Transportation involves the physical movement of goods between origin and destination points.

The transportation system links geographically separated facilities in a company’s supply chain.

Transportation facilitates the creation of time and place utility.

Transportation also has a major economic impact on the financial performance of businesses.
Role of Transportation in Supply Chain Management

Transportation is a key supply chain process that must be included in supply chain strategy development, network design, and total cost management.

- Transportation provides the critical links between supply chain partners, permitting goods to flow between their facilities.
- Transportation service availability is critical to demand fulfillment in the supply chain.
- Transportation efficiency promotes the competitiveness of a supply chain.
Challenges to carrying out transportation’s role

- Supply chain complexity
- Competing goals among supply chain partners
- Changing customer requirements
- Limited information availability
- Synchronizing transportation with other supply chain activities
- Transportation capacity constraints and rising transportation rates
- Changing governmental requirements that affect cost and service
- Growing safety and environmental regulation
Modes of Transportation

- truck
- rail
- air
- water
- pipeline
- multimodal transportation
Multimodal Transportation

Movement of goods (in the same loading unit) through successive modes of transport without further handling

- Use the best features of different modes
- Expands accessibility
- Facilitates global trade
- Standardized containers promotes multimodal growth
- Serves as an effective bridge for rail system gaps
  - Disjointed rail network
  - Break of gauge
Multimodal Transportation – Cost/Distance Graph

- Intermodal transfer, road to rail
- Rail
- Sea
- Port handling charge
- Sea Port
- Inland Waterway
- Transhipment to barge
- River Terminal
- Road
- Unloading

Costs vs Distance graph showing the cost progression from origin (ICD) to destination (unloading), with modal transfers and handling charges at different stages.
# Terms of Sale & Responsibilities

## Table 10-2: Key Responsibilities Under FOB and Freight Payment Terms

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>FOB Origin, Freight Collect</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Buyer</td>
</tr>
<tr>
<td>FOB Origin, Freight Prepaid</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
</tr>
<tr>
<td>FOB Origin, Freight Prepaid &amp; Charged Back</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Seller</td>
<td>Buyer</td>
<td>Seller</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The seller adds freight costs to</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>goods invoice.</td>
<td></td>
</tr>
<tr>
<td>FOB Destination, Freight Prepaid</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
<td>Seller</td>
</tr>
<tr>
<td>FOB Destination, Freight Collect</td>
<td>Seller</td>
<td>Seller</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Buyer</td>
</tr>
<tr>
<td>FOB Destination, Freight Collect &amp; Allowed</td>
<td>Seller</td>
<td>Seller</td>
<td>Buyer</td>
<td>Buyer</td>
<td>Buyer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The buyer deducts freight cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>from goods payment.</td>
<td></td>
</tr>
</tbody>
</table>
Modal Characteristics

- Accessibility
  - Motor transportation has advantage over air, rail, and water

- Transit Time
  - Air and motor transportation has advantage over rail, water, and pipeline

- Reliability
  - Motor carriers and air carriers are generally more reliable than water carriers and rail carriers

- Product Safety
  - Goods suffered less damage when transported by air and motor, as compare to rail and water

- Cost
  - Motor and air transportation are more expensive than rail and water transportation
Modal Selection Criteria

- Cost
- Speed
- Durability of cargo
- Cargo value
- Route
- Cargo security and safety
- Equipment availability
- Cargo characteristics (e.g. oversize, dangerous goods)
- Difference in border management process (e.g. rail shipments generally have less cross border delays)
Carrier Selection Trend

- Core carrier concept
  - Long term relations with a small number of carriers
  - Leverage purchasing dollars to drive down transport cost and secure capacity and service quality commitments from carrier
  - Reduce carrier management cost and optimize dock space usage
  - Improve IT connection, get better track and trace ability
Transportation Rate & Service Negotiation Recommendations

- Centralize contract negotiations
- Leverage volume with a small number of carriers
- Develop contracts for tailored set of transportation services at specific prices and specific duration
- Achieve mutual productivity improvements, then get a share of carrier’s gains
Preparing Shipments for Transportation

- **Corporate transportation routing guide**
  - Ensures compliance with service contracts
  - Maintain centralized control over internal and external freight routing & tendering decisions

- **Cost-saving actions**
  - Consolidate freight
  - Coordinate shipment deliveries
  - Take full advantage of equipment capacity
  - Make accurate freight count
  - Inspect and note cargo loss & damage
Freight Documents

Bill of lading
- Originates the shipment
- Provides all the information the carrier needs
- Stipulates the contract terms, including carrier’s liability for loss and damage
- Acts as a receipt for the goods the shipper tenders to the carrier
- Certificate of title to goods in some cases (Order Bill of Lading)

Freight bill
- Carrier’s invoice for services provided
- Lists shipment origin & destination, address of shipper & consignee, itemizes cargo, total weight & total charges
Freight claims form

- Filed with the carrier to recoup monetary losses if carrier fails to properly protect the shipment.
- Carriers are not liable for freight claims if the damage is attributable to:
  - Natural disaster or some other “act of God”
  - Military attack or similar “act of public enemy”
  - Government seizure of freight or “act of public authority”
  - Failure to adequately package the freight or other negligent “act of the shipper”
  - Extreme fragility, perishability, or similarly problematic “inherent nature of the goods”
Transportation Performance Metrics

- Key performance indicators (KPI) are used to evaluate
  - current performance versus historical results
  - internal goals
  - carrier commitments

- Challenge lies in narrowing down available metrics to a manageable number of KPI
- KPI should encompass service quality and efficiency
## Common metrics for monitoring carrier performance

### Table 10-5: Transportation Performance Scorecard

<table>
<thead>
<tr>
<th>PERFORMANCE CRITERIA</th>
<th>WEIGHT FACTOR</th>
<th>PERFORMANCE EVALUATION</th>
<th>POTENTIAL SCORE</th>
<th>CRITERIA SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-time delivery</td>
<td>8</td>
<td>&gt;98% = 5</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>96.01–98% = 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>94.01–96% = 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>92.01–94% = 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;92% = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss and damage rate</td>
<td>5</td>
<td>&lt;0.5% = 5</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5–1% = 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1–1.5% = 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5–2% = 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;2% = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Billing accuracy</td>
<td>3</td>
<td>&gt;99% = 5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>97–99% = 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>95–96% = 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;95% = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment condition</td>
<td>2</td>
<td>Safe, clean, correct type = 5</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor condition, incorrect = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer service</td>
<td>2</td>
<td>Superior = 5</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Good = 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average = 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fair = 2</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Unacceptable = 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td></td>
<td><strong>100</strong></td>
<td></td>
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</tr>
</tbody>
</table>
Transportation Management System (TMS)

- Critical applications include the following:
  - Routing and shipment scheduling
    - Proper routing & scheduling impact customer satisfaction & supply chain performance
  - Load planning
    - Preparation for safe, efficient deliveries
  - Load tendering
  - Delivery appointment scheduling
  - In-Transit Visibility
Maintain In-Transit Visibility

- Manage key events as product moves across the supply chain
- Information technology facilitates the ability to monitor product movements
- Visibility tools must be linked to other capabilities and processes to have an impact on supply chain event management