costs, but it has evolved into a strategy which goes beyond this goal. Because so many multi-national companies also have manufacturing as well as customer bases in many countries the global sourcing strategy now encompasses product availability, technology, delivery, lead times, labor and quality.

Issues In Global Sourcing

Global Sourcing was discussed in some detail in Chapter 8. In addition, consideration needs to be given to:

- Free trade opportunities
- Nations who have formed trading groups
- Tariffs or duties
- Ability to freely transport goods across borders
- Transportation logistics & support
  - Duty specialists
  - Freight Forwarders
  - Customs brokers
  - Export packers, management & trading companies
- Stability of markets

Other Purchasing Issues

JIT Purchasing - smaller lot sizes, fewer suppliers, on-time delivery, communications, long term relationships

Determining Prices - published price lists, competitive bidding, negotiation. Recognize that suppliers need to make a reasonable profit in order to survive.

Centralized Purchasing - handled by one special department. Can offer price advantages by quantity discount negotiations.

Decentralized Purchasing - individual departments or facilities handle their own purchasing
Lesson 20 – Supply Chain Management

Supplier Analysis

**Price**

- Replacement of a defective item
- Maintenance (especially when equipment is involved)

**Quality**

- Location
  - Transportation costs
  - Lead times (recall auto carpet discussion)

**Reputation**

- Inventory policy of supplier

**Services**

- Willingness to respond to changes in demand

**Location**

- Transportation costs
- Lead times (recall auto carpet discussion)

**Services**

- Willingness to respond to changes in demand

**Financial Stability**

Supplier Analysis

**Supplier Audits** - periodic checks are a means of keeping current on supplier’s capabilities, quality and delivery problems and resolutions, as well as supplier performance on other buyer criteria.

**Supplier Certification** - a detailed examination of the policies and capabilities of a supplier to ensure that the supplier meets or exceeds the expectations of the buyer. Some companies use the ISO 9000 standards for supplier certification.

**Supplier As A Partner**

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Partner</th>
<th>Adversary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of suppliers</td>
<td>One or a few</td>
<td>Many - play one against the other</td>
</tr>
<tr>
<td>Length of relationship</td>
<td>Long term</td>
<td>May be brief</td>
</tr>
<tr>
<td>Low price</td>
<td>Moderately important</td>
<td>Major consideration</td>
</tr>
<tr>
<td>Reliability</td>
<td>High</td>
<td>May not be high</td>
</tr>
<tr>
<td>Openness</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Quality</td>
<td>Insured at the source</td>
<td>Vendor certified</td>
</tr>
<tr>
<td>Volume of business</td>
<td>High</td>
<td>May be low due to many suppliers</td>
</tr>
<tr>
<td>Location</td>
<td>Proximity may be stressed</td>
<td>Widely dispersed</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Relatively high</td>
<td>Relatively low</td>
</tr>
</tbody>
</table>
Supplier Improvements

9 areas where buyers believe suppliers can improve

- Reduce cost of making the purchase
- Reduce transportation costs
- Reduce production costs
- Improve product quality
- Improve product design
- Reduce Time to market
- Improve customer satisfaction
- Reduce inventory costs
- Introduce new products or services

Logistics - the movement of materials and supplies

- Within a facility
- Incoming materials/supplies
- Outgoing materials and supplies

Traffic Management - overseeing the shipment of incoming and outgoing goods and handling schedules and decisions on shipping methods and times while taking into account various alternatives, government regulations, highway construction, trucker strike's, etc.

Electronic Data Interchange (EDI) - the direct transmission of inter-organization transactions between computers. EDI is used to communicate purchase orders, shipping notices, debit/credit memos, design specifications, point-of-sale information, etc.

Other Supply Chain Issues

Logistics – Within A Supply Network

Minimize transportation costs between Supplying Locations (Factories) and Demand Locations (Warehouses).
Other Supply Chain Issues

**Distribution Requirements Planning (DRP)** - an extension of the concepts of MRP to finished goods inventory management and distribution planning. DRP starts with demand at the end of the channel and works backward through the warehouse system to obtain a time phased replenishment schedule for moving inventories through the warehouse network. Extremely useful when multiple warehouses are present (e.g. Wal-Mart). Many MRP vendors also have a DRP module.

Other Supply Chain Issues

- Trust among partners
- Sharing information
- CPFR (Collaborative Planning Forecasting and Replenishment)

Effective communications (new computer systems, new technology)
- RFID (remote frequency identification)
- EDI
- Internet

Performance Metrics
### Supply Chain Metrics

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>On-time delivery</td>
</tr>
<tr>
<td></td>
<td>Order fulfillment lead time</td>
</tr>
<tr>
<td></td>
<td>Fill rate (fraction of demand met from stock)</td>
</tr>
<tr>
<td></td>
<td>Perfect order fulfillment</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Supply chain response time</td>
</tr>
<tr>
<td></td>
<td>Upside production flexibility</td>
</tr>
<tr>
<td>Expenses</td>
<td>Supply chain management costs</td>
</tr>
<tr>
<td></td>
<td>Warranty cost as a percent of revenue</td>
</tr>
<tr>
<td></td>
<td>Value added per employee</td>
</tr>
<tr>
<td>Assets/utilization</td>
<td>Total inventory days of supply</td>
</tr>
<tr>
<td></td>
<td>Cash-to-cash cycle time</td>
</tr>
<tr>
<td></td>
<td>Net asset turns</td>
</tr>
</tbody>
</table>

### Evaluating Shipping Alternatives

Many times a business must make a choice between quicker (more expensive) shipping alternatives and slower (cheaper) alternatives. Quicker shipments mean that the vendor will get paid earlier; therefore the slower alternatives have a greater carrying or holding cost. The following relationship can be useful in evaluating which alternative you choose.

\[
\text{Incremental Holding Cost} = H \left( \frac{d}{365} \right)
\]

where:
- \( H \) = annual holding cost for the item
- \( d \) = time saving in days

**Example 1a:** Determine which shipping alternative 1 day or 3 days is best when the holding cost of an item is $1,000 per year and the 1-day shipping cost is $40 and the 3-day shipping cost is $35.

- Time Savings = 2 days
- Cost Savings for 3 day shipping = $40-$35=$5
- Incremental Holding Cost = \( 1000 \left( \frac{2}{365} \right) \approx 5.48 \)

Since Incremental Holding Cost is greater than Cost Savings it is better to ship the quickest way - 1 day
Example 1b: Determine which shipping alternative 1 day or 3 days is best when the holding cost of an item is $1,000 per year and the 1-day shipping cost is $40 and the 3-day shipping cost is $30.

Time Savings = 2 days
Cost Savings = $40-$30=$10

Incremental Holding Cost = 1000 \left( \frac{2}{365} \right) = $5.48

Since Incremental Holding Cost is less than Cost Savings it is better to ship the slower way - 3 day.

Homework
Read and understand all material in the chapter.
Discussion and Review Questions
Recreate and understand all classroom examples
Exercises on chapter web page