

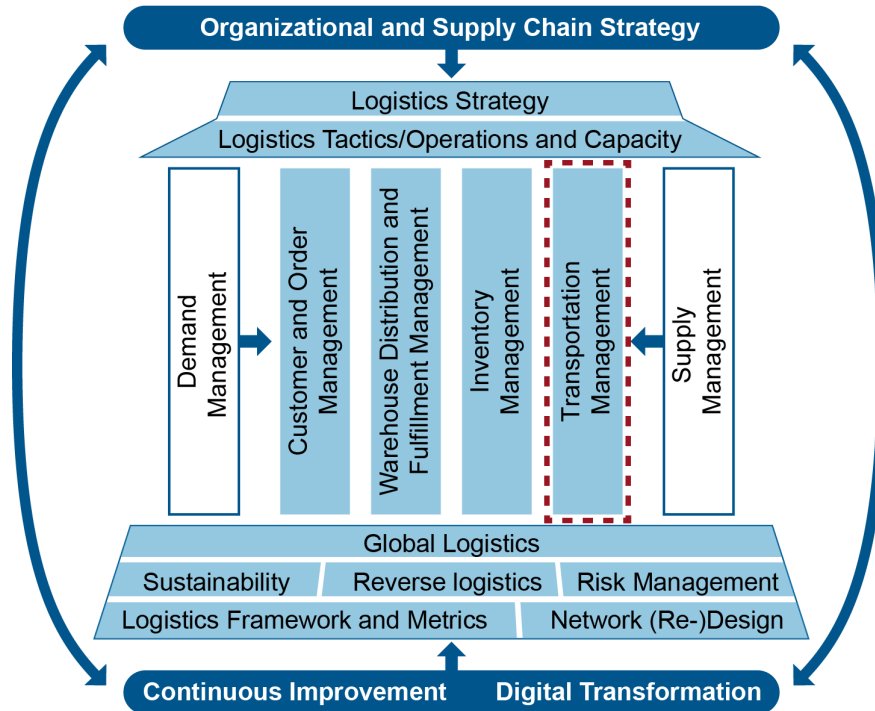
# CLTD

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TRANSPORTATION AND DISTRIBUTION

## MODULE 6: TRANSPORTATION MANAGEMENT

# Module 6: Transportation Management

## Module 6 Overview



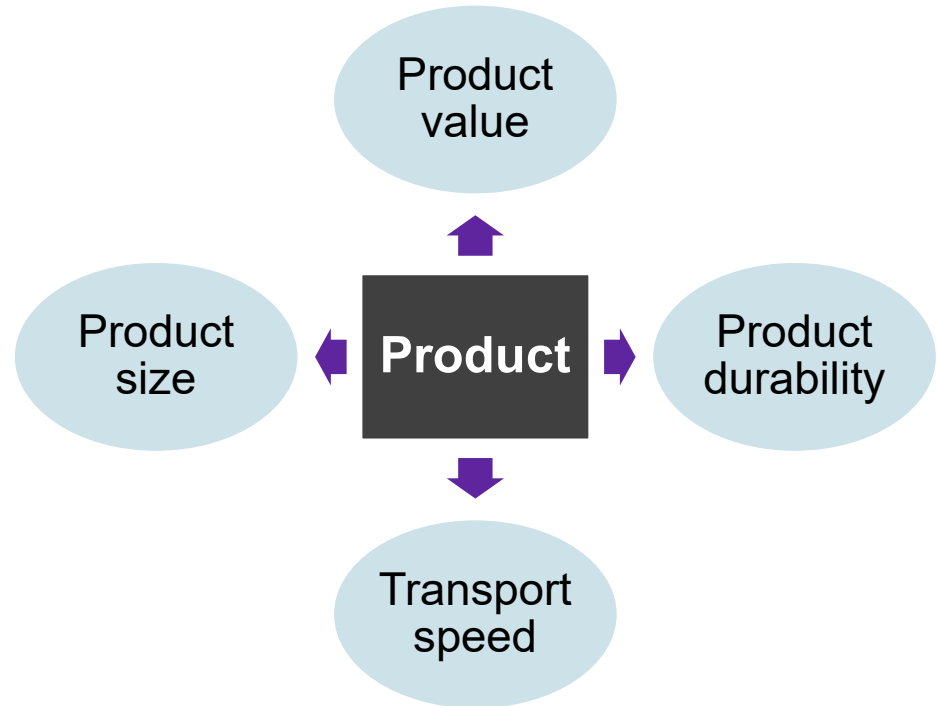
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## MODULE 6, SECTION A: UNDERSTAND TRANSPORTATION FUNDAMENTALS

## Transportation and Mode Selection

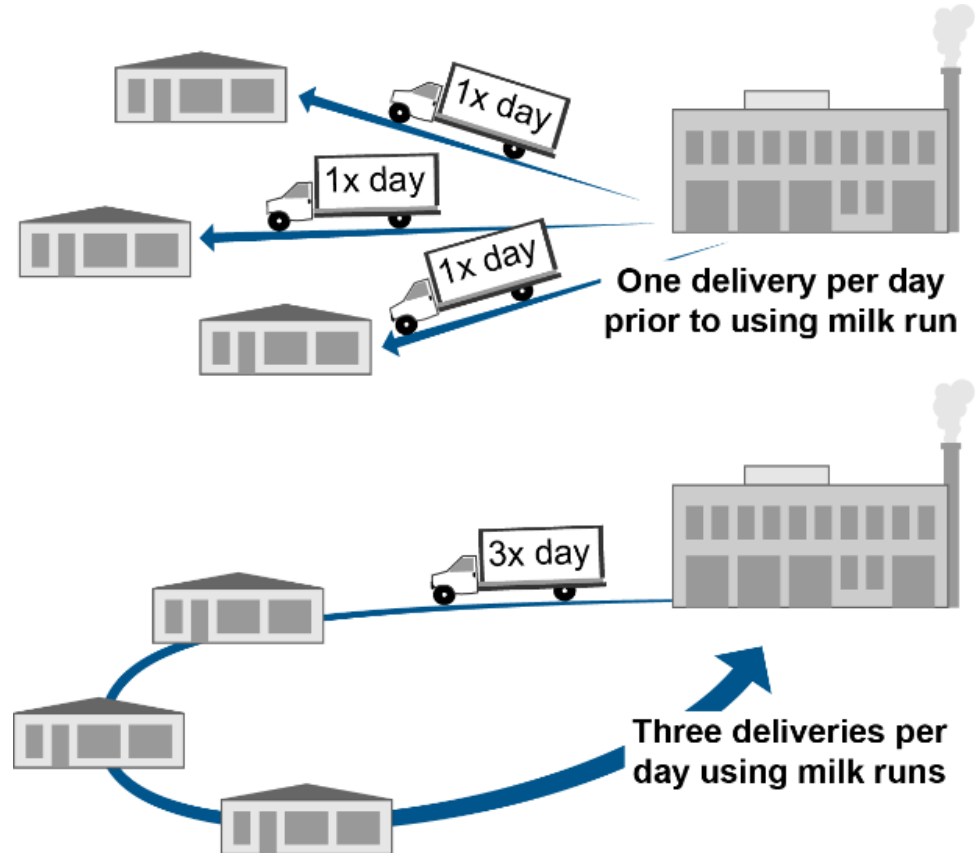
- Economy of scale
- Economy of distance
- Cost of velocity
- Cost-effective transport widens profitable sales range



# Understand Transportation and Transportation Cost Structure

## Terminals

- Pickup and delivery (PUD)
  - Hub-and-spoke
  - Milk run
- Break-bulk
- Relay
- Cross-docking



## Asset-Based or Not

- Asset-based: owned or leased
- Non-asset-based: Brokers
- Vehicle costing provides
  - Vehicle details and fleet performance to control operations
  - Timely information on vehicle cost trends to allow for changes

# Understand Transportation and Transportation Cost Structure

## Costing



Human resources—vehicle drivers



Machinery—vehicles



Materials—associated materials (tires, fuel, etc.)



Money—resource costs



Minutes—resource use/purpose(s)

## Private Trucking

### Pros



- Greater control
- Better service
- Guaranteed capacity
- Schedule flexibility/convenience
- Design fleet for specific needs
- Low cost if high utilization
- Security

### Cons



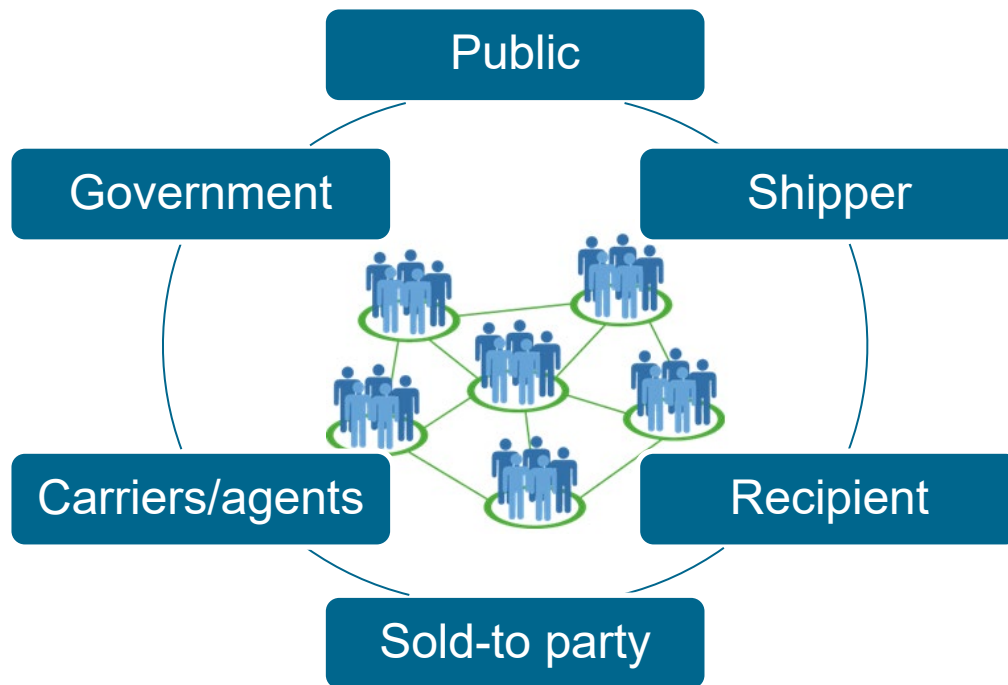
- Higher capital expenses
- Ongoing maintenance
- Scheduling/routing
- Increased liability
- Labor union dependent
- Capacity in peak seasons



## Outsourcing Transportation

- No capital cost of starting and maintaining private fleet
- Reduces or eliminates risks
  - Accident liability
  - Regulations compliance
  - Unions

## Transportation Stakeholders



## Load Transport: Product Movement

Goods to destination while minimizing expenses and environmental impact

Freight  
services

Terminal  
services

Loading/  
unloading

Value-added

Documentation

Diversion and  
reconsignment

## Product Storage

### Transport mode

- Common to store products in trailers, containers, etc.
- Usually only for short time, as cost is high

### In-transit storage

- Often used when there is a space shortage at receiver's warehouse

## Asset-Based or Non-Asset-Based Carriers?



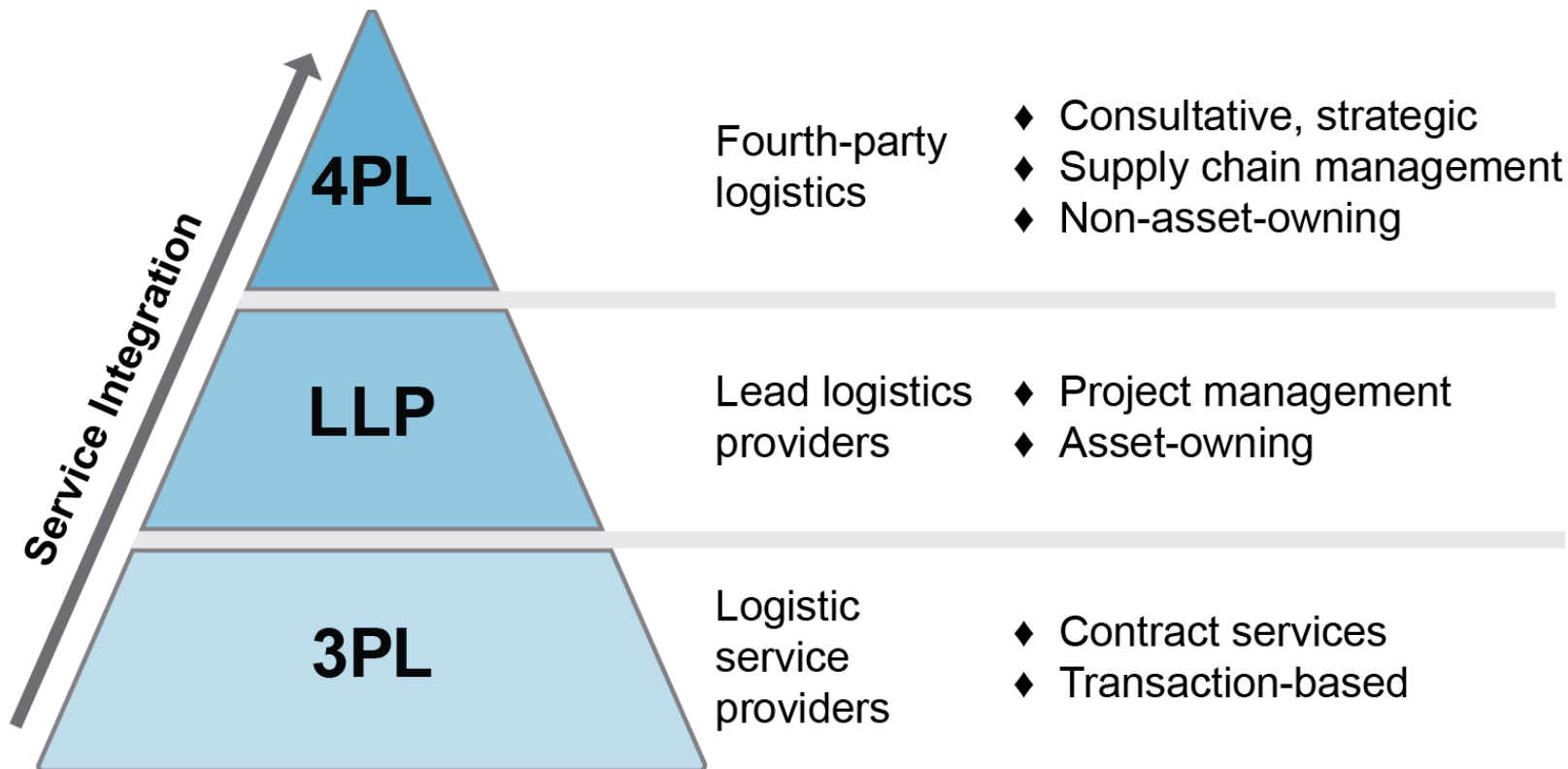
Sufficient support with existing assets?

Can flex services up or down based on market?

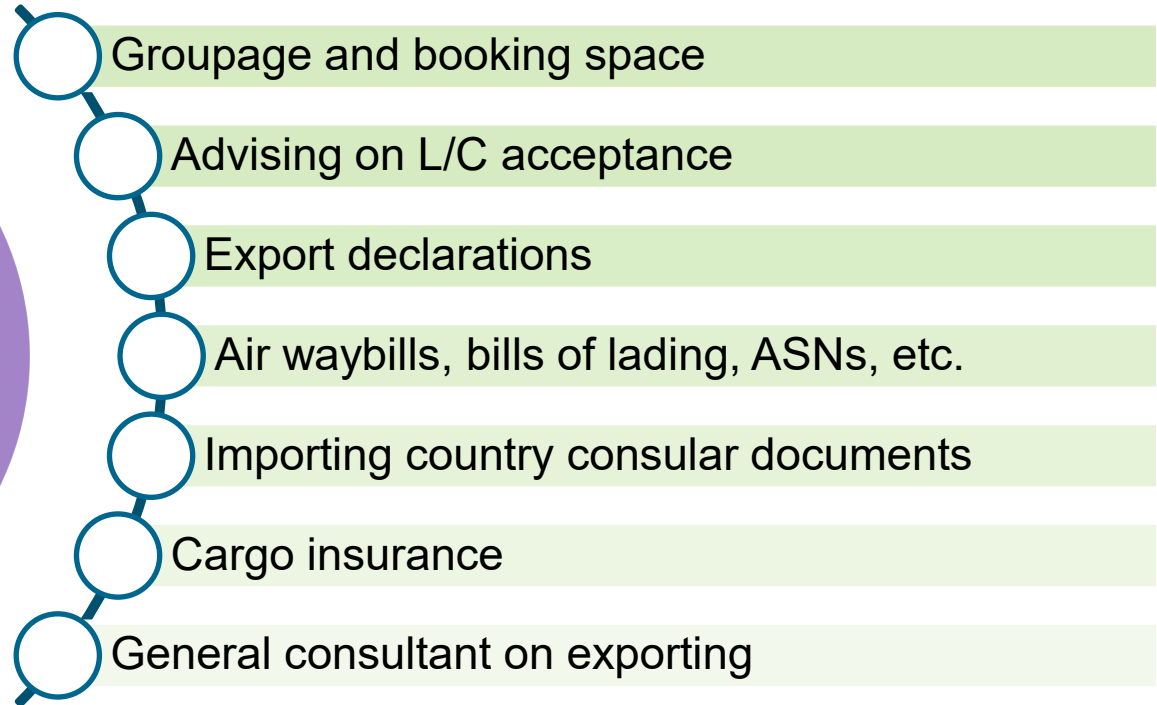
History of saving money for clients (e.g., asset utilization)?

Current capacity?

## Service Provider Structure



## International Freight Forwarder (IFF) Functions



## Broker Roles in Transportation

### Freight broker

- Finds carriers
- Doesn't take possession (unlike forwarder)
- Negotiates terms
- Documentation

### Customs broker

- Tracks and moves through proper channels
- International shipping documents

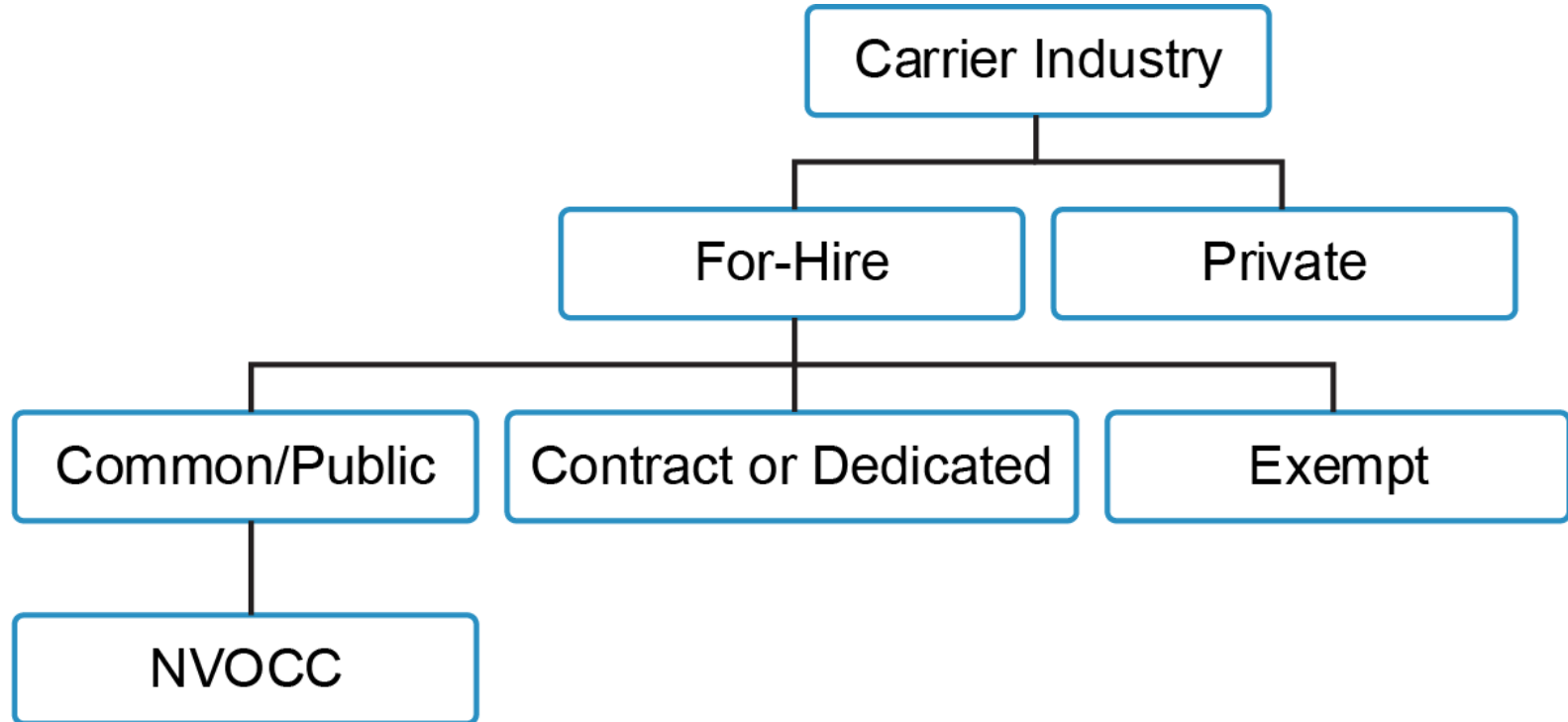


## Other Transport Intermediaries

- Export management company (EMC)
- Export trading company (ETC)
- Shipping associations
- Shipper's agents
- Export packing companies

# Differentiate Between Various Carrier Types

## Carrier Types



# Understand Modes of Transportation

## Fixed and Variable Costs of Modes

### Fixed costs













- Costs that do not change with the volume of goods transported.
  - Land
  - Facilities
  - Equipment
  - Salaries if not paid according to amount of cargo or distance traveled

### Variable costs

- Costs that fluctuate with the volume moved.
  - Fuel
  - Maintenance
  - Border-crossing fees
  - Hourly rates or wages based on distance traveled

# Understand Modes of Transportation

## Industry Cost Overview

Mode	Fixed Costs	Variable Costs
Road	Low 	High 
Rail	High 	Low 
Air	Low 	High 
Water	Low 	High 
Pipeline	High 	Low 
Multimodal	Varies	Varies
Parcel, courier, express	Low 	High 

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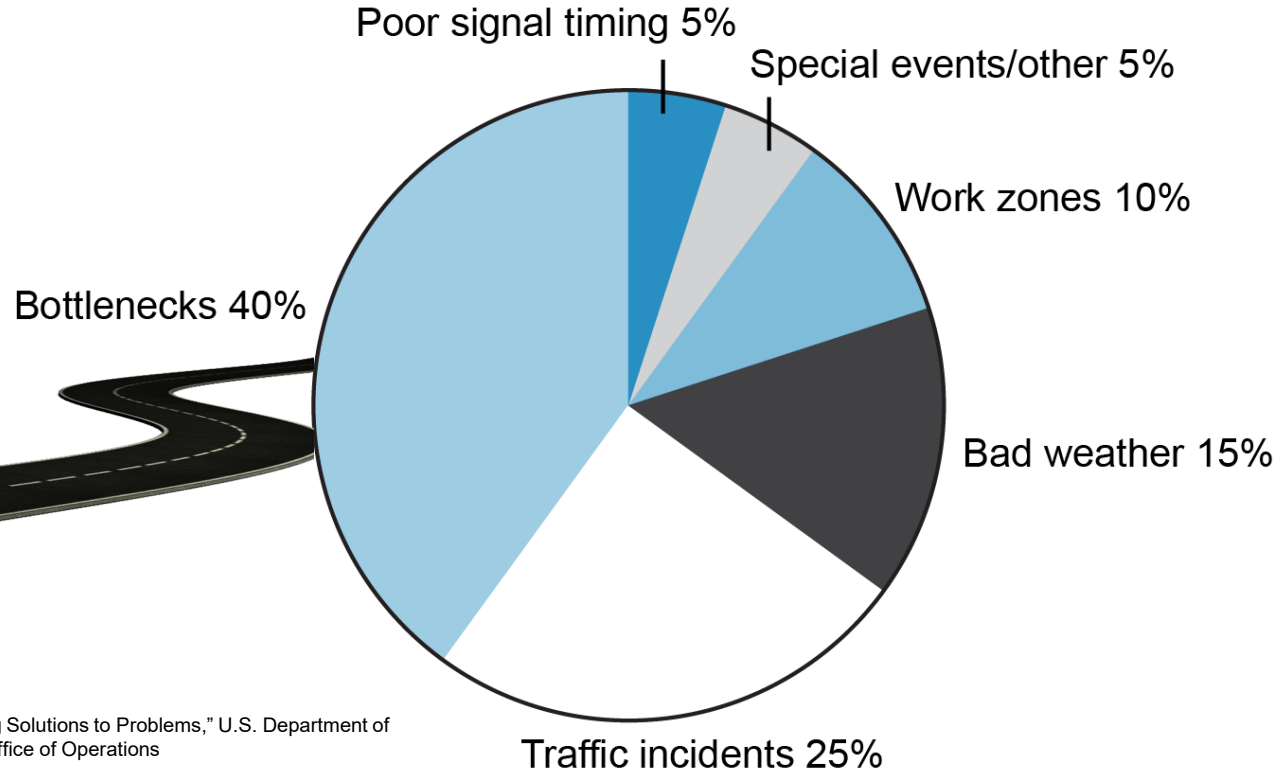
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## MODULE 6, SECTION B: IDENTIFY ROAD TRANSPORTATION CHARACTERISTICS

# Understand Road Infrastructure

## Infrastructure and Sources of Road Congestion

- Highways
- Other roads
- Terminals



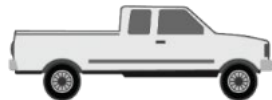
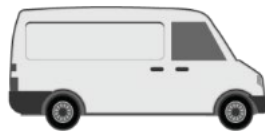
Source: "Traffic Congestion and Reliability: Linking Solutions to Problems," U.S. Department of Transportation, Federal Highway Administration Office of Operations

# Identify Road Vehicle and Trailer Types

## Common Road Vehicles: Single Units



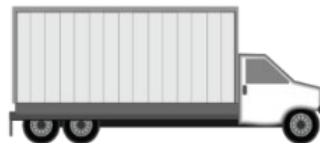
Motorcycles



Pickups,  
panels, vans



2-axle trucks



3-axle trucks



4+-axle trucks

# Identify Road Vehicle and Trailer Types

## Truck-Trailer Combinations (Semis)



Single trailer  
(3 or 4)



Single trailer  
(5+)



Single trailer  
(6+)



Multi-trailer (5  
or fewer)



Multi-trailer (6)



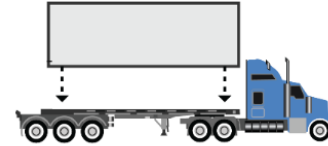
Multi-trailer  
(7+)



Auto carrier



Gooseneck  
trailer



Skeletal trailer



# Consider Road Service Types

## Freight Rate

Established price for transport, based on distance, weight, measure, equipment type, package, commodity, etc.

- Rate often refers to the price per unit weight (e.g., per hundredweight)
- Products grouped into uniform classifications based on similar
  - Density
  - Handling requirements
  - Stowability
  - Value characteristics
  - Liability

# Consider Road Service Types

## Freight Classifications

### **LTL** **Less-than-truckload**

Shipment will not use entire cargo capacity.

### **TL or FTL** **Full Truckload**

Shipment uses full cargo capacity.

### **Small parcel** **Specialized carriers**

Multiple shipments on single vehicle.

### **Cartage** **Local, short-haul, and delivery**

Move pallets in short hauls from origin to destination.

## Types of Services

### Local

- Local pickup—when a company uses multimodal transport
- Local delivery—from warehouse/carrier to final destination

### Multi-stop

- Serves more than one customer
- May be multiple stops along route

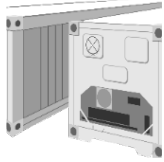
### In-bond

- Origin in one country to destination in another

### Line haul

- Drive between home terminal and reshipment terminal

## Operating and Service Characteristics



Capability

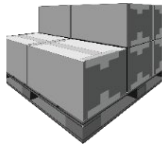


Accessibility

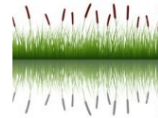
Cost  
structure



Flexibility



Capacity



Environmental

Speed



Safety



## Cost Structure: Operating Ratio

$$\text{Operating Ratio} = \frac{\text{Operating Expenses}}{\text{Operating Revenue}} \times 100$$

Operating expenses:

- Fuel
- Truck and trailer lease or purchase payments
- Vehicle repair and maintenance
- Truck insurance premiums
- Permits and special licenses
- Tolls
- Driver wages and benefits

# Consider Road Issues and Challenges

## Issues and Challenges



Environmental  
impact

Capacity  
management

Cyclical/seasonal  
markets

Operating  
restrictions



Labor disputes

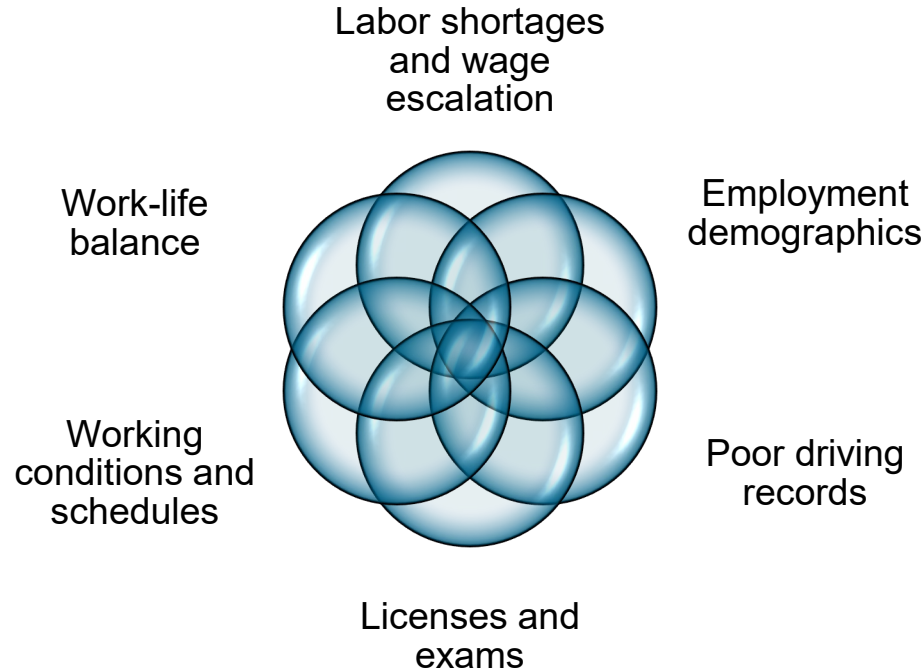
Hours of service

Security

Congestion

# Consider Road Issues and Challenges

## Capacity Management: Truck Driver Issues



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## MODULE 6, SECTION C: IDENTIFY RAIL TRANSPORTATION CHARACTERISTICS



# Understand Rail History and Infrastructure

## Railroad Infrastructure and International Rail Use

- Rail infrastructure
  - Switching yards
  - Rights of way
  - Terminals, depots, power
- Internationally, unlinked national rail systems:
  - Penetration lines
  - Regional networks
  - Transcontinental lines



# Identify Types of Operations

## Types of Freight

Food  
ingredients

Livestock

Farm products

Construction  
materials

Nonmetallic  
materials

Mined goods

Chemicals

Transportation  
equipment

Break-bulk  
goods

Bulk goods

# Identify Types of Operations

## Types of Railcars



Boxcar



Hopper car



Flatcar



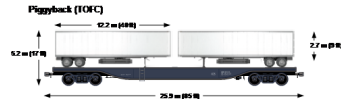
Tank car



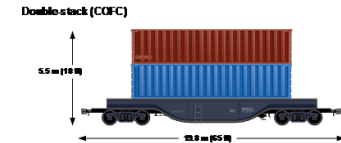
Refrigerated  
car



Gondola car



TOFC



COFC

## Rail Cost Structures

### Variable costs

- Labor
- Fuel
- Power

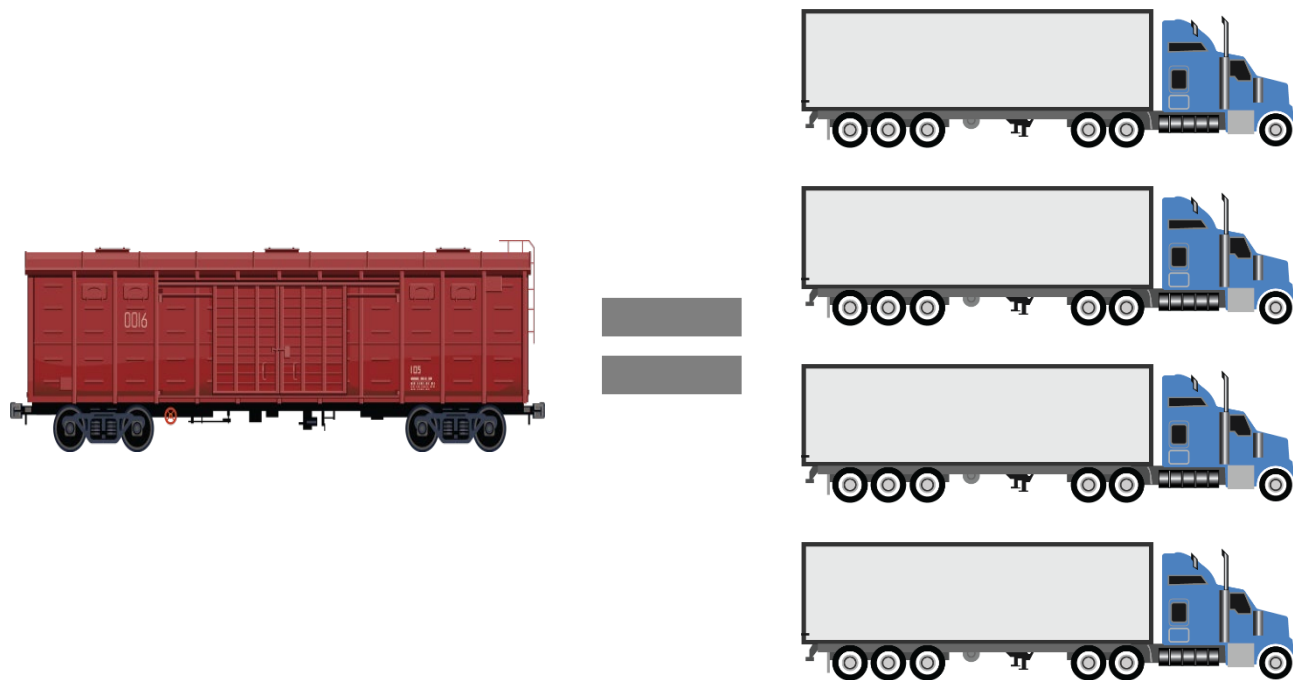
### Semi-variable costs

- Maintain rights of way
- Terminal structures
- Equipment

### Fixed costs

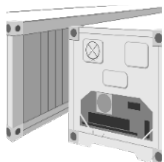
- Property taxes
- Building maintenance
- Equipment maintenance

## Rail Transport Capacity



# Identify Rail Market Structure and Operating/Service Characteristics

## Operating and Service Characteristics



Capability

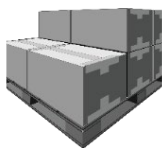


Accessibility

Cost  
structure



Flexibility



Capacity



Environmental

Speed



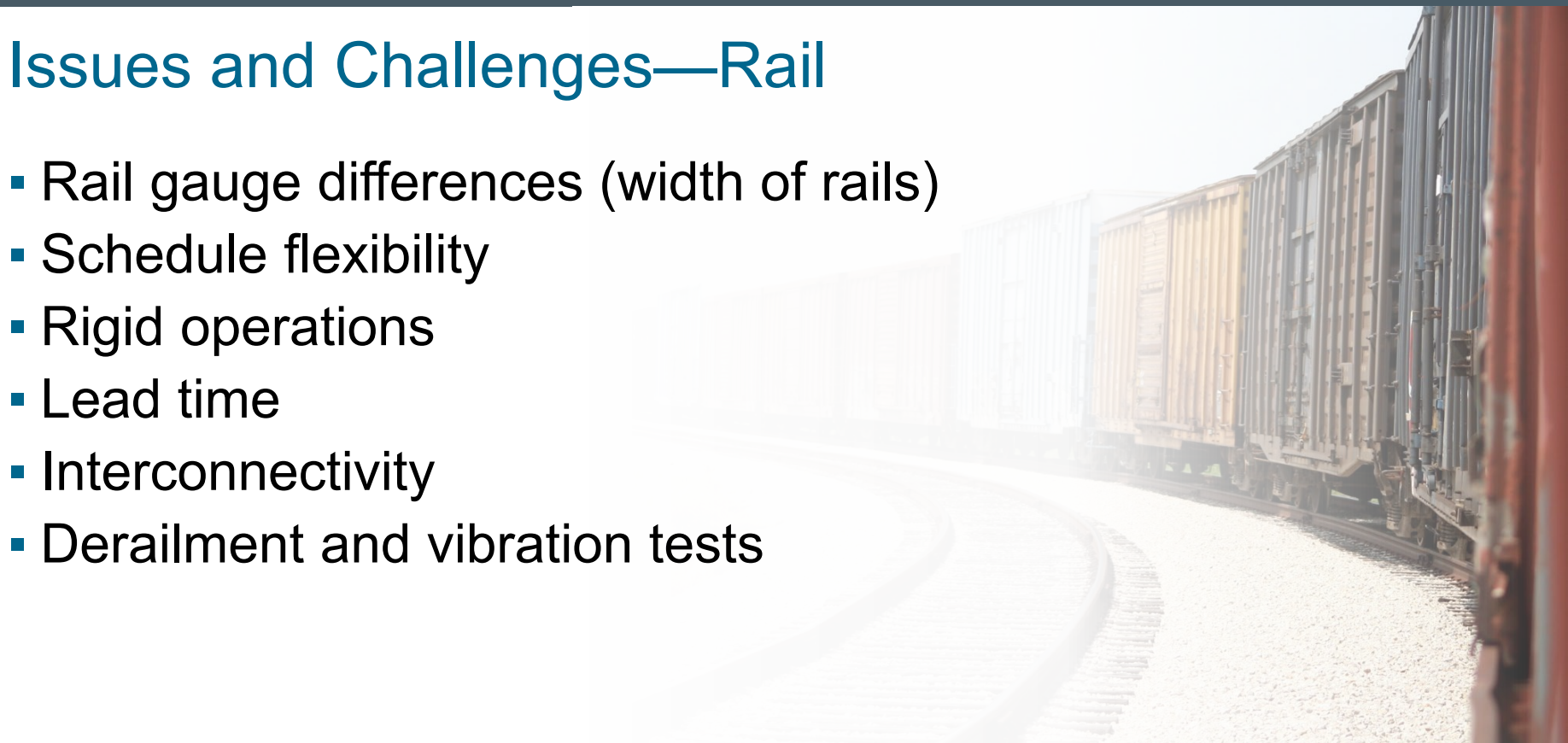
Safety



# Consider Rail Issues and Challenges

## Issues and Challenges—Rail

- Rail gauge differences (width of rails)
- Schedule flexibility
- Rigid operations
- Lead time
- Interconnectivity
- Derailment and vibration tests



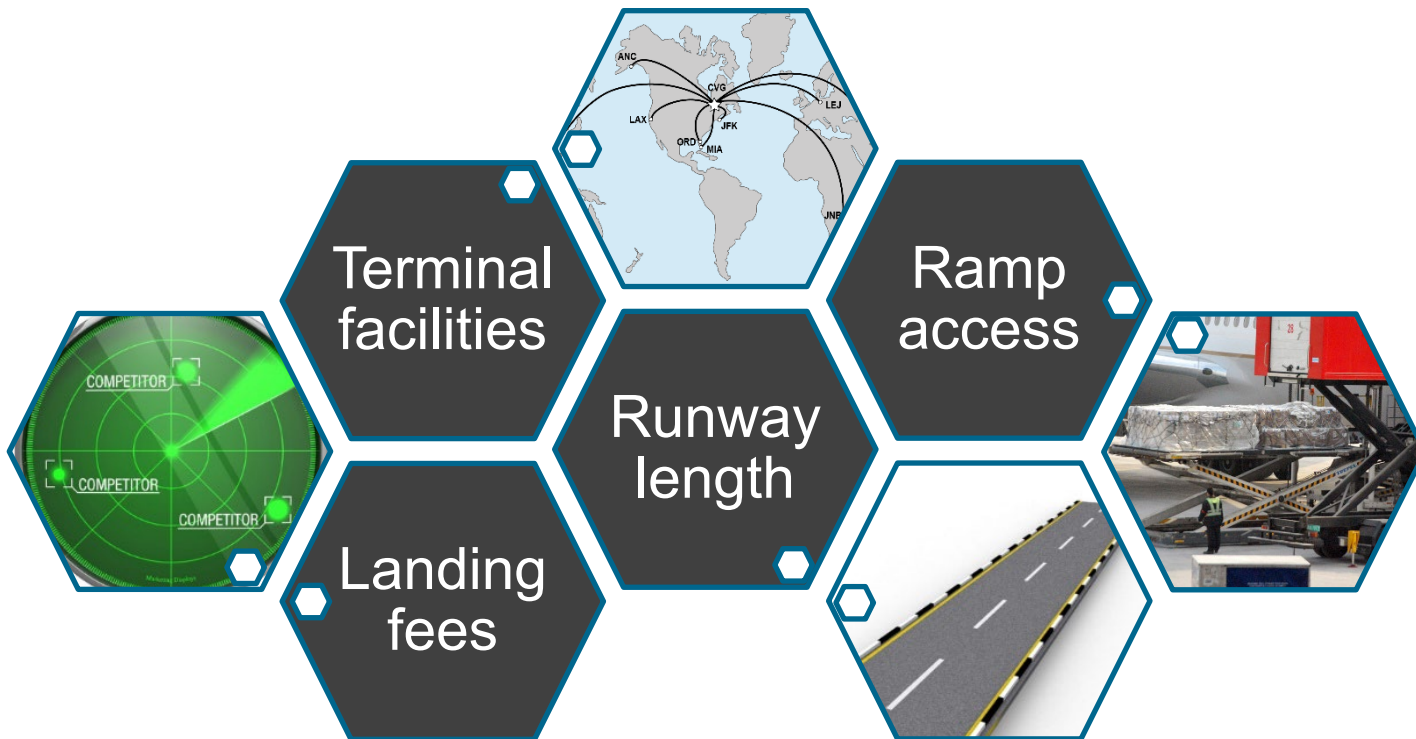
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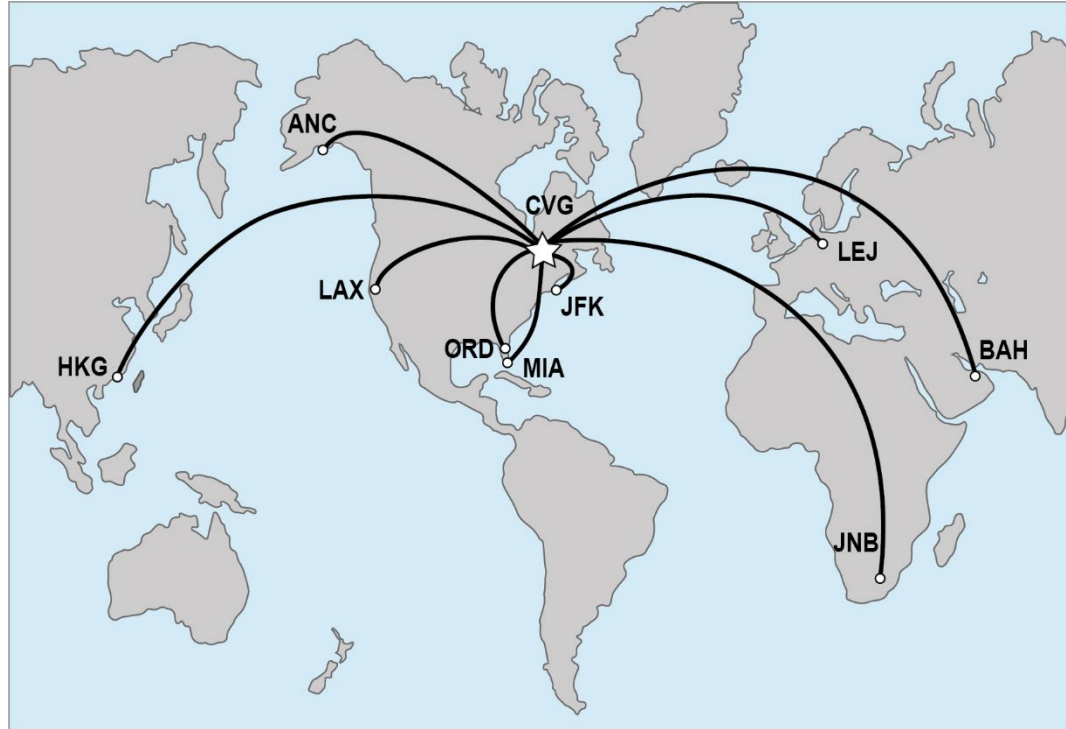
## MODULE 6, SECTION D: IDENTIFY AIR TRANSPORT CHARACTERISTICS



## Air Transport Infrastructure Considerations



## Hub-and-Spoke Model: DHL Example (Abridged)



## Types of Carriers: Combination Carriers

Freight and passengers

Freight on main deck and in hold

Freight can be bumped (passenger luggage)

## Types of Carriers: Air Cargo Carriers

Letters, envelopes, packages, and freight

Integrated: door-to-door service

Nonintegrated carriers: air-only services

Scheduled flights to fixed destination carriers

## Aircraft Body Types

Either of the following body types can be combination passenger and cargo or cargo-only:

- Narrow body
- Wide body

Larger specialized aircraft exist for project cargo.

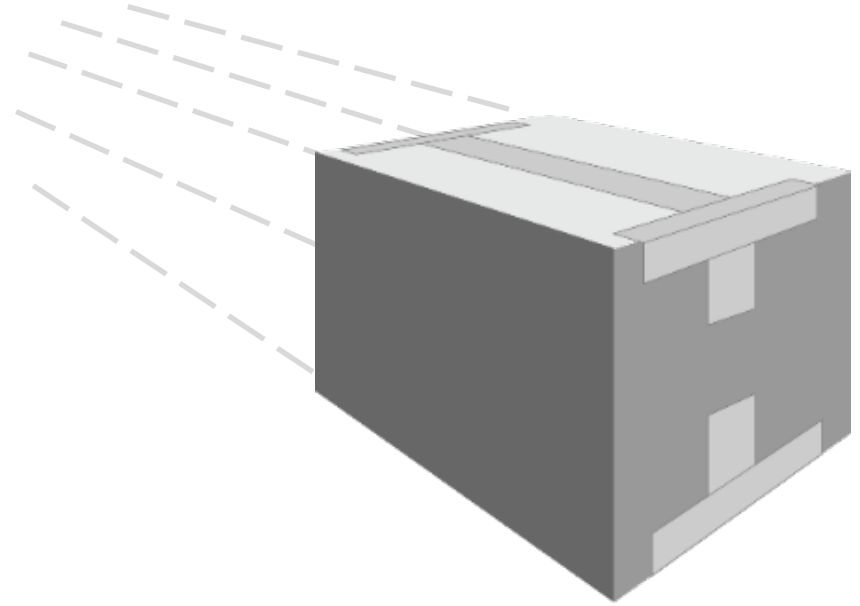
## Unit Load Devices (ULDs)



# Identify Air Market Structure and Sales Strategy

## Market Structure

- Air transport is used for
  - Urgency
  - Practicality
- Main benefit is delivery speed.



# Identify Air Market Structure and Sales Strategy

## Air Freight Transport

- Perishable goods available all year
- Critical equipment available on short notice
- Humanitarian aid delivered quickly and effectively



- Aircraft dimensions limit cargo size and weight
- Air safety and security limit types of cargo
- Air cargo has high unit cost
- Carbon footprint





# Identify Air Market Structure and Sales Strategy

## Rates: Dimensional Weight

- Greater of weight or dim weight
- Dimensional Weight= 
$$\frac{L \times W \times H}{\text{Artificially Selected Number}}$$
- Artificially selected number:
  - UPS: 166 cubic inches/pound for domestic
  - FedEx: 139 cubic inches/pound

## Operational Efficiency: Load Factor

- Load factor is operating efficiency metric: percentage of plane's capacity used
- Load Factor =  $\frac{\text{Cargo Volume}}{\text{Cargo Space}} \times 100$

# Identify Air Operating/Service Characteristics

## Operating and Service Characteristics



Cost structure

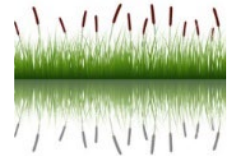


Accessibility/  
flexibility

Capacity: Lanes  
per week



Environmental



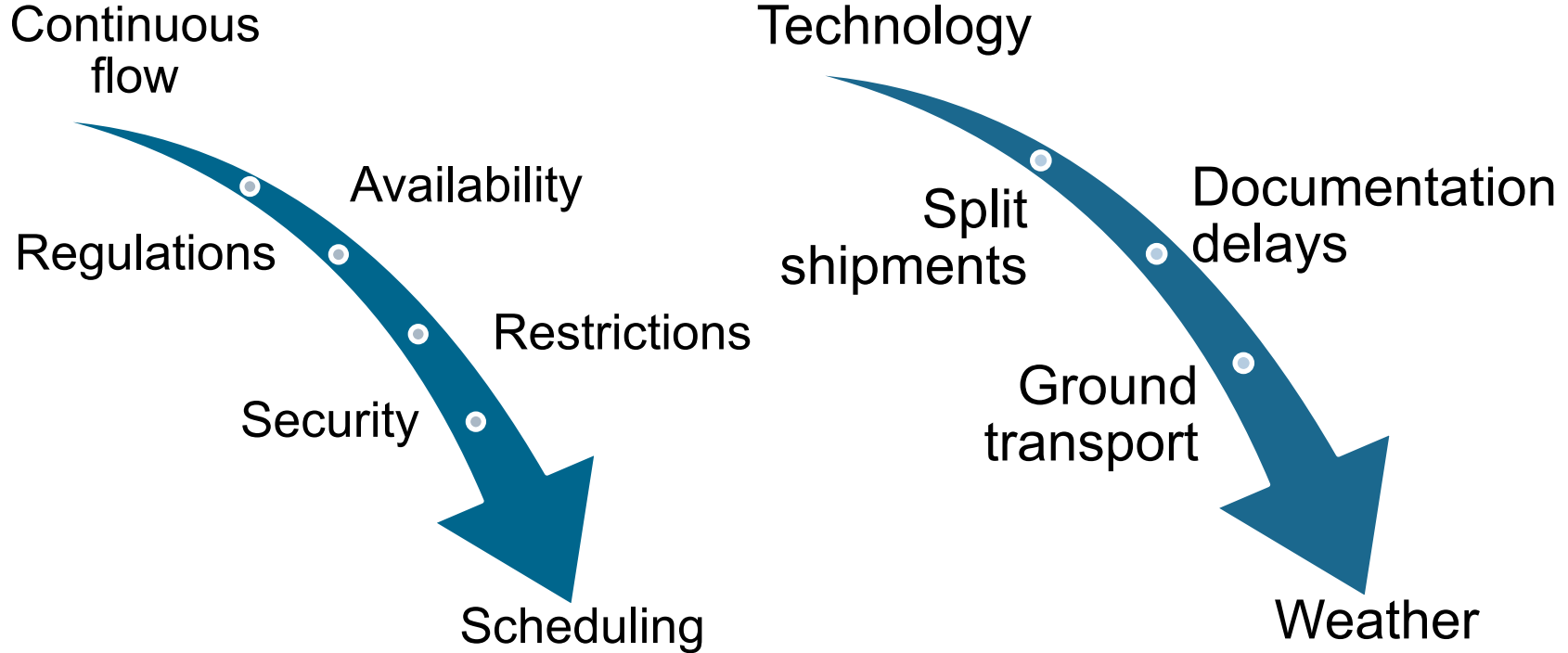
Speed



Safety

# Consider Air Issues and Challenges

## Issues and Challenges

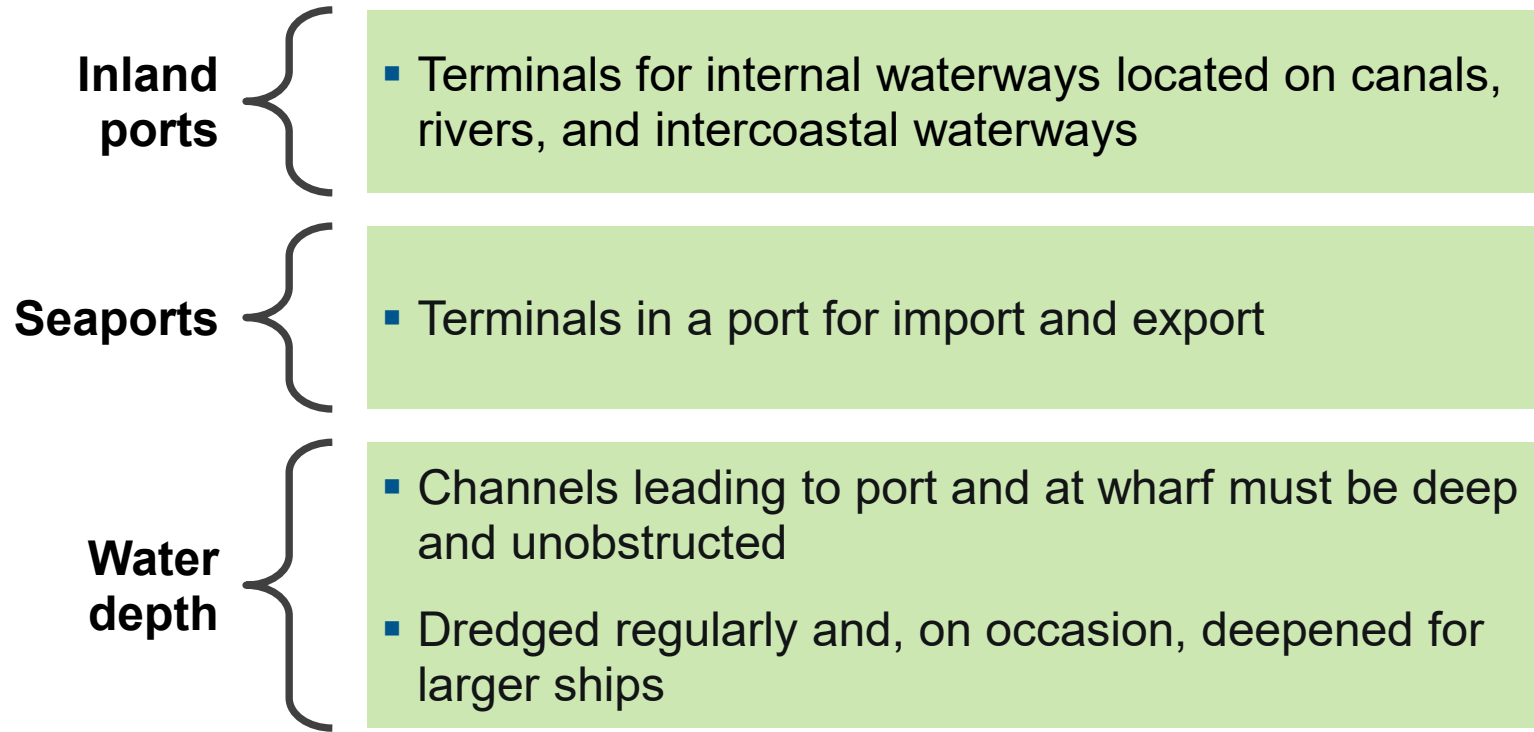


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## MODULE 6, SECTION E: IDENTIFY WATER (OCEAN AND INLAND WATERWAY) TRANSPORTATION CHARACTERISTICS

## Water Transport Infrastructure



## Water Service Types

### **LCL**

- Less-than-container load
- Less than cubic volume or weight capacity; shipped with other LCL cargo

### **FCL**

- Full-container load
- Close to volume or weight limits; only one shipper's order

### **Bulk or break-bulk**

- Bulk: loose, scooped, vacuumed, pumped, e.g., crude oil, grain
- Break-bulk: Large mass and volume, e.g., steel coils
- Uses capacity with high efficiency but risk of theft, contamination, and spillage

# Identify Types of Carriers and Water Vessel Types

## Types of Carriers

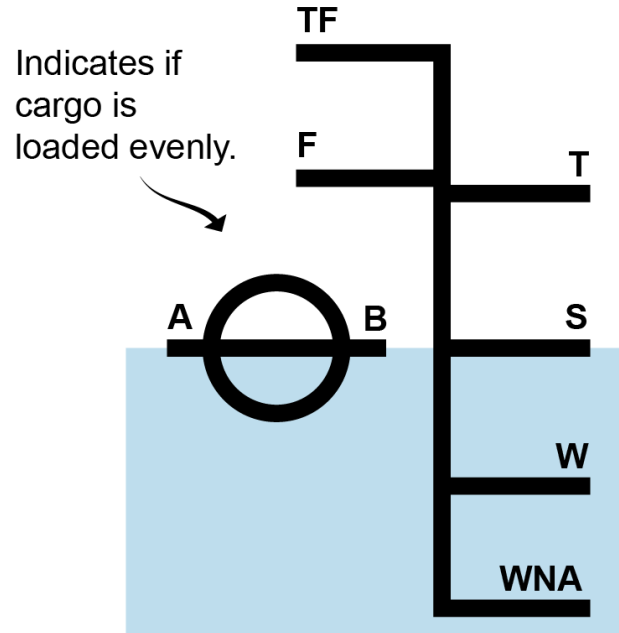
<b>Liner carriers</b>	<ul style="list-style-type: none"><li>▪ Regularly scheduled voyage</li><li>▪ Multiple regular stops make a string</li></ul>
<b>Charter carriers</b>	<ul style="list-style-type: none"><li>▪ Contract basis, no standard schedules or specific routes<ul style="list-style-type: none"><li>▪ Voyage charter</li><li>▪ Time charter</li><li>▪ Bareboat or demise charter</li></ul></li></ul>
<b>Private carriers</b>	<ul style="list-style-type: none"><li>▪ Used to lower costs or increase control</li></ul>
<b>Common carriers: VOCCs</b>	<ul style="list-style-type: none"><li>▪ Asset-based, operates own vessels</li><li>▪ Responsible for cargo from origin to destination</li></ul>
<b>Common carriers: NVOCCs</b>	<ul style="list-style-type: none"><li>▪ Non-asset-based ocean freight consolidator</li><li>▪ Issues its own bills of lading</li><li>▪ Buys multiple container berths and sells in increments.</li></ul>



# Identify Types of Carriers and Water Vessel Types

## Weights and Measures

- Charges based on weight (tonnage)
- Deadweight (dwt): Max weight ship can carry
- Draft: Depth ship sits in water
- Plimsoll line: Marking on hull used when loading



T = Tropical  
S = Summer  
W = Winter  
WNA = Winter North Atlantic  
F = Freshwater  
TF = Tropical freshwater  
A/B = Indicates the registration authority

# Identify Types of Carriers and Water Vessel Types

## Water Vessel Types

### Liner carriers

- RORO ships
- Bulk carriers
  - Handysize
  - Capesize
- Containerships

### Containership sizes

- Small feeder and feeder
- Feedermax
- Panamax
- Post-Panamax
- Neo-Panamax
- ULCV

# Identify Types of Carriers and Water Vessel Types

## Water Vessel Types

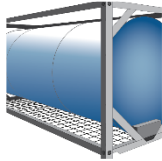
### Tankers

- Very large crude carrier (VLCC)
- Ultra-large crude carrier (ULCC)

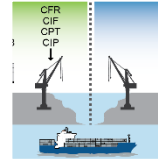
### Other types of ships

- Mother and feeder vessels
  - Work together
- Offshore vessels (OSV)
- General cargo ships
  - Bring own handling equipment

## Operating and Service Characteristics



Capability

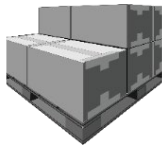
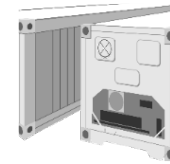


Accessibility

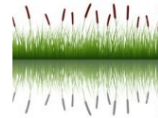
Cost  
structure



Flexibility



Capacity



Environmental



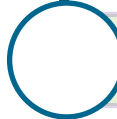


Speed



Safety

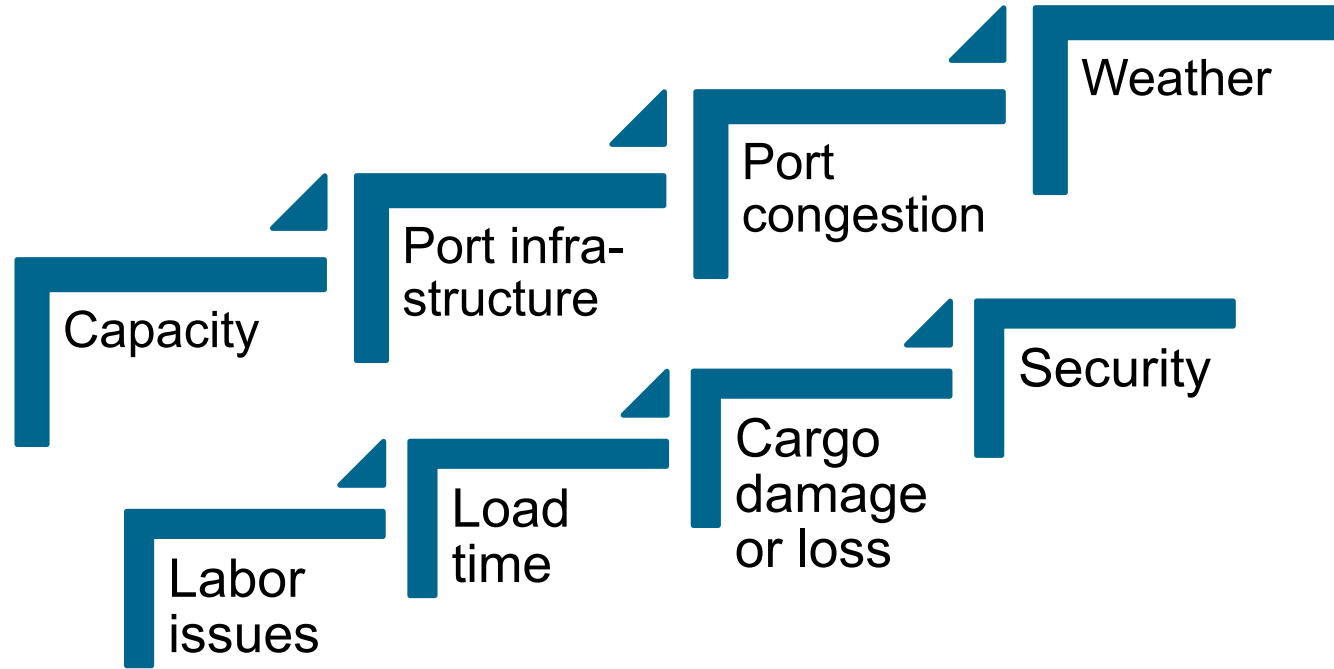


## Port Facilities

-  Unloading and handling facilities?
-  Sufficient terminal access or berth for carrier?
-  Warehouse/yard space for temporary storage?
-  Multimodal transport and labor available?
-  When will detention/demurrage begin?

# Consider Water Issues and Challenges

## Issues and Challenges



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## MODULE 6, SECTION F: IDENTIFY MULTIMODAL, MULTI-STOP, AND CHARACTERISTICS OF OTHER MODES

# Understand Multimodal, Multi-Stop, and Container Shipping

## Multimodal

### Ocean-truck

- Low cost, fast transit from port.

### Ocean-rail, rail-ocean, or ocean-rail-ocean

- Land bridges.

### Air-truck

- Fast transportation of in-demand items (e.g., fashion).

### On-dock rail

- Rail often first loaded/unloaded at dockside.



# Understand Multimodal, Multi-Stop, and Container Shipping

## Multi-Stop (Split Delivery)

---

2+ delivery destinations

---

Single or multiple customers

---

Hybrid between TL and LTL with special rates

---

Do not need break-bulk terminal

---

Consolidation terminal needed

---

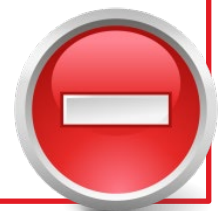
Diversion and reconsignment

## Container Shipping

- Small, non-bulk products store conveniently and safely
- Secure and physically protected
- Far less inventory handling (AGVs, UAVs)
- Storage outdoors
- Speed of loading/unloading



- Fuel costs: container weight
- Closed: Smuggling easier
- Susceptible to loss, especially at sea
- Transport cost of empty containers more than new container cost
- Imbalance of trade by container type



## Equivalent Units



*20-foot  
equivalent units  
(6 meters)*

ISO 668 and  
ISO 1496;  
20' x 8' x 8'

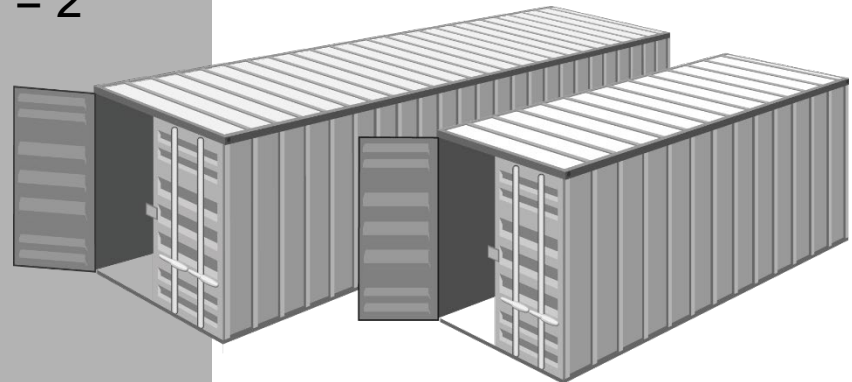
**TEUs**



*40-foot  
equivalent units  
(12 meters)*

Double length  
of TEU  
1 FEU = 2  
TEUs

**FEUs**



# Understand Multimodal, Multi-Stop, and Container Shipping

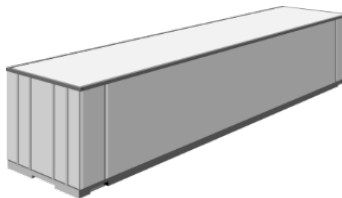
## Container Types

Other types

- Pallet-wide
- Out-of-gauge (OOG)



General-purpose



High-cube



Flatrack



Open-top



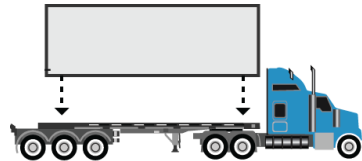
Tank



Temperature-controlled

## Types of Multimodal Service

- Air-road (birdyback)
- Rail-road (piggyback)
  - Container on a flatcar
  - Trailer on a flatcar
  - Swapbody
  - Caisse mobile
  - Skeletal trailer
  - Extendable trailer
- Water-road (fishyback)
  - Lift-on, lift-off
  - Roll-on, roll-off
- Rail-water (trainship)
  - Land bridge
  - Mini land bridge
  - Micro land bridge

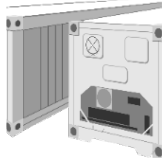


## Multimodal Market Structure and Sales Strategy

- Use most efficient combinations that make sense for customers.
- Carriers base decision on:
  - Capacity.
  - Route.
  - Cost efficiency.
  - Delivery deadlines.

# Understand Multimodal, Multi-Stop, and Container Shipping

## Operating and Service Characteristics



Capability

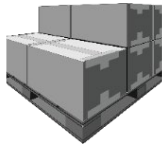
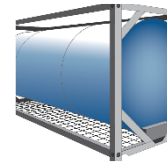


Accessibility

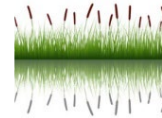
Cost  
structure



Flexibility



Capacity



Environmental

Speed



Safety



## Issues and Challenges

### Visibility

- More carriers
- Some use old technology



### Ports of Entry

- Know destination port location for accurate routing and scheduling
- Challenge in less developed nations
- Specialized equipment need
- Drayage services
- Delay from one mode (e.g., rail)



# Identify Parcel, Courier, and Express Services Characteristics

## Filling the Need

Fills common carrier and small package shipping gap



### Parcel

- Transportation specialists
- Accept packages up to a certain weight



### Courier

- Local
- Pick up and deliver important documents and packages



### Express

- Guarantee delivery by a predetermined date

## Market Structure and Sales Strategy

- Demand for parcel, courier, and express services has grown.
  - E-commerce
  - Consumer demand
- Integrators
  - Parcel delivery
  - Supply chain solutions
- Regional couriers
  - Local, personalized



## Operating and Service Characteristics

<b>Capability</b>	<ul style="list-style-type: none"><li>• Driven by general public's purchases</li></ul>
<b>Cost structure</b>	<ul style="list-style-type: none"><li>• Market-based pricing</li><li>• Most carriers publish transport services and prices.</li></ul>
<b>Capacity</b>	<ul style="list-style-type: none"><li>• Dictated by commodities being shipped</li></ul>
<b>Speed</b>	<ul style="list-style-type: none"><li>• Guaranteed overnight or same-day delivery.</li></ul>
<b>Accessibility/ flexibility</b>	<ul style="list-style-type: none"><li>• Internet makes carriers available around the clock.</li><li>• Door-to-door service: easy for consumers</li></ul>
<b>Environmental efficiency/efficacy</b>	<ul style="list-style-type: none"><li>• Recyclable, less packaging</li><li>• Alternative energy vehicles</li></ul>
<b>Safety</b>	<ul style="list-style-type: none"><li>• Safety procedures, company rules, and preventive measures help carriers avoid most safety challenges.</li></ul>

## Issues and Challenges

### Speed

- Delivery date guarantees create customer expectation and cost if not met

### Packaging

- Customers must follow parcel packaging guidelines
- Differ by carrier

### Pricing

- Both size and weight impact pricing
- Websites for calculating costs

# Identify Pipeline Transportation Characteristics

## Types of Carriers

- Deliver liquid cargo for further refining or to customers
- Move crude oil/liquid cargo from producers to pipelines



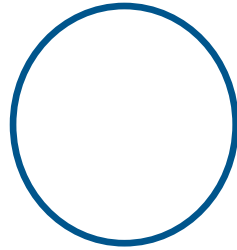
# Identify Pipeline Transportation Characteristics

## Pipeline Infrastructure

Gathering lines



Trunk lines



Refined product lines



Distribution pipelines



- Physical pipeline plant
- Tankers
- Liquefied natural gas (LNG) infrastructure



# Identify Pipeline Transportation Characteristics

## Pipeline Market Structure and Sales Strategy

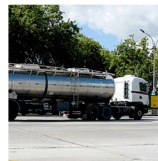
- Dominated by small number of very large carriers.
- High start-up costs limit participants.
- Limited competition in industry.
- There may be joint ownership of high capital cost lines.
- Other modes support pipeline rather than compete.

# Understand Multimodal, Multi-Stop, and Container Shipping

## Pipeline Operating and Service Characteristics



Capability

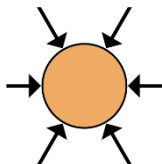


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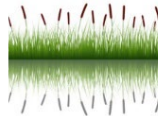
Cost  
structure



Flexibility



Capacity



Environmental

Speed



Safety





# Identify Pipeline Transportation Characteristics

## Issues and Challenges

- Government regulations: Many government agencies oversee pipeline industry.
- Political issues: Use law of eminent domain, pipeline use in sensitive ecosystems.
- Cross-country boundaries: Needs collaboration.
- Safety concerns: Enviably records for safety, but industry must be vigilant.

# CLTD

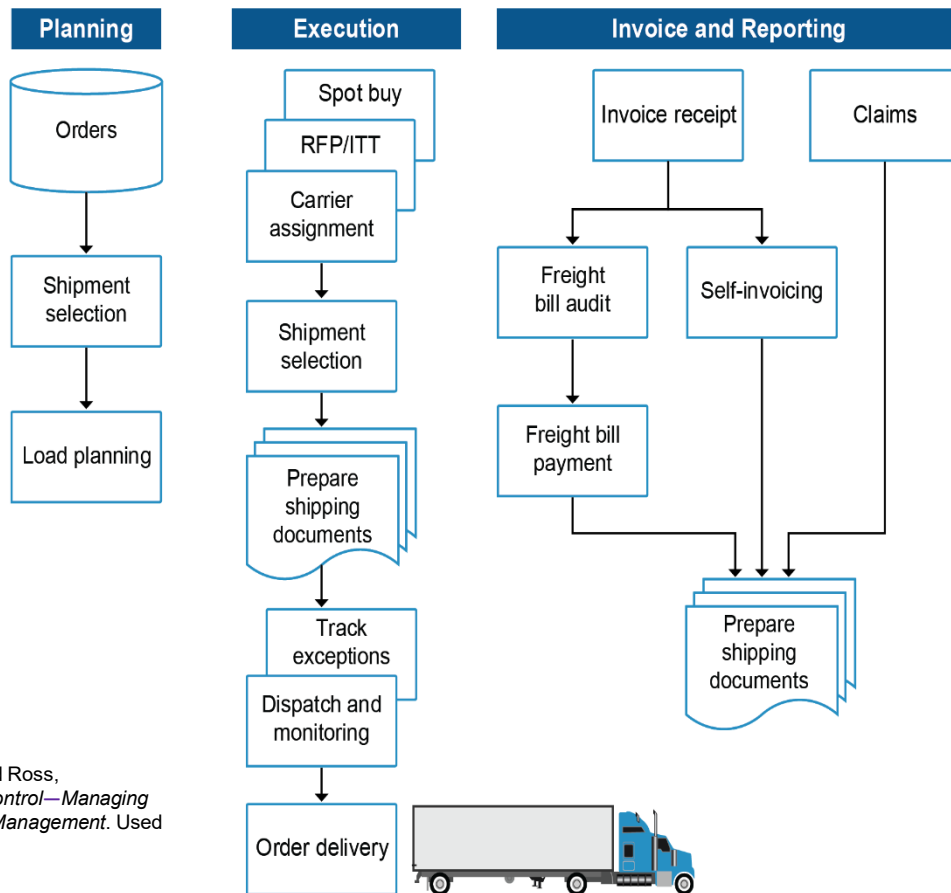
CERTIFIED IN LOGISTICS,  
TRANSPORTATION AND DISTRIBUTION

## MODULE 6, SECTION G: IMPLEMENT TRANSPORTATION MANAGEMENT

## Transportation Management Tasks

“Planning, scheduling, budgeting of transportation assets, services, and related systems”

Source: Adapted from David Ross, *Distribution Planning and Control—Managing in the Era of Supply Chain Management*. Used with permission.



## Product Labeling

- Weight
- Consignee's name
- Name of company
- Shipment number
- Number of units  
(e.g., 1 of 2)



## Product Considerations

- Temperature/humidity
- Bulk shipments
- Hazardous materials
- Perishables
- Live animals
- Classified/government material
- Prohibited goods
- Pharmaceuticals
- High-value goods
- Household goods
- Personal effects

## Selection of Transport Mode

### External considerations

- Country infrastructure
- Trade barriers
- Export controls, licenses
- Law and taxation
- Economic
- Culture/political
- Climate
- Regional/geographic

### Customer considerations

- Service level requirements
- Delivery point constraints
- Terms of sale
- Order size preference
- Customer importance
- Product knowledge

### Product considerations

- Volume-to-weight ratio
- Value-to-weight ratio
- Substitutability
- Package dimensions
- Packaging requirements
- Special characteristics

## Characteristics of Transportation Modes

Characteristics	Road	Rail	Water	Air	Pipeline
Capability	Minimal limitations	Minimal limitations	Few limits	Limited	Very limited
Cost	Moderate/high	Low	Low	Very high	Very low
Capacity	Moderate	High	Very high	Very low	Very high
Speed of delivery	Fast	Moderate	Slow	Very fast	Slow
Accessibility/ flexibility	Very high	Very low/low	Low	Moderate	Very low/low
Damage	High (LTL only)	Very high	High	Very low	Low
Reliability	High	Low	Low	High	Very high
Multimodal capability	Very high	Very high	Very high	High	Low
Parcel delivery	Very high	Low	Very low	Very high	N/A

Source: Adapted from David F. Ross, *Distribution Planning and Control—Managing in the Era of Supply Chain Management*, and John J. Coyle, et al., *Managing Supply Chains: A Logistics Approach*.

## Modal Capabilities

Mode	Strengths	Weaknesses	Product Characteristics	Cost
Road	<ul style="list-style-type: none"> <li>▪ Accessible and versatile</li> <li>▪ Fast</li> <li>▪ Customer service</li> </ul>	<ul style="list-style-type: none"> <li>▪ Limited capacity</li> <li>▪ Higher cost</li> </ul>	<ul style="list-style-type: none"> <li>▪ High value</li> <li>▪ Finished goods</li> <li>▪ Low volume</li> </ul>	High
Rail	<ul style="list-style-type: none"> <li>▪ High capacity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Accessibility</li> <li>▪ Service levels</li> <li>▪ Damage rates</li> </ul>	<ul style="list-style-type: none"> <li>▪ Low value</li> <li>▪ Raw materials</li> <li>▪ High volume</li> </ul>	Low
Air	<ul style="list-style-type: none"> <li>▪ Speed</li> <li>▪ Load protection</li> <li>▪ Flexibility</li> <li>▪ International capabilities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Accessibility</li> <li>▪ Limited capacity</li> </ul>	<ul style="list-style-type: none"> <li>▪ High value</li> <li>▪ Finished goods</li> <li>▪ Low volume</li> <li>▪ Time-sensitive</li> </ul>	High
Water	<ul style="list-style-type: none"> <li>▪ High capacity</li> <li>▪ International capabilities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Slow</li> <li>▪ Accessibility</li> </ul>	<ul style="list-style-type: none"> <li>▪ Low value</li> <li>▪ Raw materials or bulk commodities</li> <li>▪ Containerized finished goods</li> </ul>	Low
Pipeline	<ul style="list-style-type: none"> <li>▪ In-transit storage</li> <li>▪ Load protection</li> <li>▪ Efficiency</li> </ul>	<ul style="list-style-type: none"> <li>▪ Slow</li> <li>▪ Limited network</li> </ul>	<ul style="list-style-type: none"> <li>▪ Low value</li> <li>▪ Liquid commodities</li> <li>▪ Not time-sensitive</li> </ul>	Low



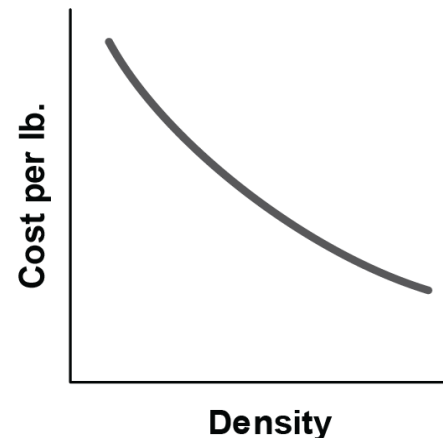
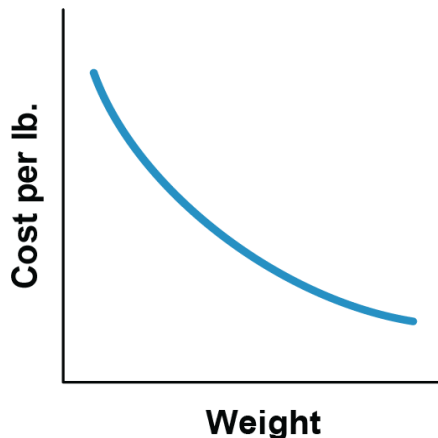
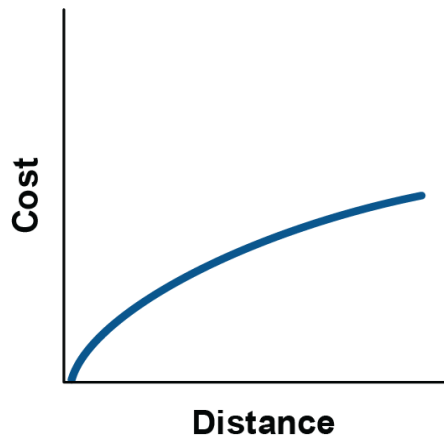
## Distance, Weight, and Density

Cost per unit of weight decreases as load size increases

**Distance**

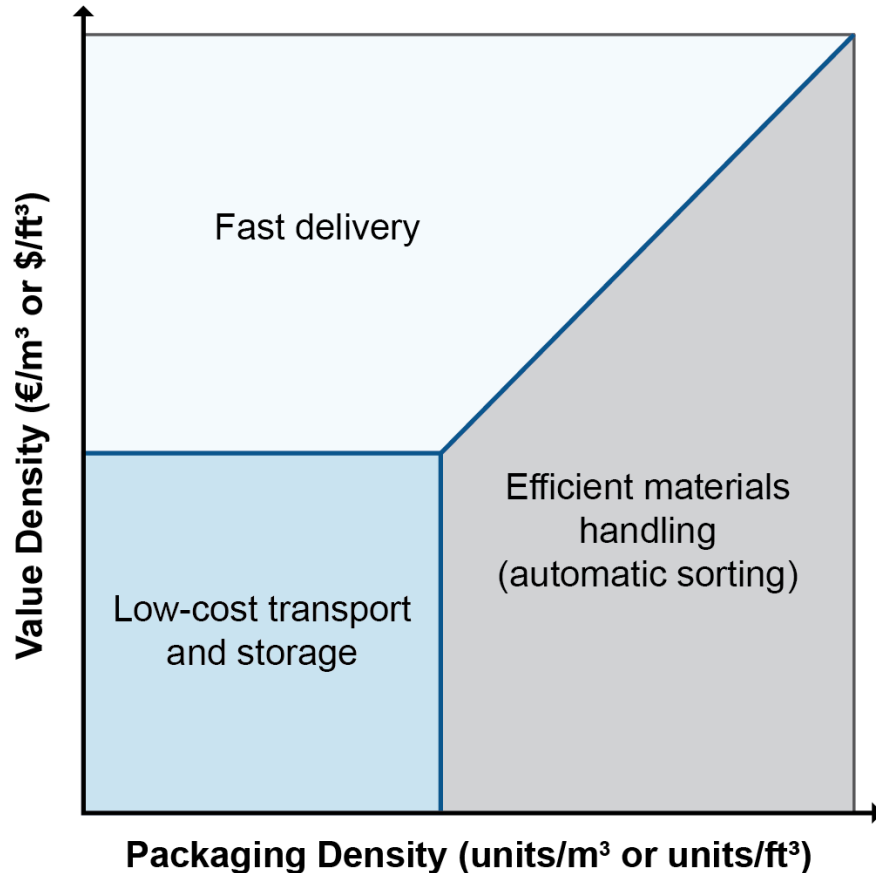
**Weight**

**Density**



## Value Density vs. Packaging Density

- Lower value products need lower cost transport
- Speed is a component of cost.



## Line-Haul Services

Reconsignment

Diversion

Groupage or  
Pooling

Stopping in  
transit

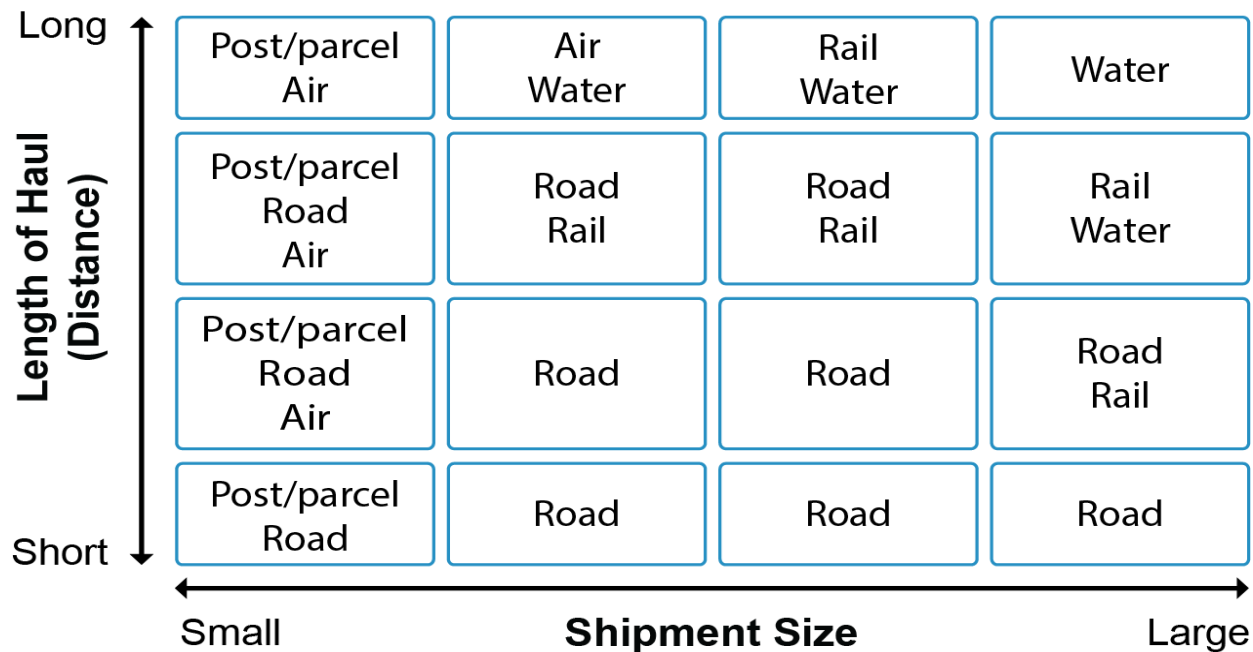
Transit privilege

Pickup and  
delivery

Terminal  
handling

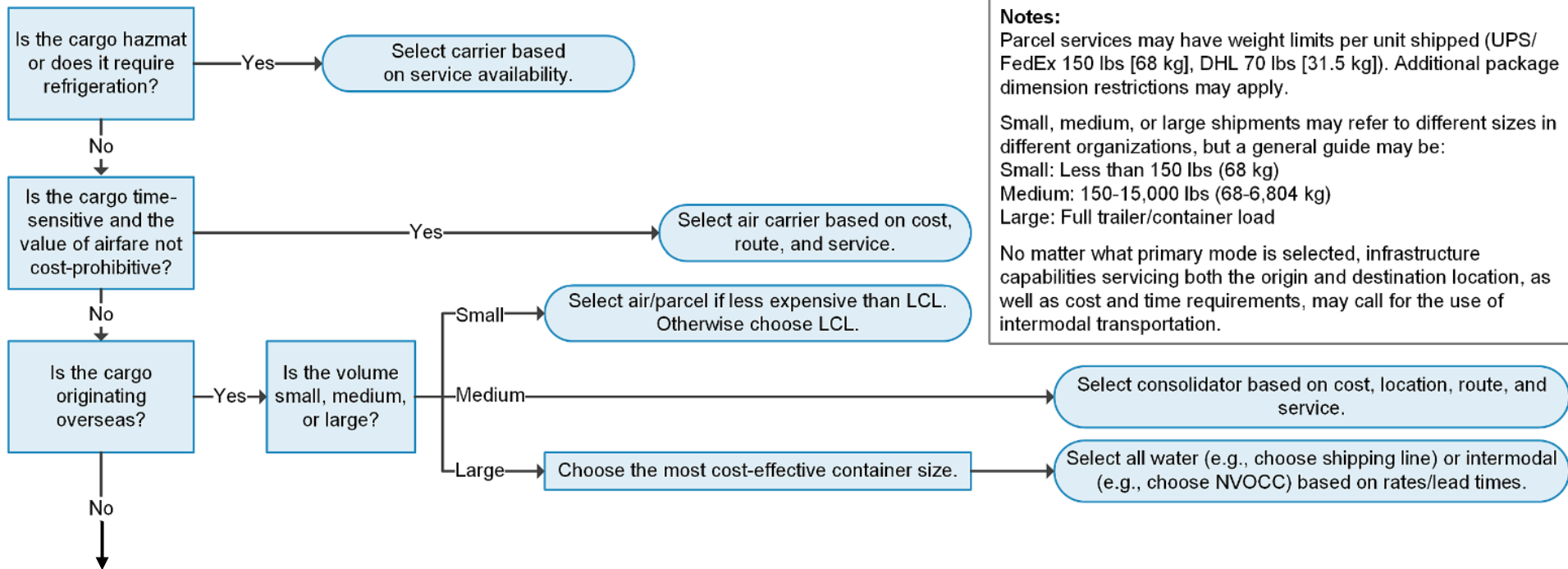
## Selection Matrix

- Consider freight volume or load size and delivery distance
- Cost is secondary to distance (schedule)



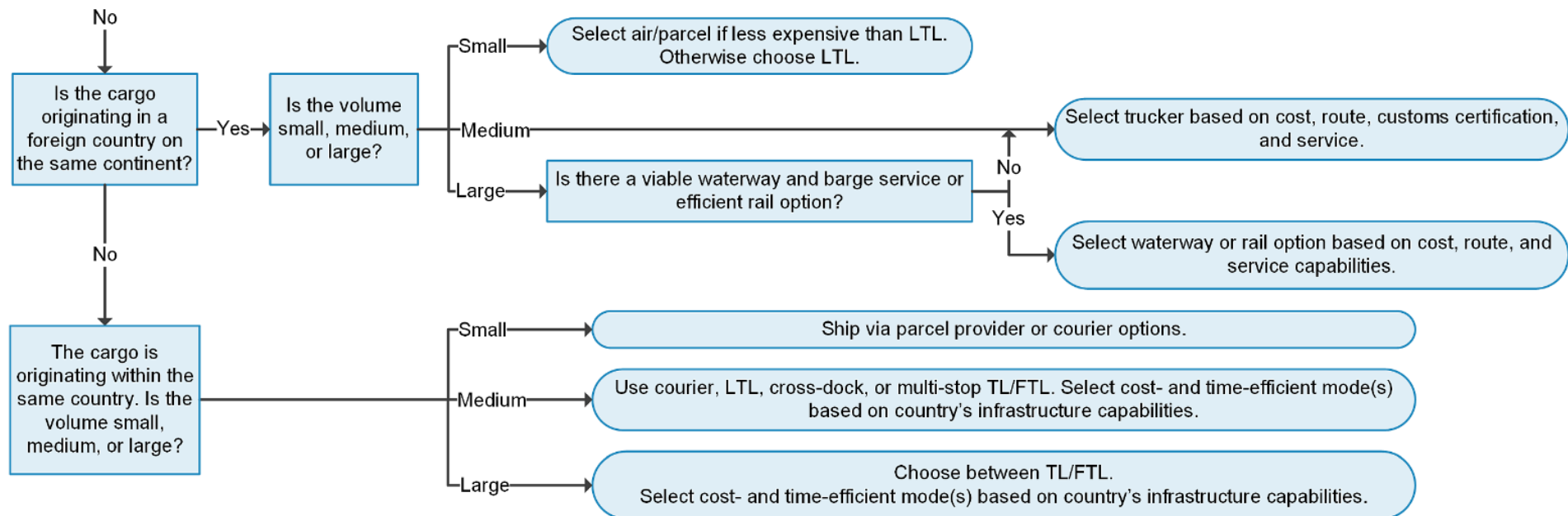
Source: Adapted from Alan Rushton, Phil Croucher, and Peter Baker, *The Handbook of Logistics and Distribution Management: Understanding the Supply Chain*, 2014.

# Develop/Execute Transportation Management, Network Design, and Mode Selection

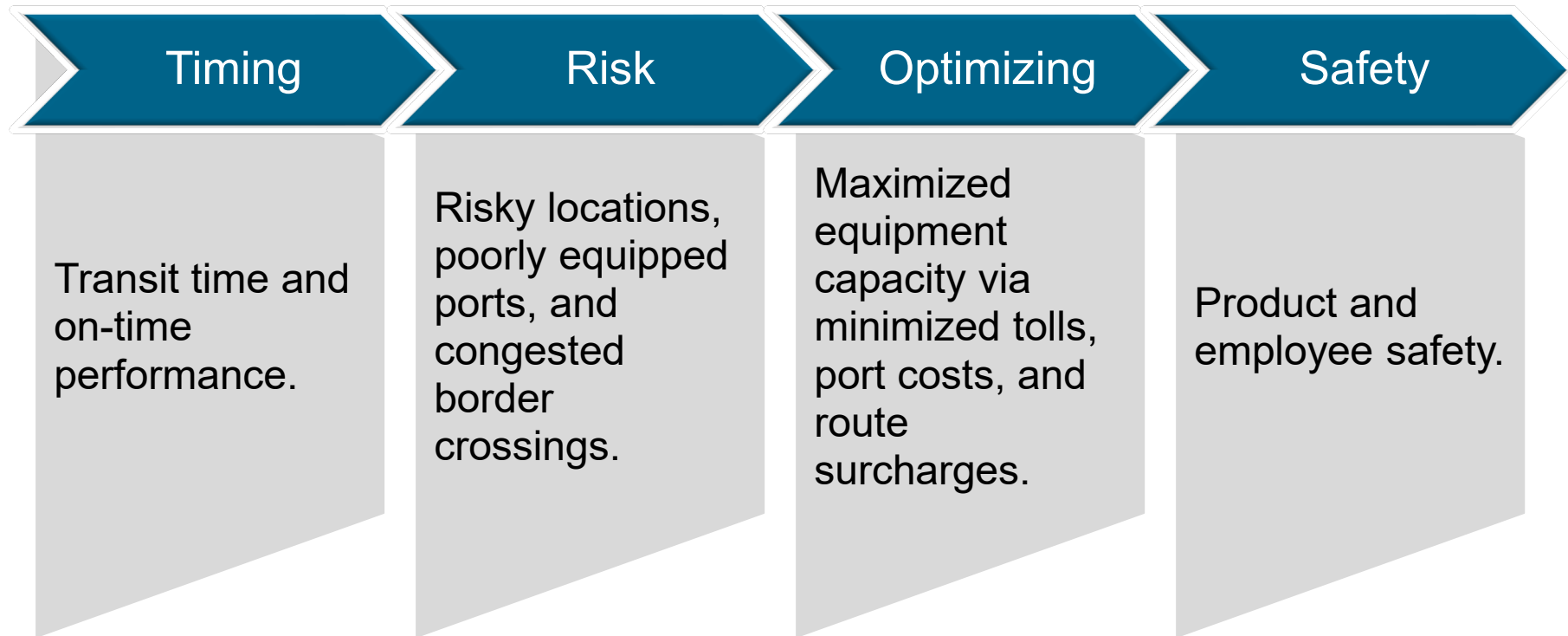


See next slide

# Develop/Execute Transportation Management, Network Design, and Mode Selection



## Route Planning and Scheduling



## Business Intelligence (BI) for Transportation Managers

- Routing and scheduling
- Performance
- Distance requirements
- Vehicle details  
(e.g., age; vehicle weight; type of body, axle, engine)
- Cargo capacity
- Idle time
- Maintenance details
- Fuel used
- Delivery details



# Facilitate Carrier Negotiations and Selection

## Insourcing vs. Outsourcing for Logistics Services

Will organization differentiate on...

- Customer service?
- Cost control?
- Integration?
- Data?
- Flexibility?



# Facilitate Carrier Negotiations and Selection

## Statement of Work (SOW) for Carrier Selection

Detailed and specific document that describes the required work in terms of scope

Transportation  
need

Selected  
transport  
mode

Frequency  
needed

Transportation  
lanes

# Facilitate Carrier Negotiations and Selection

## Carrier Selection Process

1. Clarify requirements and scope.
2. Identify type of provider needed.
3. Locate and research potential providers.
4. Prepare RFP/ITT or equivalent.
5. Evaluate and compare responses.
6. Select a contractor and negotiate.
7. Finalize contract and sign.

# Facilitate Carrier Negotiations and Selection

## Requests for Information (RFI)

- Preliminary planning step before RFP or RFQ
- Information from providers about their capabilities
- Used to build short list of contractors
  - Adequate abilities
  - Interest

# Facilitate Carrier Negotiations and Selection

## Key Sections of an RFP/ITT

Statement of requirement

Statement of purpose

Background information

Scope of work

Performance standards

Delivery schedule

Contract terms and conditions

Payments, incentives and penalties

# Facilitate Carrier Negotiations and Selection

## Alternative: Online Shipper Auctions

- Buyers bid on services
  - Cost-effective deal
  - Publish shipment requirements
  - Time to submit bids
- Shippers fill excess capacity

# Facilitate Carrier Negotiations and Selection

## RFP/ITT Evaluation Criteria

Transit time average and reliability

Equipment availability and capacity

Geographic coverage

Product protection

Rates

# Facilitate Carrier Negotiations and Selection

## Contracts



### Contracts

Oral or written

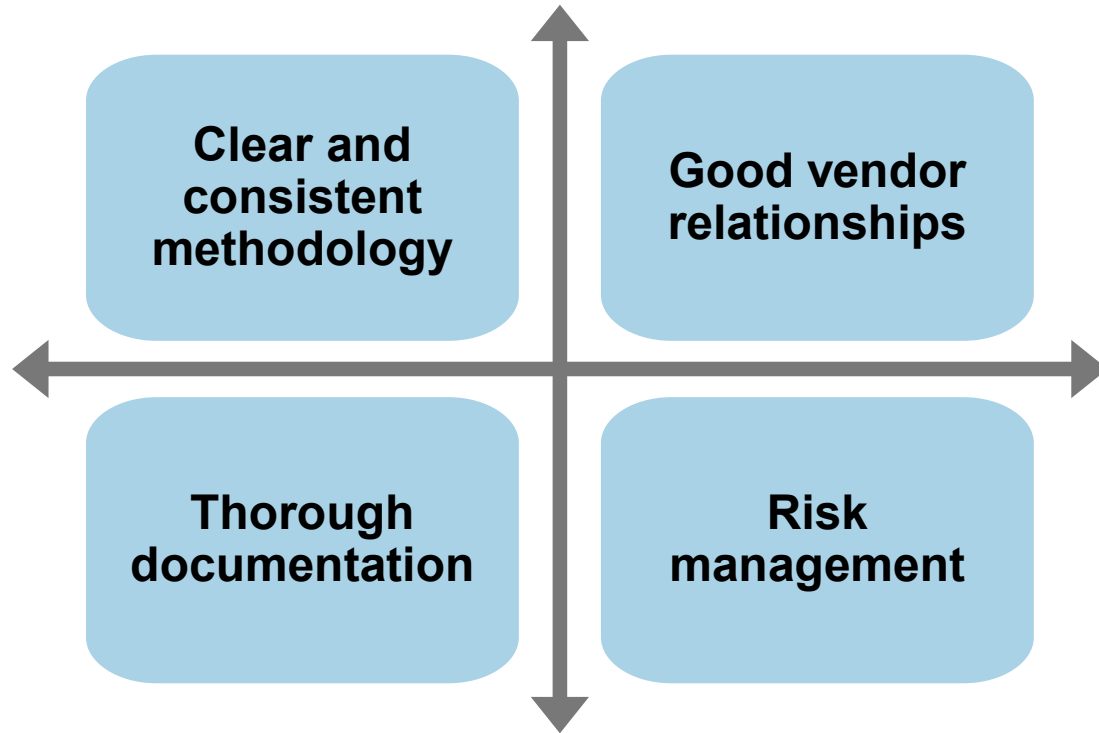
Single purchase

Delivery of products  
over defined period



# Facilitate Carrier Negotiations and Selection

## Contracting Best Practices



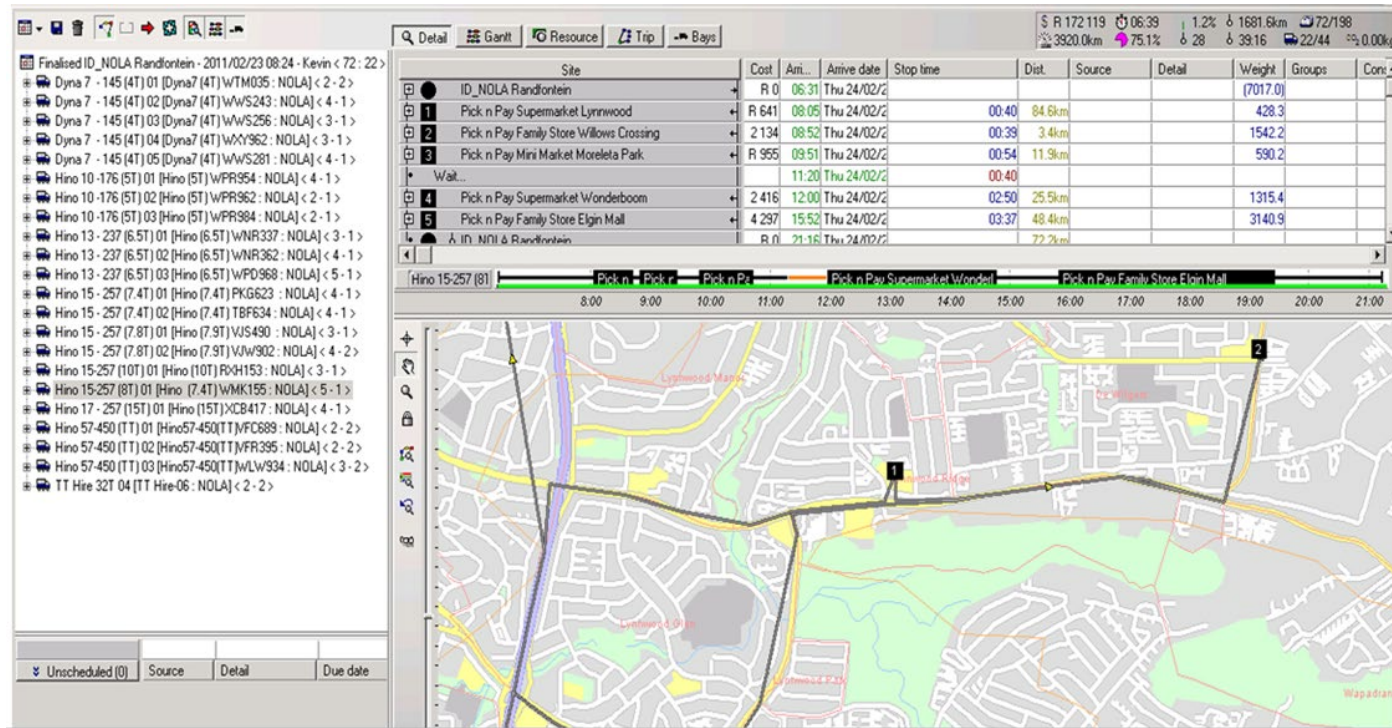
# Optimize the Fleet Management Process

## Transportation Management Systems (TMS)

- Optimizing fleet: planning and executing across entire shipping system, including by facilitating RFP bids
- Routing and rating
- Executing shipment across multiple modes
- Tracking and tracing loads
- Freight settlement
- Hybrid planning, execution, evaluation capabilities
- Reduce freight costs by 6 to 10%

# Optimize the Fleet Management Process

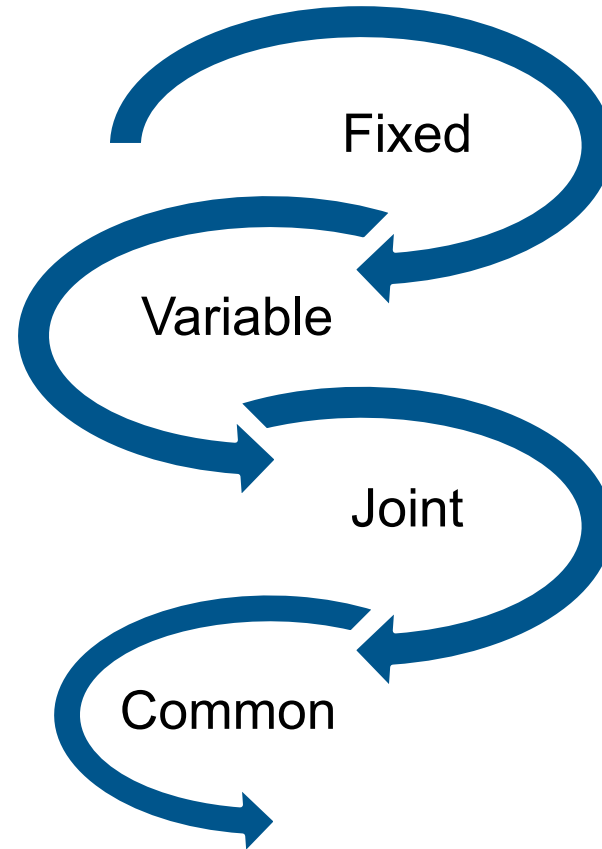
## Automated Route Planning



# Understand Rate Structures

## Types of Charges

Understand these costs before pricing.



# Understand Rate Structures

## Assigning a Rate Tariff



# Understand Rate Structures

## Determinants of Tariffs: Drivers

**Distance**

**Weight**

**Density**

**Stowability**

**Handling**

**Liability**

**Market**

# Understand Rate Structures

## Rates Per Mode

### Road

- LTL/TL
- Per-truckload
- Discount

### Rail

- Multiple-car
- Unit-train

### Air

- Weight or dim weight
- Density rates
- Deferred delivery

### Water

- Container basis
- Additional charges for international shipping

### Pipeline

- Per-barrel basis
- Point-to-point

# Understand Rate Structures

## Other Rate Structures

- Contract
- Distance
- Corporate volume



- Deficit weight
- Dead freight
- Weight break



# Understand Rate Structures

## Accessorial

- Advance notice
- Hazardous surcharge
- Environmental services
- Bill of lading correction fee
- Liftgate
- Limited access fee
- Overweight
- Detention
- Demurrage
- Per diem
- Storage
- Truck order not used
- Out of Gauge (OOG)

# CLTD

CERTIFIED IN LOGISTICS,  
TRANSPORTATION AND DISTRIBUTION

## MODULE 6, SECTION H: CONDUCT TRANSPORTATION ADMINISTRATION

# Bills of Lading

- Master bill of lading (MBL)
- House bill of lading (HBL)

115

## Tracking and Tracing

### Tracking

- Current location of shipment

### Tracing

- Shipment believed lost
- Shipper must initiate
- Carrier's responsibility to provide information

## Consolidating and Optimization

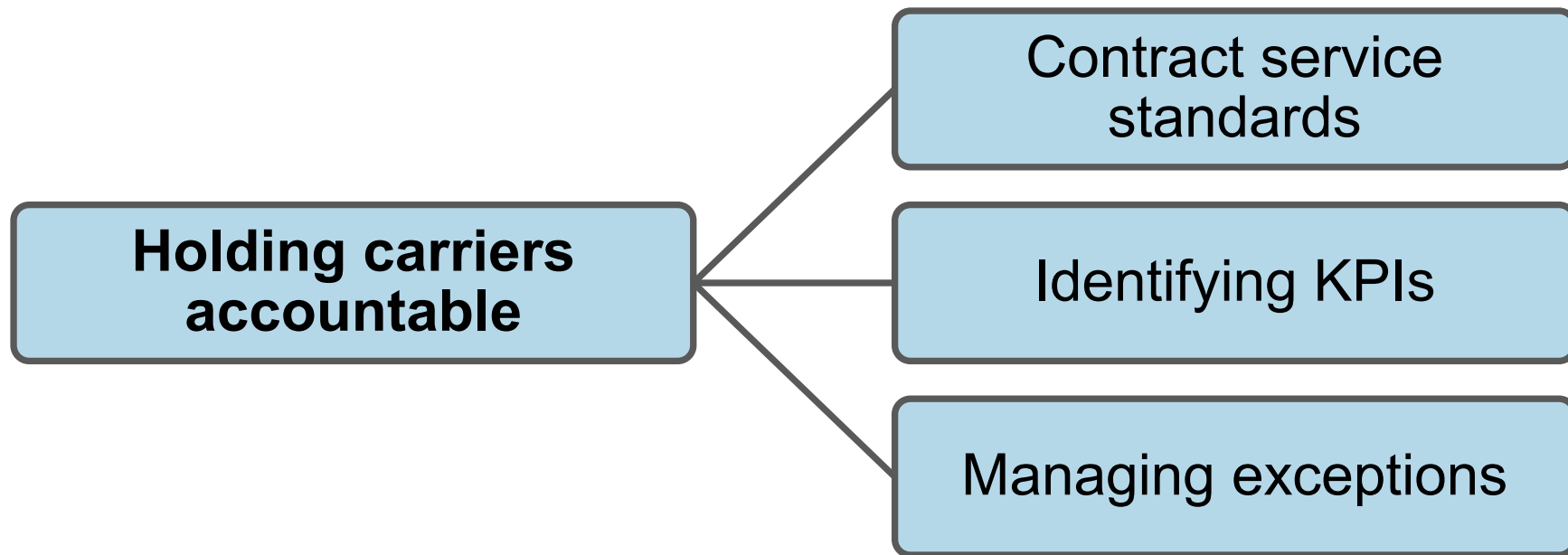
### Consolidating

- Reduce costs
- Reactive
  - Market area
  - Scheduled delivery area
  - Pooled delivery
- Proactive
  - Preorder planning
  - Multivendor consolidation

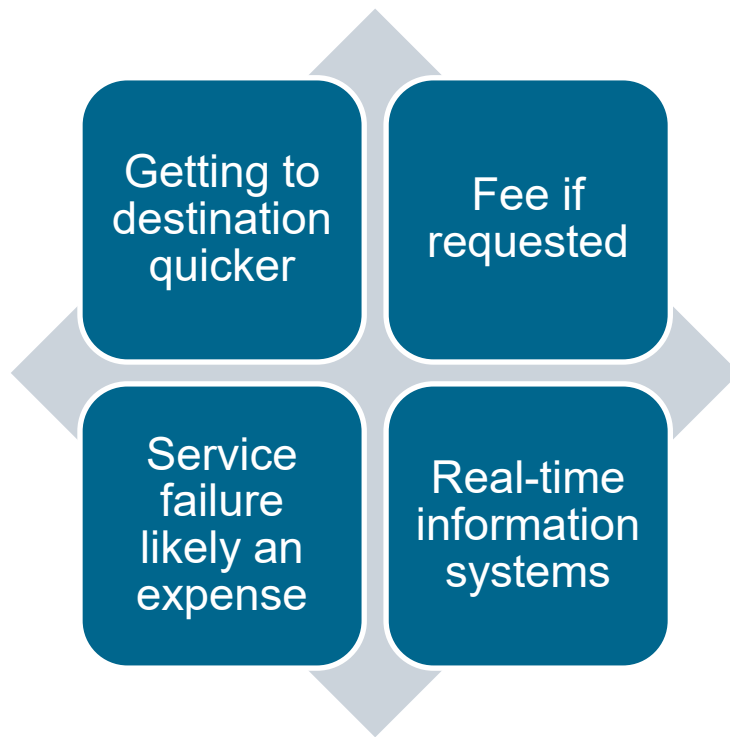
### Optimization

- Load planning
- Planner selects orders for shipment schedule
- Optimize space for single destination
- Optimize sequence for more destinations

## Exception Management



## Exception Management: Expediting



## Routing

### Routing

- Making best origin and destination decisions to balance cost and service.
- ASNs help organization plan arrival, schedule the delivery, and redeploy if needed.
- Effective routing is the key.



## Freight Settlement

### **Freight settlement**

- Document that compares freight order invoice as received to invoice as expected.
- Authorizes payment if consistent
- Traffic department with external provider expertise for specific commodity group

## Freight Pay and Audit (FP&A)

- Audit carrier invoices for correct rate, discount, fuel surcharge, and accessorial charges
- Automate
- Resolve vendor disputes in real time using visibility tools
- Manage freight claims and freight settlement

## Freight Claims

Reimbursement Request for Loss or Damage



**Time to submit**



**Filing process**

