The Role of Distribution in the Supply Chain

- **Distribution**: the steps taken to move and store a product from the supplier stage to the customer stage in a supply chain
- Distribution directly affects cost and the customer experience and therefore drives profitability
- Choice of distribution network can achieve supply chain objectives from low cost to high responsiveness

Factors Influencing Distribution Network Design

- Distribution network performance evaluated along two dimensions at the highest level:
  - Customer needs that are met
  - Cost of meeting customer needs
- Distribution network design options must therefore be compared according to their impact on customer service and the cost to provide this level of service

Factors Influencing Distribution Network Design

- Elements of customer service influenced by network structure:
  - Response time
  - Product variety
  - Product availability
  - Customer experience
  - Order visibility
  - Returnability
- Supply chain costs affected by network structure:
  - Inventories
  - Transportation
  - Facilities and handling
  - Information
Design Options for a Distribution Network

- Manufacturer Storage with Direct Shipping
- Manufacturer Storage with Direct Shipping and In-Transit Merge
- Distributor Storage with Carrier Delivery
- Distributor Storage with Last Mile Delivery
- Manufacturer or Distributor Storage with Customer Pickup
- Retail Storage with Customer Pickup

Manufacturer Storage with Direct Shipping (Fig. 4.6)

In-Transit Merge Network (Fig. 4.7)

Distributor Storage with Carrier Delivery (Fig. 4.8)
Distributor Storage with Last Mile Delivery (Fig. 4.9)

Factories -> Distributor/Retailer Warehouse

Distributor/Retailer Warehouse -> Customers

Product Flow Information Flow

Manufacturer or Distributor Storage with Customer Pickup (Fig. 4.10)

Factories -> Cross Dock DC

Cross Dock DC -> Pickup Sites

Pickup Sites -> Retailer

Retailer -> Customers

Product Flow Information Flow

Comparative Performance of Delivery Network Designs (Table 4.7)

<table>
<thead>
<tr>
<th></th>
<th>Retail Storage with Customer Pickup</th>
<th>Manufacturer Storage with Direct Shipping</th>
<th>Manufacturer Storage with In-Transit Merge</th>
<th>Distributor Storage with Package Carrier Delivery</th>
<th>Distributor storage with last mile delivery</th>
<th>Manufacturer storage with pickup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Time</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Product Variety</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Product Availability</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Customer Experience</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Order Visibility</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Returnability</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Inventory</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Transportation</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Facility &amp; Handling</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Information</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Performance of Delivery Networks for Different Product/Customer Characteristics (Table 4.8)

<table>
<thead>
<tr>
<th></th>
<th>Retail Storage with Customer Pickup</th>
<th>Manufacturer Storage with Direct Shipping</th>
<th>Manufacturer Storage with In-Transit Merge</th>
<th>Distributor Storage with Package Carrier Delivery</th>
<th>Distributor storage with last mile delivery</th>
<th>Manufacturer storage with pickup</th>
</tr>
</thead>
<tbody>
<tr>
<td>High demand product</td>
<td>+2</td>
<td>-2</td>
<td>-1</td>
<td>0</td>
<td>+1</td>
<td>-1</td>
</tr>
<tr>
<td>Medium demand product</td>
<td>+1</td>
<td>-1</td>
<td>0</td>
<td>+1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Low demand product</td>
<td>-1</td>
<td>+1</td>
<td>0</td>
<td>+1</td>
<td>-1</td>
<td>+1</td>
</tr>
<tr>
<td>Very low demand product</td>
<td>-2</td>
<td>+2</td>
<td>+1</td>
<td>0</td>
<td>-2</td>
<td>+1</td>
</tr>
<tr>
<td>Many product sources</td>
<td>+1</td>
<td>-1</td>
<td>-1</td>
<td>+2</td>
<td>+1</td>
<td>0</td>
</tr>
<tr>
<td>High product value</td>
<td>-1</td>
<td>+2</td>
<td>+1</td>
<td>+1</td>
<td>0</td>
<td>-2</td>
</tr>
<tr>
<td>Quick desired response</td>
<td>+2</td>
<td>-2</td>
<td>-2</td>
<td>-1</td>
<td>+1</td>
<td>-2</td>
</tr>
<tr>
<td>High product variety</td>
<td>-1</td>
<td>+2</td>
<td>0</td>
<td>+1</td>
<td>0</td>
<td>+2</td>
</tr>
<tr>
<td>Low customer effort</td>
<td>-2</td>
<td>+1</td>
<td>+2</td>
<td>+2</td>
<td>+2</td>
<td>-1</td>
</tr>
</tbody>
</table>
Supply Chain Facilitators

Third-Party Logistics (3PL)
Logistics outsourcing
Contract logistics
Fourth-party logistics (4PL) primarily used in global companies
Lead logistics provider (LLP)
Managing end-to-end supply chain

Impact of E-Business on Customer Service
❖ Response time
❖ Product variety
❖ Product Availability
❖ Customer experience
❖ Time to market
❖ Order Visibility
❖ Returnability
❖ Direct Sales to Customers
❖ Flexible Pricing, Product Portfolio, and Promotions
❖ Efficient Funds Transfer

A Framework for Network Design Decisions
**Conventional Network**

**Tailored Network: Multi-Echelon Finished Goods Network**

**Free Trade Zones**
- Also called Special Economic Zone (SEZ)
- An area where some normal trade barriers such as tariffs and quotas are eliminated and bureaucratic requirements are lowered
- Non-domestic merchandise may be stored, exhibited, processed or used in manufacturing operations
- Often located close to ports, like Jebel Ali (Dubai), Colon FZ (Panama), Shannon (Ireland)
- Worldwide about 3,000 FTZ's in over 110 countries

**SCM Models**
- Supply Chain Operations Reference (SCOR) - Supply Chain Council
  - 5 processes, open-source benchmarking
- Global Supply Chain Forum (GSCF) - Supply Chain Management Institute
  - 8 processes, own assessment tool
- Process Classification Framework (PCF) – APQC
  - 12 processes, open-source benchmarking
### The Supply Chain Operations Reference (SCOR) Model

<table>
<thead>
<tr>
<th>SCOR Process</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>Processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production, and delivery requirements</td>
</tr>
<tr>
<td>Source</td>
<td>Processes that procure goods and services to meet planned or actual demand</td>
</tr>
<tr>
<td>Make</td>
<td>Processes that transform product to a finished state to meet planned or actual demand</td>
</tr>
<tr>
<td>Deliver</td>
<td>Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management</td>
</tr>
<tr>
<td>Return</td>
<td>Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support</td>
</tr>
</tbody>
</table>

### Barriers to Supply Chain Management

- Regulatory and political considerations
- Lack of top management commitment
- Reluctance to share, or use, relevant data
- Incompatible information systems
- Incompatible corporate cultures
- Globalization

### Globalization of Supply Chains

- Increasing globalization
- Lower priced materials and labor
- Global perspective of companies
- Development of global competition
- Extremely difficult to execute due to differences
  - Cultural, economic, and technological
  - Political, spatial, and logistical

### The cost breakdown of a shirt made in various countries and sold in France

<table>
<thead>
<tr>
<th>Country</th>
<th>Cost in euros</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>15.55€</td>
</tr>
<tr>
<td>Portugal</td>
<td>14.38€</td>
</tr>
<tr>
<td>Turkey</td>
<td>11.49€</td>
</tr>
<tr>
<td>Thailand</td>
<td>11.43€</td>
</tr>
<tr>
<td>Morocco</td>
<td>11.19€</td>
</tr>
<tr>
<td>Romania</td>
<td>10.82€</td>
</tr>
<tr>
<td>China</td>
<td>10.37€</td>
</tr>
<tr>
<td>Myanmar</td>
<td>9.60€</td>
</tr>
</tbody>
</table>

- Labour
- Transport
- Fabric
- Supplies
- Customs duties
The Offshoring Decision: Total Cost

Total cost can be identified by focusing on the complete sourcing process.

Offshoring to low-cost countries is likely to be most attractive for products with:
- High labor content
- Large production volumes
- Relatively low variety
- Low transportation costs

Perform a careful review of the production process.

| TABLE 6-1 Results of Accenture Survey on Sources of Risk That Impact Global Supply Chain Performance |
|----------------------------------|----------------------|------------------|
| Risk Factors                      | Percent Supply Chains Impacted |
| Natural disasters                | 35                    |
| Shortage of skilled resources    | 24                    |
| Geopolitical uncertainty         | 20                    |
| Terrorist infiltration of cargo  | 13                    |
| Volatility of fuel prices        | 37                    |
| Currency fluctuation             | 29                    |
| Port operations/custom delays     | 23                    |
| Customer/consumer preference shifts | 23                |
| Performance of supply chain partners | 38            |
| Logistics capacity/complexity    | 33                    |
| Forecasting/planning accuracy    | 30                    |
| Supplier planning/communication issues | 27            |
| Inflexible supply chain technology | 21                |

Source: Adapted from “Integration: The Key to Global Success,” Jaime Ferre, Johann Kurberg, and Jamie Hultman, Supply Chain Management Review (March 2007) 24-30.

Risk Management in Global Supply Chains

Combining strategic planning and financial planning during global network design.

Use multiple metrics to evaluate global supply chain networks.

Use financial analysis as an input to decision making, not as the decision-making process.

Make an estimate along with sensitivity analysis.

Making Global Supply Chain Design Decisions Under Uncertainty in Practice

Table 6-2: Dimensions to Consider When Evaluating Total Landed Cost from Offshoring

<table>
<thead>
<tr>
<th>Performance Dimension</th>
<th>Activity Impacting Performance</th>
<th>Impact of Offshoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order communication</td>
<td>Order placement</td>
<td>More difficult</td>
</tr>
<tr>
<td>Supply chain visibility</td>
<td>Scheduling and expediting</td>
<td>Poorer visibility</td>
</tr>
<tr>
<td>Raw material costs</td>
<td>Sourcing of raw material</td>
<td>Caused by</td>
</tr>
<tr>
<td>Unit cost</td>
<td>Production, quality (production</td>
<td>Material sourcing</td>
</tr>
<tr>
<td></td>
<td>and transportation)</td>
<td>Labor intensive</td>
</tr>
<tr>
<td>Freight costs</td>
<td>Transportation modes and quantity</td>
<td>Higher costs</td>
</tr>
<tr>
<td>Taxes and tariffs</td>
<td>Tax paid on import</td>
<td>Could go either way</td>
</tr>
<tr>
<td>Supply lead time</td>
<td>Order communication, supplier</td>
<td>Lead time increase</td>
</tr>
<tr>
<td></td>
<td>production scheduling, production time, customs, transportation, receiving</td>
<td>results in poor forecasts and higher inventories</td>
</tr>
<tr>
<td>On-time delivery time</td>
<td>Quality, customs, transportation, receiving</td>
<td>Lower on-time delivery and increased uncertainty results in higher inventory and lower product availability</td>
</tr>
<tr>
<td>Minimum order quantity</td>
<td>Production, transportation</td>
<td>Large minimum order quantities increase inventory</td>
</tr>
<tr>
<td>Product returns</td>
<td>Quality</td>
<td>Increased returns likely</td>
</tr>
<tr>
<td>Inventories</td>
<td>Lead times, inventory in transit and production</td>
<td>Increase</td>
</tr>
<tr>
<td>Working capital</td>
<td>Inventories and financial</td>
<td>Increase</td>
</tr>
<tr>
<td>Hidden costs</td>
<td>Order communication, moving errors, managing exchange rate risk</td>
<td>Higher hidden costs</td>
</tr>
<tr>
<td>Stock-outs</td>
<td>Ordering, production, transportation with poor visibility</td>
<td>Increase</td>
</tr>
</tbody>
</table>