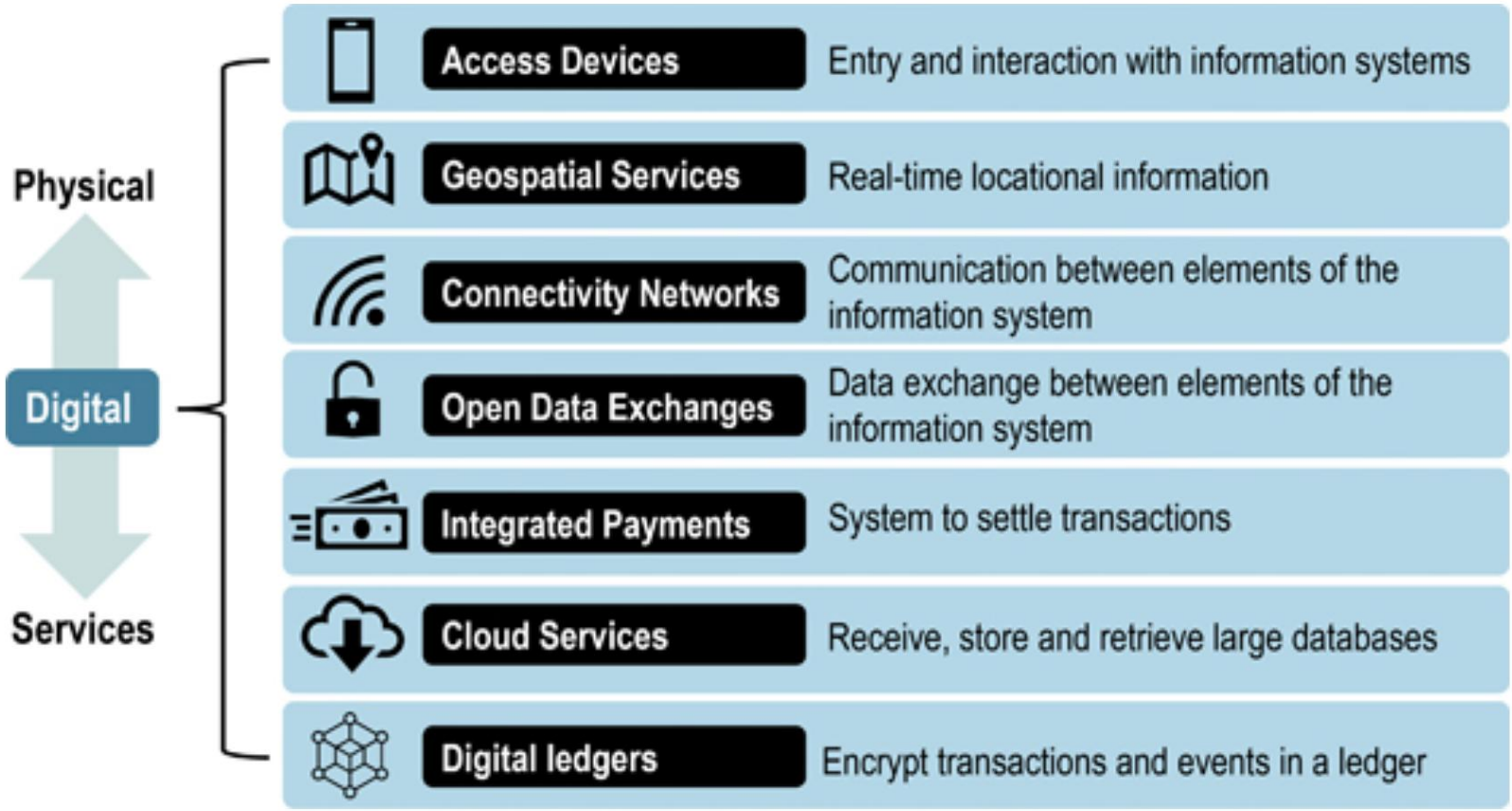
# Digitalization and transport



# Digitalization

**Access devices.**
A whole array of computing devices, such as computers and smartphones, can access telecommunicati on networks and retrieve, process, and send information.

**Geospatial services.**
Computing devices able to provide real-time locational information that can be used for a variety of purposes including vehicle tracking and navigation. They can also include other sensors that can be used to supply visual information (optical character recognition or environment processing) or attribute

**Connectivity networks.**
A range of telecommunicati on systems enabling components of the information system to communicate, which include wired and wireless networks.

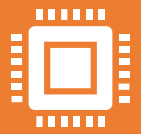
**Open data exchanges.**
A set of standards allowing information exchange and storage that all devices can handle.

**Integrated payments.**
A system that allows actors, such as financial institutions, to settle transactions, such as contracts, purchases, tolls, or fares.

**Cloud services.**
A distributed network of servers is able to offer massive storage, retrieval, and processing of data.

**Digital ledgers.**
An encrypted digital ledger system, such as a blockchain, is able to accurately record events and transactions.

# BLOCKCHAIN



A blockchain is a **distributed electronic ledger** shared across a network of servers that records transactions in cryptographic units that are called blocks in a permanent and verifiable manner. They are often referred as digital ledger technologies (DLT).

ach block is a **unique digital object** which is stored on multiple servers (nodes) in a peer-to-peer network that verifies if each block copy matches its equivalent on all nodes.

# BLOCKCHAIN

The replacement of processes that tend to be slow and manual with automation.

The origin and characteristics of passengers and cargo (raw materials, parts, and final goods).

Information about passengers and cargoes to ensure a continuity of payments, insurance, and customs duties.

Information about the conditions of the passengers and cargo to ensure their integrity it terms of the mode and their locations in transit.

Information for regulatory authorities about the passengers and cargo, the actors involved (importer, exporter) and the carriers.

# The Core Principles of Digital Ledgers

**Distributed Digital Ledger**

**Sequence of Blocks**

Creation and transfer of unique digital objects in a decentralized structure

**Digital Trust**

Encryption, transparency, verifiability and immutability

**Smart Contracts**

Programmable actions that can be traced

**Open Source**

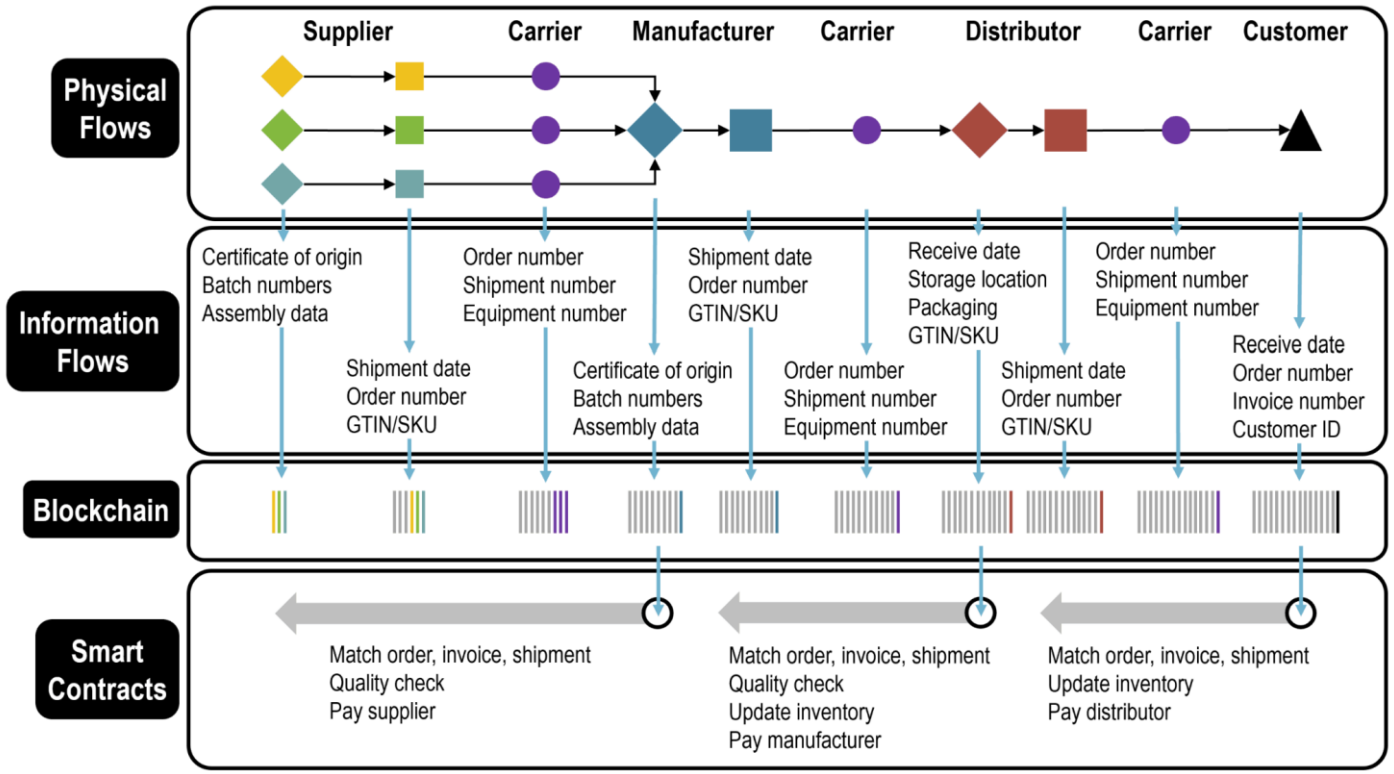
Accessibility and inclusiveness

# Main Types of Blockchain Uses

| Static Registry | Smart Contracts | Dynamic Registry | Payment Infrastructure |
| --- | --- | --- | --- |
| • Distributed database for storing reference data.<br>• Asset ownership.<br>• Registration information. | • Recorded conditions triggering automated actions when met.<br>• Transportation fares. | • Distributed database that is updated as assets are exchanged.<br>• Supply chain management. | • Distributed database that is updated as cryptocurrencies are exchanged.<br>• International contract settlements. |

Main Types of Blockchain Uses

# Supply Chains and Blockchains




Supply Chains and Blockchains

# Supply Chains

**Velocity of Supply Chains**

Faster transactions.
Less latency, improving cash flow and inventory carrying costs.

**Supply Chain Visibility (Tracking)**

Track shipments along an intermodal transport chain and identify issues causing delays.
Create a market where service providers bid to handle “blocs”.

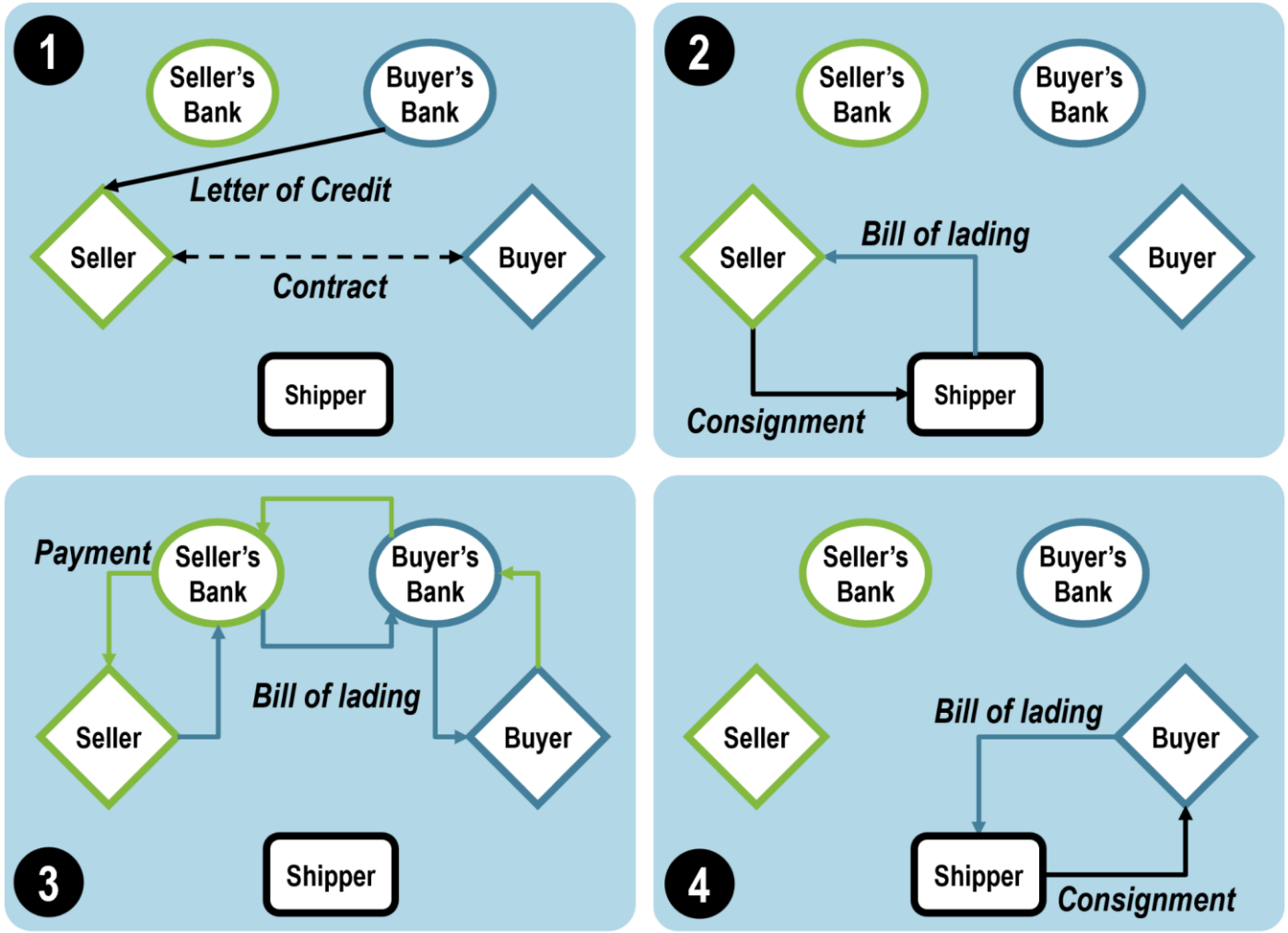
**Supply Chain Security (Tracing)**

See where, when and how a specific event took place (e.g. cold chain logistics).
Counterfeiting and the use of sub-par materials easier to detect.

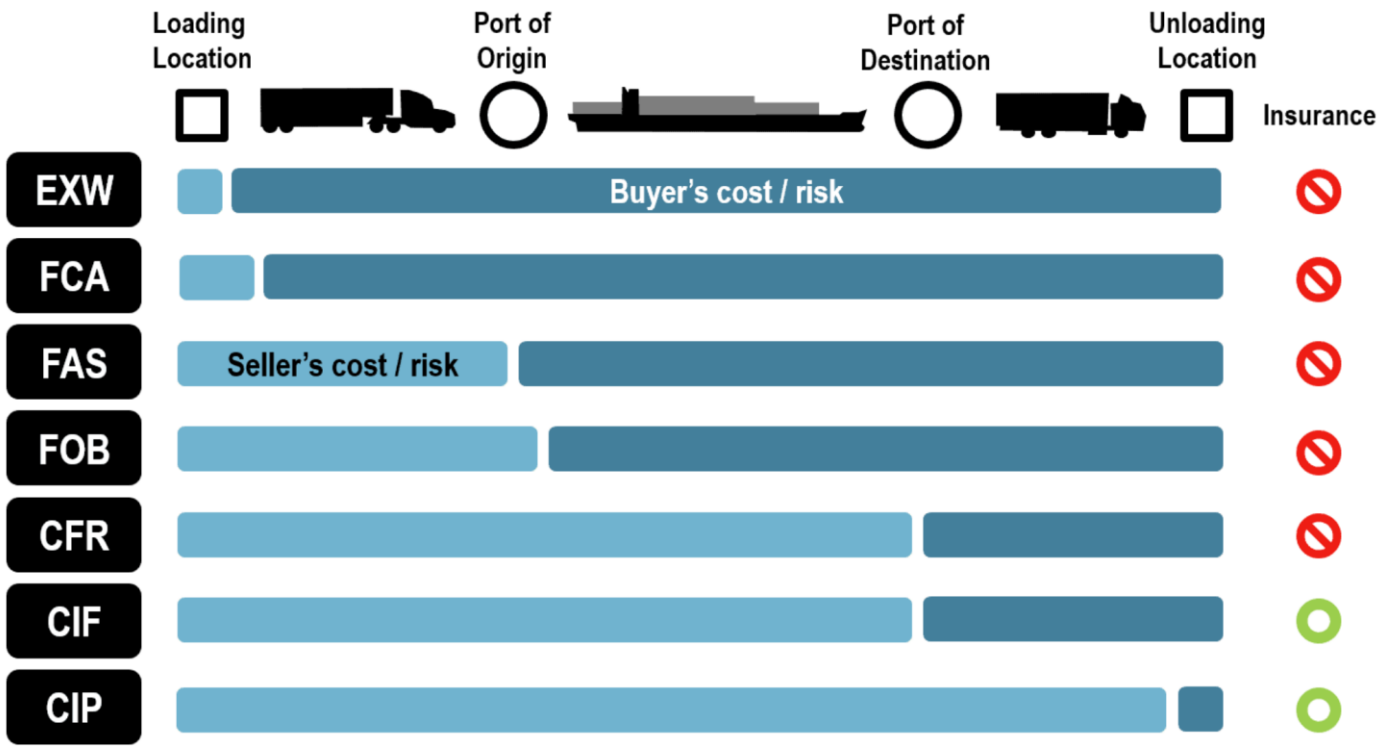
**Standards and Certification Compliance**

Proof that cargo was handled by specific modes, carriers and distribution centers.
Calculate accurately energy use and environmental impacts (e.g. CO2 footprint) .

# Letters of Credit and Bills of Lading in Commercial Transactions

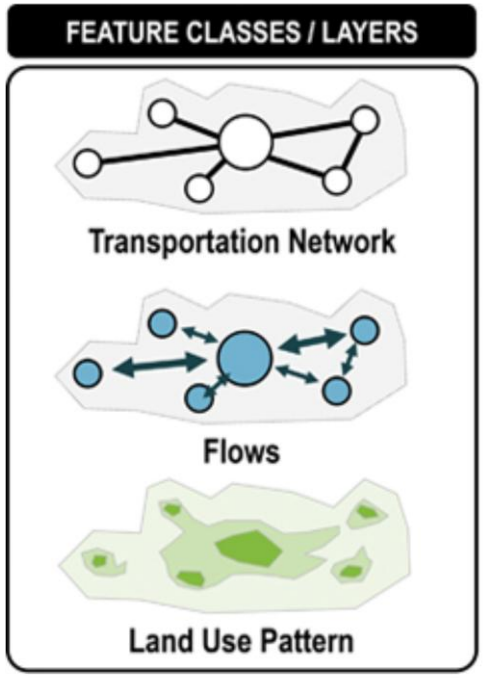


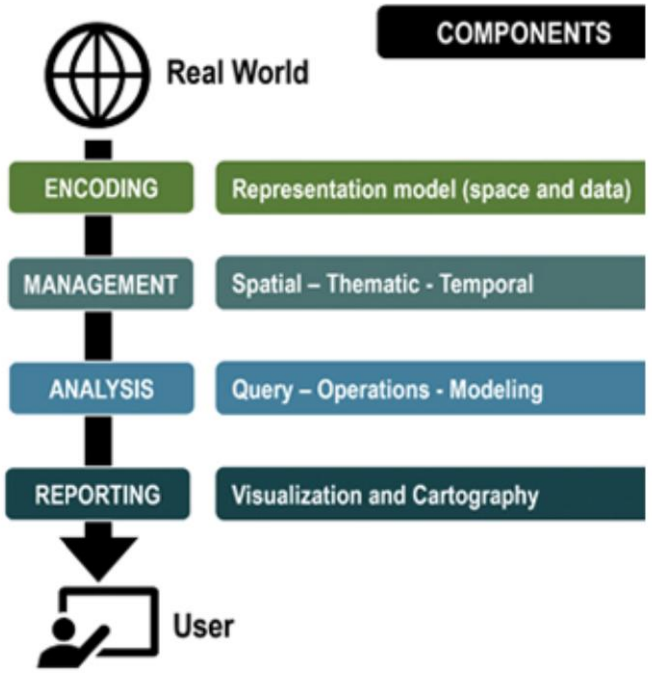
# Selected International Commercial Terms (Incoterms)




Selected International Commercial Terms Incoterms

# GEOGRAPHIC INFORMATION SYSTEM



# Urban distribution

- European and North American cities, warehousing have been **decentralized**
- Rail centers remain **unfortunately in centers** which have to be moved to suburban areas
- A modal shift to lower gas emission will be possible that way
- Artificial intelligence (how to load small loads in the proper priority)
- Information tower
- Non Greenhouse emission vehicles
- Mobile containers

# Types of urban structures

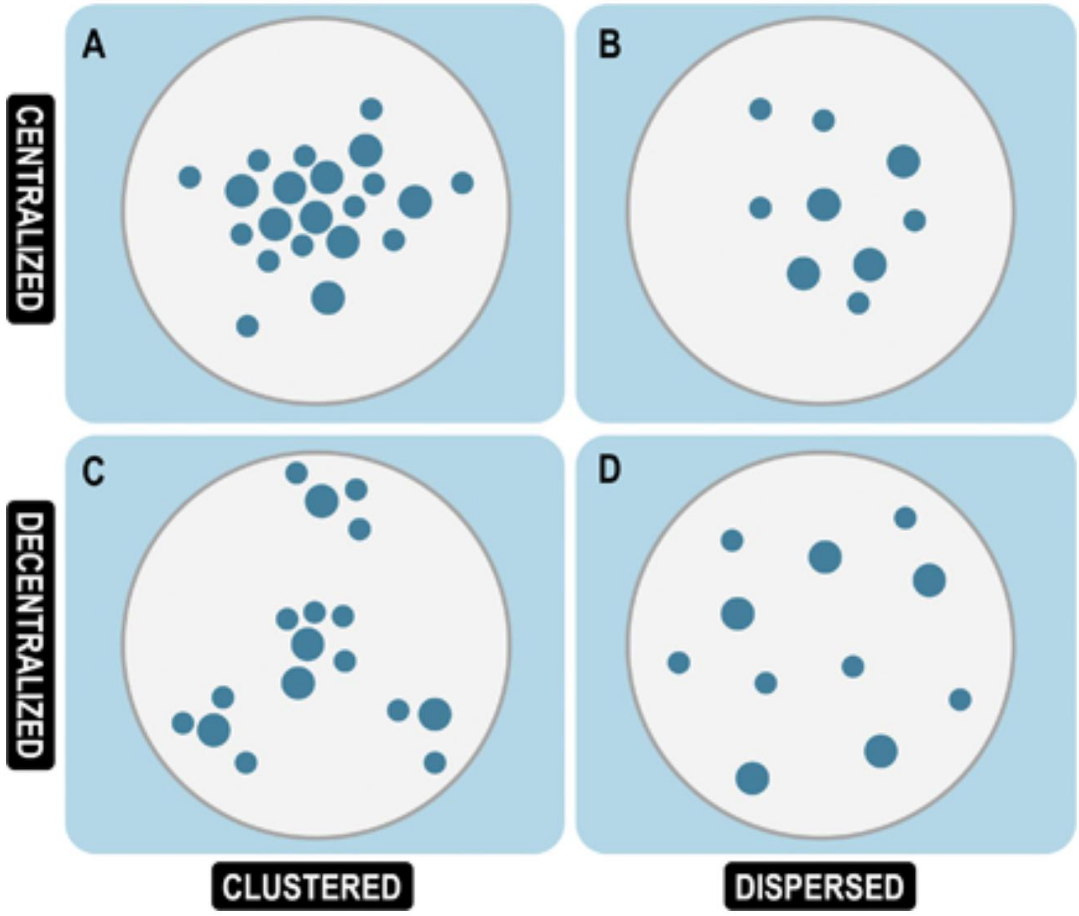


Table 5. 1 Example system design characteristics

| | Intermodal terminal | Road haulage | Distribution centre |
|---|---|---|---|
| Capacity | • I reach stacker | • 2 trucks<br>• 22 trailers (either 1*40 ft or 2*20 ft per trailer)<br>• 5 lorry drivers | Between 1 2 and 24 gates<br>• Staffing 2 shifts of 14 on average per shift |
| Opening/ operating hours | Mon-Fri 05.00-18.00 | Mon—Fri 04.30-23.30 | Mon-Thu 06.00-23.00<br>Fri 06.00-16.00<br>Sat 06.00-20.00 |
| Activity and lead times | • Loading/unloading time: 2—5 min per trailer<br>• Outside opening hours:<br>• Time for marshalling of trailer including leaving/picking up trailer at the gate: 20-35 min | Transport time: 30-35 min (one-way). | Time for marshalling of trailer including leaving/picking up trailer at the gate: 20—35 min |

# Road focus

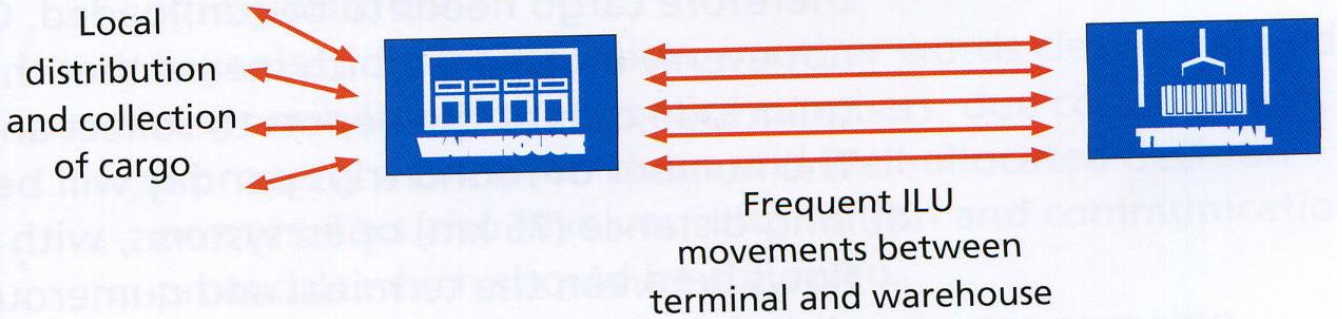
- **Last mile**
  - Looking for closer distance between terminal and operators
  - Extended terminal opening hours but extra cost ; Acquire more trailers
- **Final leg** is stripping / stuffing
- **Empty repositioning of containers** are depending on
  - Number of Containers stored at the terminal
  - Opening hours of the terminal
  - Number of trucks and working hours of drivers
  - Capacity of trucks
  - Number of trailers
  - Opening hours and manning of central warehouse
  - Difficulty to take into account = fluctuations

# Road focus

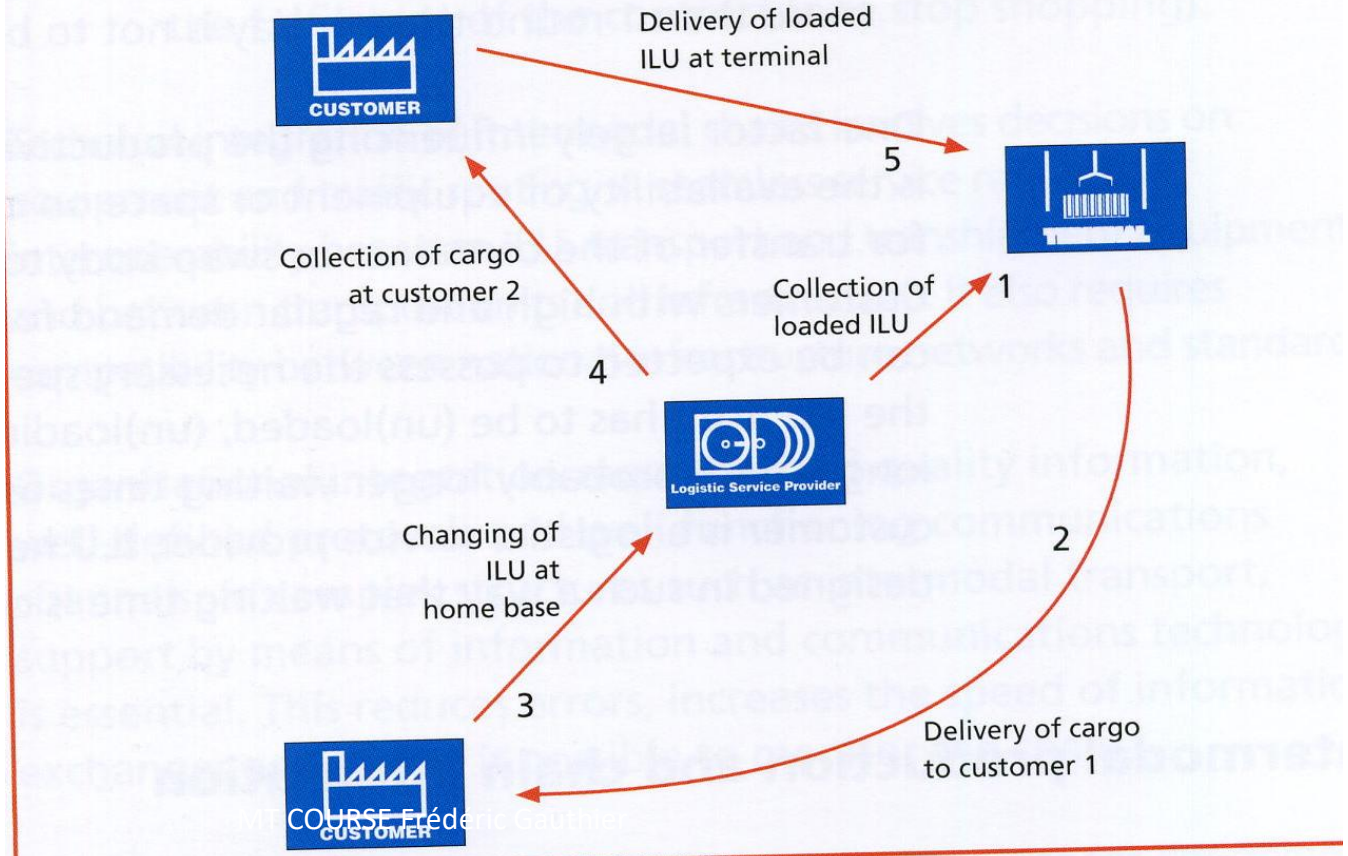
- Example in EU **inbound train than truck on  delivery**
  - Truck returns the empty container
  - In the US, containers remain on the chassis

    **Or**
  - Truck coming with an empty container contacts the reach Stacker driver that he arrived and takes a full container at the yard
  - Then deliver to the D C he **advised by radio**
  - than DC can allocate discharge (and plan in advance)
  - And truck  driver can take an empty container
  - **Save significant round trip time**

## Dedicated terminal cartage system




## Open terminal cartage system

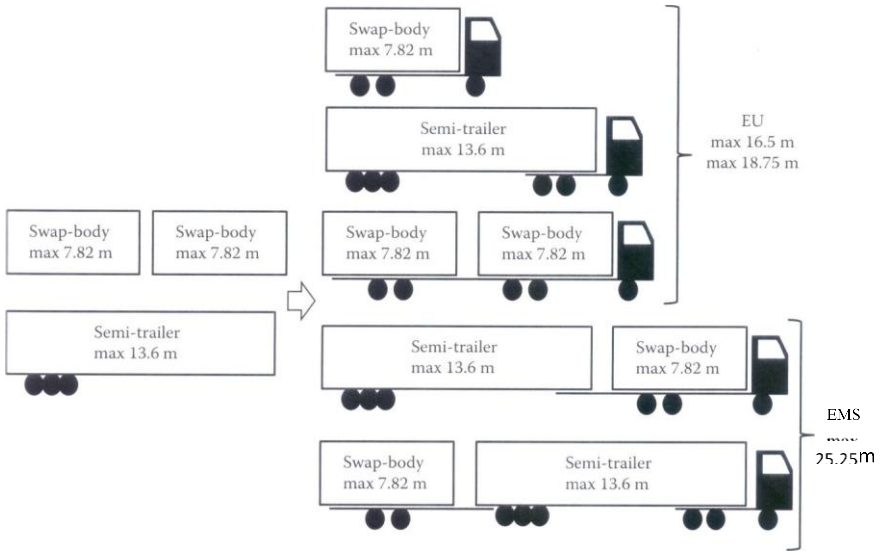


# Road focus

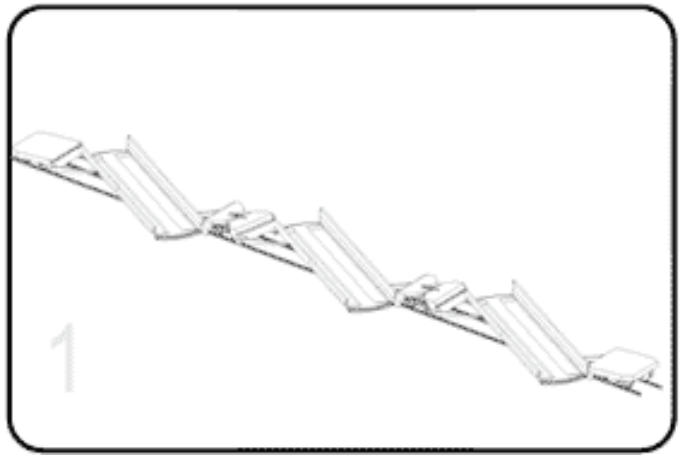
High capacity transport

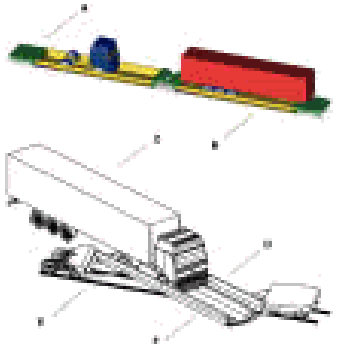
- Maximum length on cross border traffic = 16.50 m
- And 18.75m for articulated vehicles
- 44 t when transporting containers

- Will 25. 25 in Sweden , Finland , NL with weight restrictions
- Possible new regulation for 25.25m and 60 t



- Piggyback
  - Channel tunnel
    - Hazardous goods
    - Reefer trailers
  - Modalohr
    - Pivot on each wagon
    - Retractable ramp
    - Heavy goods vehicles
    - Where road traffic is saturated
    - As railway sidings do not exist – improved rail road combined transport
    - Multimodal platform





- Roll on roll off : short sea crossing
  - Roll on to water based
    - Tractors – buses – trucks
    - Safest and most inexpensive
    - No need for dismantling and reassembly
  - RoRo vessels
    - Outsized cargo
    - Multi-port operation


- Lift on lift off
  - Lifted into
  - Similar to RORO
  - Stored below the deck

MT COURSE Frédéric Gauthier

# 3 – Continental approach

## Handling facilities

- Adequation
- Cost of moving
- Inland movement of containers

## Container Corporation of India Case Study

- Development of inland container handling facilities
- Railway use
- Traffic
- ICD/CFS

# COVID 19 vaccine example

- **Pfizer forecast**
  - Filling process in Kalamazoo plant in Michigan
  - **Special shipping boxes** = 0.40x0.40x0.56 m  packed with dry ice
  - **Each box** contains 975 flasks containing each 5 vaccine doses
  - Six **trucks daily** to ship to  Fedex, UPS, DHL
  - **Delivery time** : 1 to 2 days in the U.S. and 3 days worldwide
  - 20 daily's flights
  - **Authorization for dry ice** to Fedex in Boeing 767 and 777 (to avoid gas emission)
  - **At destination** : each box will be opened briefly twice a day
  - Dedicated to big vaccine centers
  - **To be stored 2 weeks** in the original refrigerated box
  - **Production this very year … to start** : 50 millions doses
    - 20 to 30 millions delivered in the U.S. this year and 70 millions more in 2021
    - Europe : 200 millions ; 120 millions Japan, 30 millions U.K.
  - **Then competitors** as from first quarter 2021 will have their own on the market
    - Moderna, Astra Zeneca, Johnson & Johnson, Sanofi …

# CMA CGM case


1 France (FRA)
2 Benelux & Rhine Valle (BXL)
3 Germany & Central Europe (GCE)
4 Great-Britain (GB)
5 Northern & Central Italy (ITA)
6 Spain (IBE)
7 Adriatic & Central Europe (ACE)
8 Scandinavia (SCA)
Under investigation:
9 Russia
10 Portugal, Ireland, Greece, Turkey, Ukrania, etc
Design streamlined by EIA
Map 1

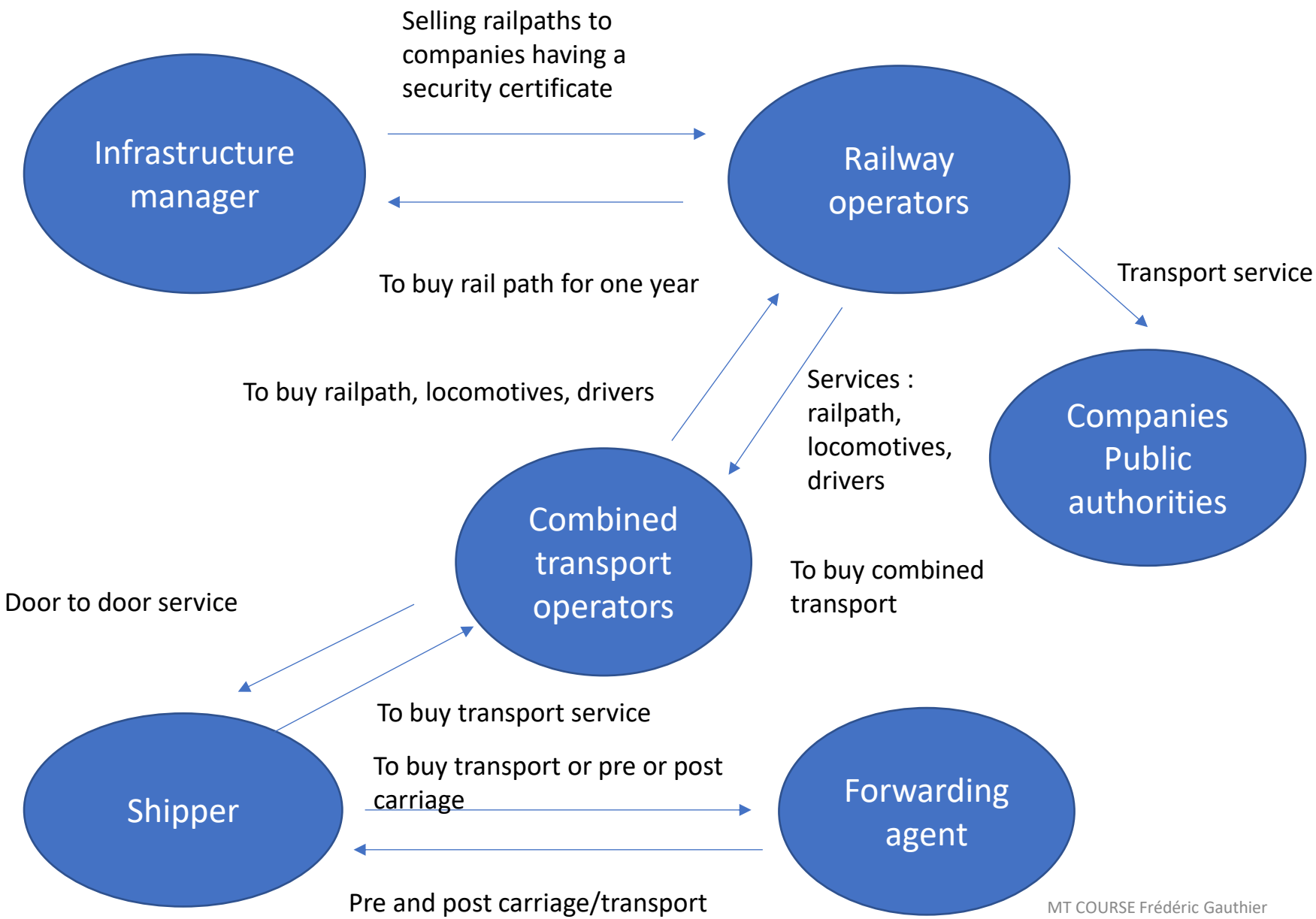
# 3-

- Short sea shipping in EU
  - Imo Fal
  - Marco Polo Programme
    - Programme
    - Structure
  - Loading units
  - Customs procedures for short sea shipping
  - A growth
  - Analysis per countries

# Continental & Multimodal choice

| About | Inlandwaterway | Railway |
|---|---|---|
| Full distance | From a short distance to 200 kms | More than 200 kms<br>Some cases less than 200 kms |
| Pre/post carriage | From 0 km on short distance<br>Till 150 km on a long distance | Less than 40 km<br>Latest km might increase drastically total cost |
| Volumes | General cargo from 1 FCL<br>Bulk : 250 t as a minimum (Freycinet barge)<br>Heavy and over sized goods | 22 to 24 rail cars 80 to 100 cbm<br><br>Filling rate more than 85 % |
| Services | On request to bulk or operating cycle or liner shipping | Round trip or one way |
| Frequency | Just in time is possible | Can meet with rigidity (timetable, location which is compulsory, Investment justified with flows (locomotive, raicars) highest productivity as a goal |
| Regular flows | Non specific constraint : taking care of mode disruption | Regular and sustainable flows |
| Goods | Heavy bulk or heavy general cargo, intermodal transport unit | Heavy goods (steel, construction material, drinks) and bulk sand, cereals, coal …) |
| Offer | 10 to 15 brokers in France<br>Several shipowners<br>Direct chartering | One historical rail carrier in France<br>2 competitors<br>Network RFF in France : to get train pathes |

# Road and rail




Intermodal freight transport in Europe
24% of freight vehicles in E.U. run empty
The average loading of the rest is 57%
There is an estimated recoverable loss for the E.U. of € 160 bn
Main evolution
European ports ranking
Trends in freight transport
Increasing by free trade
Land use and different transport systems and .. infrastructures
Increasing number of terminals for all kinds of shifts

# V- Operators

1- Physical distribution

2- Network

3- Multimodal transport operator

4- Selection methods

# 1- Physical distribution

**Legal types of carriage**

**For hire**

- Common carrier

**Or private**

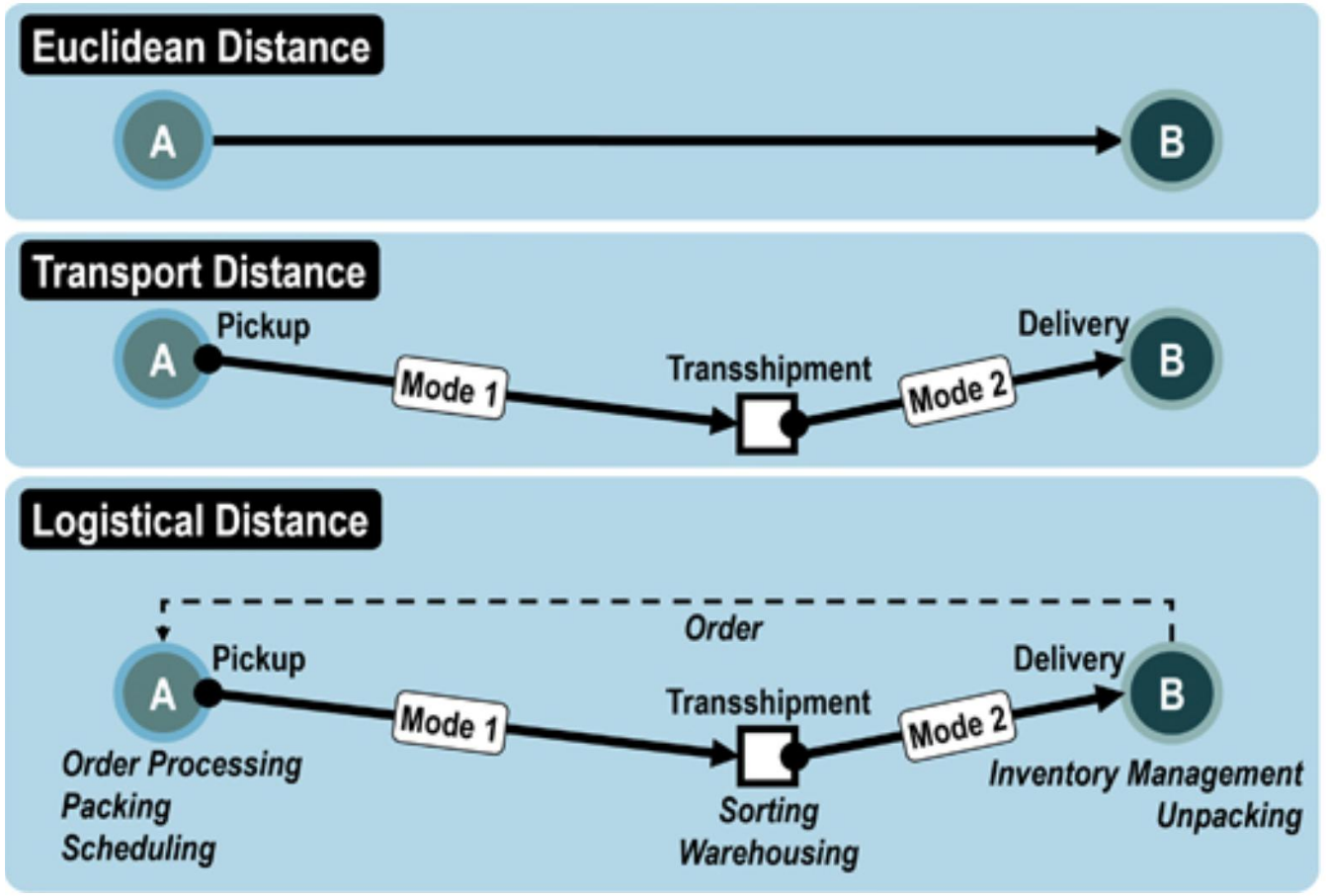
**Service capability**

- Market place under schedules and regulations

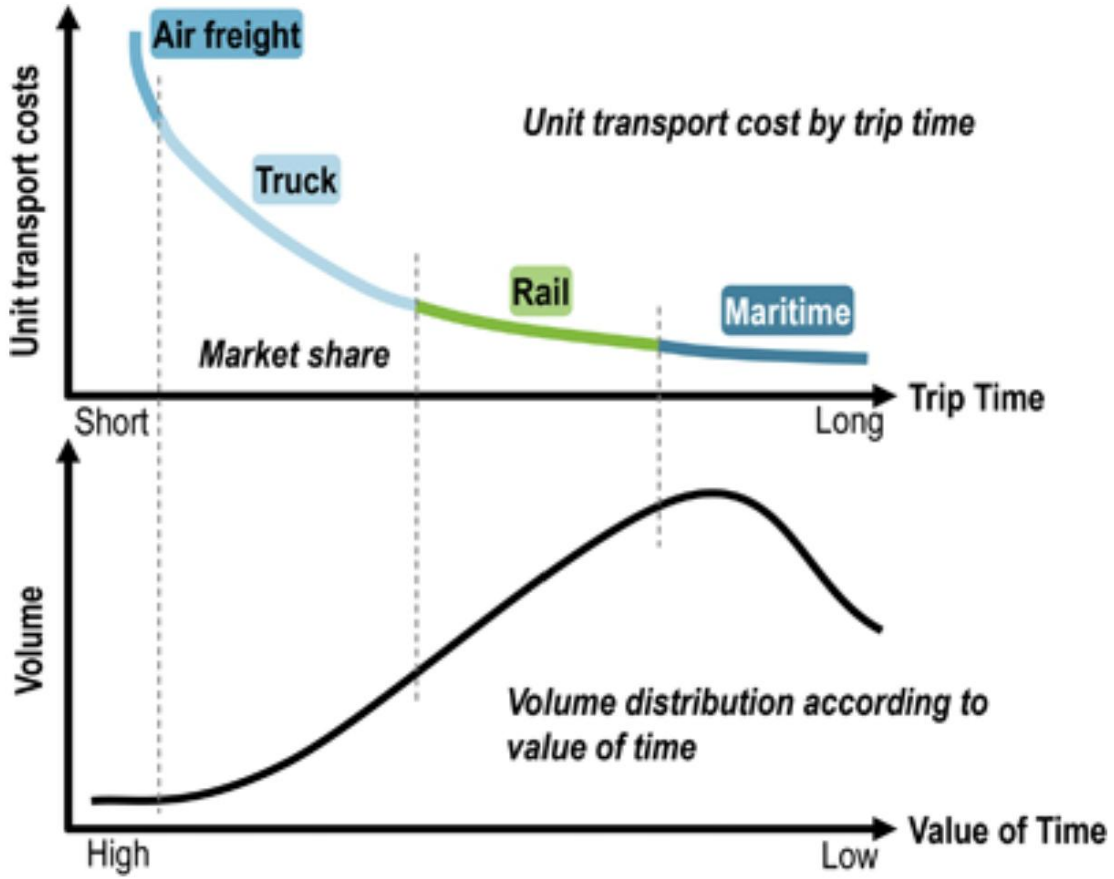
**Other transportation agencies to remember**

- Post office
- Freight forwarders

# Distance factor TO REMIND



# Time and transport market



# 1- Physical distribution

- Transportation cost elements
  - **Line-haul costs**
    - Distance factor
    - Limitations to weight and cubic volume
  - **Pick-up and delivery costs**
    - And consolidation to reduce possibly the cost
  - **Terminal handling**
    - Number of times to load, handle and disload
    - consolidation factor is also critical
  - **Billing and collecting**
    - And paperwork
  - **Total transportation costs management**
    - Decreasing costs
      - Line haul (by increasing weight),
      - Pick up (by reducing number),
      - Terminal, billing
  - **Insurance**
    - Value and density
    - Perishability
    - Packaging
    - Two rate structures LTL and FTL

# 1- Physical distribution

- **Warehousing**
  - Plant, regional, local and … wholesalers
  - Role of warehouses
    - General and distribution
    - Transportation reduced by using warehouses
    - Product mixing (different locations)
  - **Market boundaries**
    - Laid-down cost
    - Example Toronto / Boston
      - LTL cost 0.20 $ Product cost at Boston 70$ and 10$ in Toronto and 500 miles distance
  - **Effect on transportation costs of adding more warehouses**
    - Full truckload : cost increase and L.T.L. cost decrease
      - More distribution centers
      - Saving decrease with the major first distribution centers
    - Package care
    - Unitization
      - Pallets

# 2- network

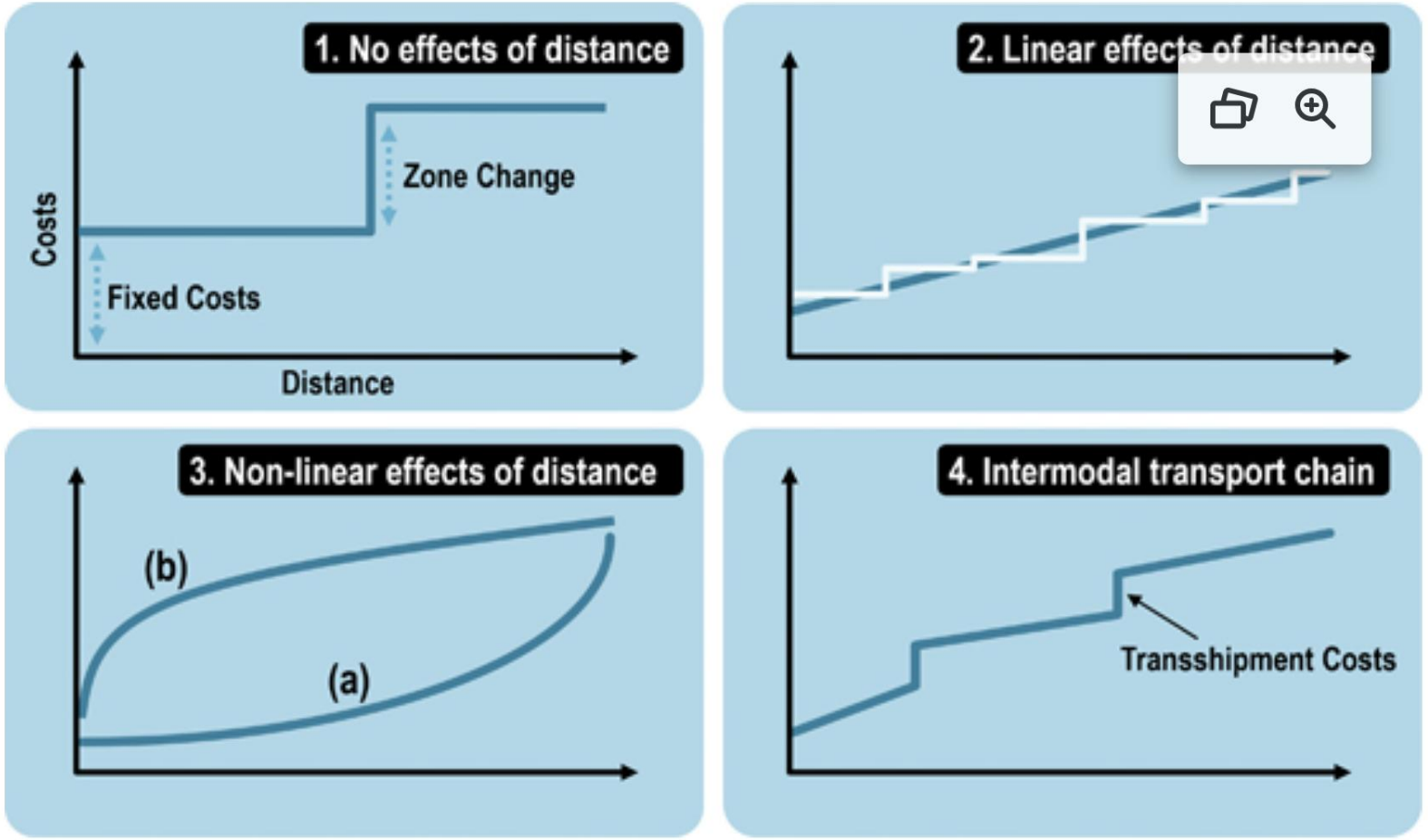
Situation

Types of transportation

Forwarding agent

- Cost
  - **Variable and fixed costs**
    - Line haul
    - Fixed costs depends on mode
  - Common or join costs
    - Arbitrary cost allocation
    - The back haul

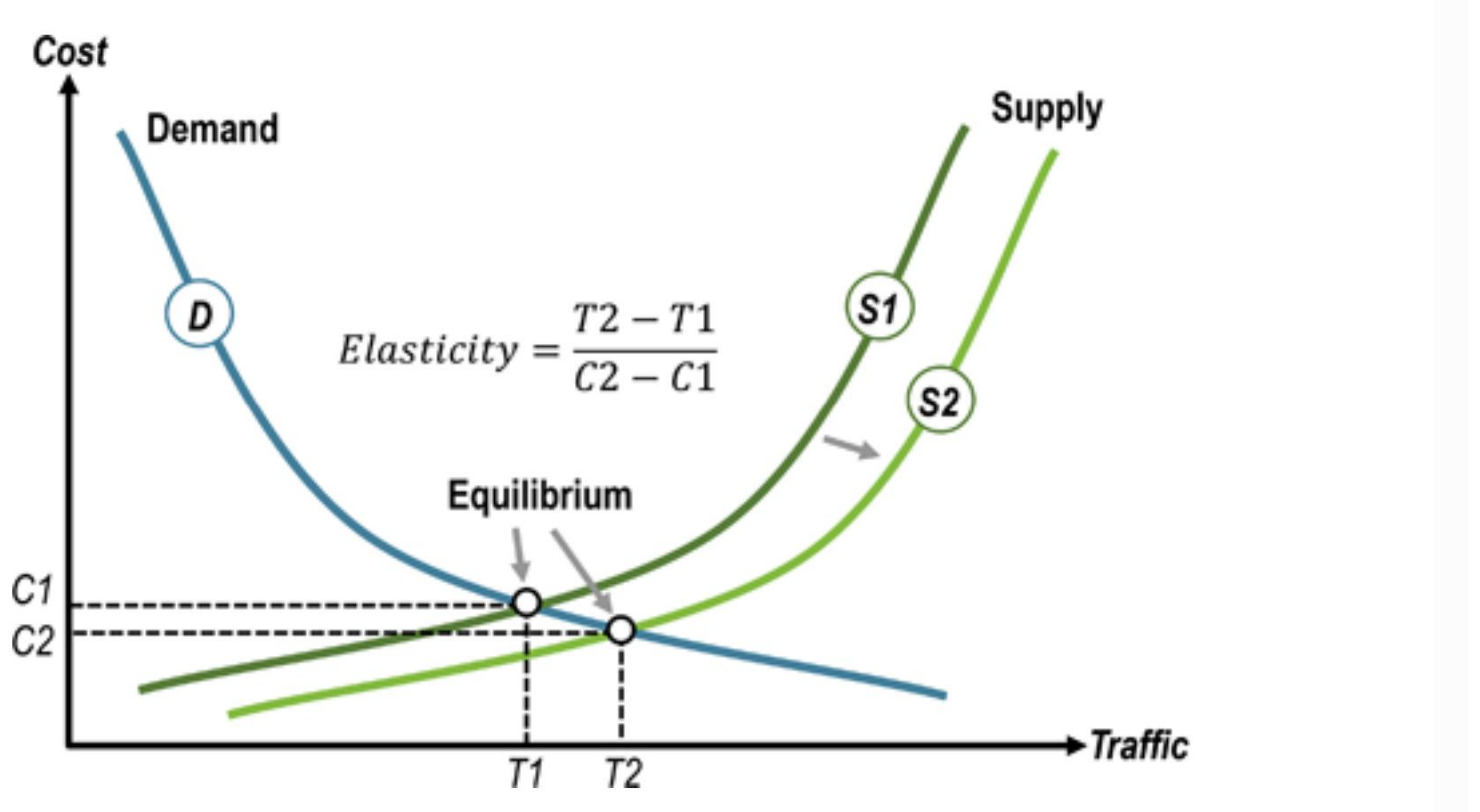
# cost


1. No effects of distance
Costs
Zone Change
Fixed Costs
Distance
2. Linear effects of distance
3. Non-linear effects of distance
(b)
(a)
4. Intermodal transport chain
Transshipment Costs

# Factors REMINDER

- **Transport time**
  - Concerns the real duration of transport
  - Geographical **constraints** such as weather or technical
  - Transport time on roadways is technically limited to legal speed limits.
  - The limitation of maritime and air concerns fuel economy and design speed. Although rail can accommodate a variety of speeds, schedules impose limited variations.
- **Order time**
  - advance preparation, mainly to secure a capacity, an itinerary, and a rate.
  - some cases, the **order time is short** and a matter of queuing on a first-come, first-served basis
  - **large shipments**, orders must be secured months in advance so that capacity can be made available. This is the case for maritime shipping
  - also the presence of a **spot market** where capacity can be booked with limited advance notice, but subject to higher rates and the likelihood that there will be no capacity available.
- **Timing**
  - Involves the usage of a specific departure time
  - While air and rail travel timing is commonly tight due to **fixed schedules** and access to a terminal capacity commuters and trucking have more flexibility
  - **trucking companies** may elect to modify their schedule accordingly (earlier or later delivery).
- **Punctuality.**
  - The longer the distance, the more likely potential disruptions may affect schedule integrity
- **Frequency**
  - The number of departures for a specific time range
  - Combining **long-distance travel and high frequency** is an expensive undertaking for transport providers as a greater number of vehicles must be assigned to a specific route, as in the case of maritime container shipping.

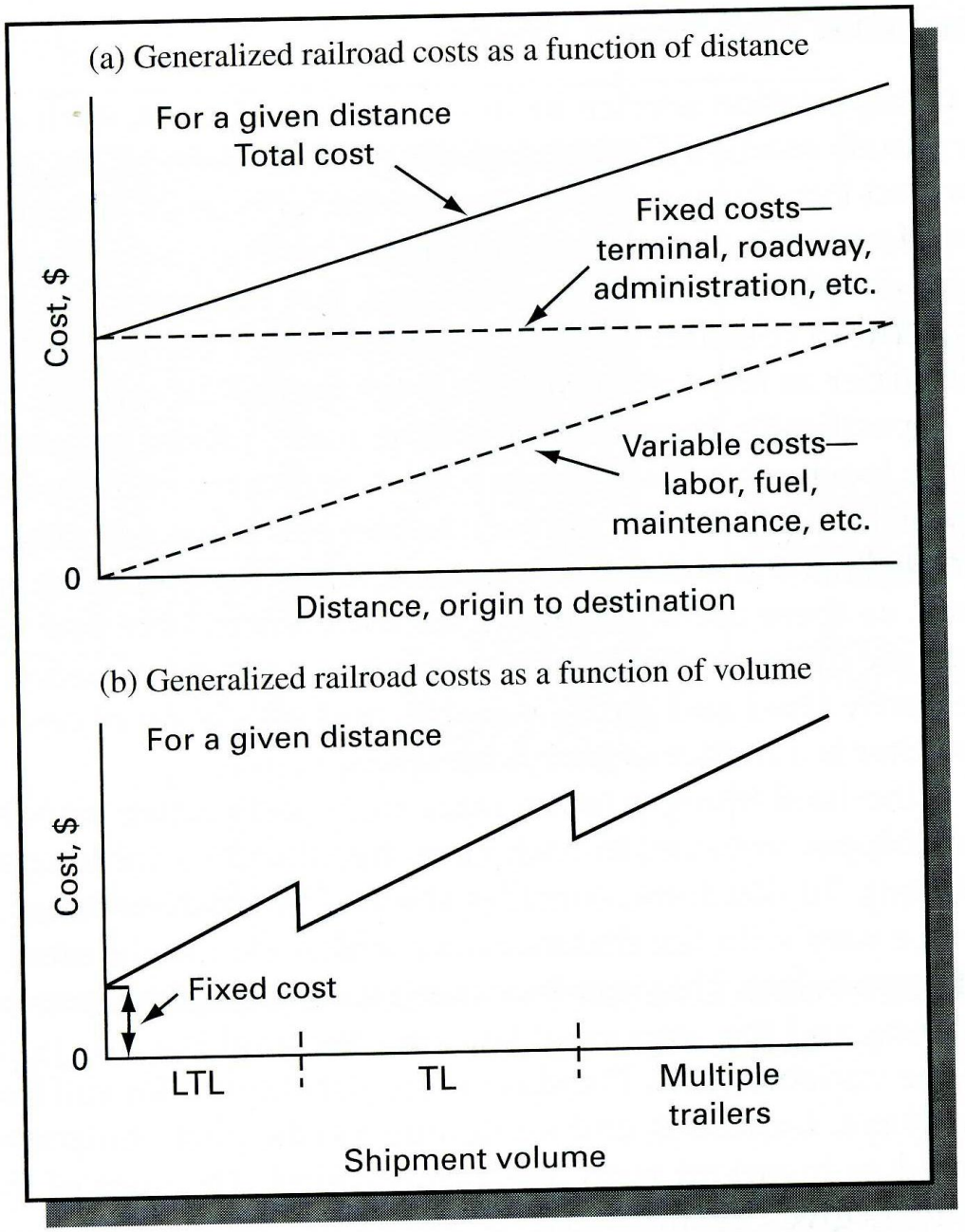
# Supply tends to be larger than demand




"If costs are high, transport providers would be willing to supply high quantities of services since high profits will likely arise under such circumstances. If costs are low, the quantity of transport services would be low as many providers would see little benefits operating at a loss."

# Total cost

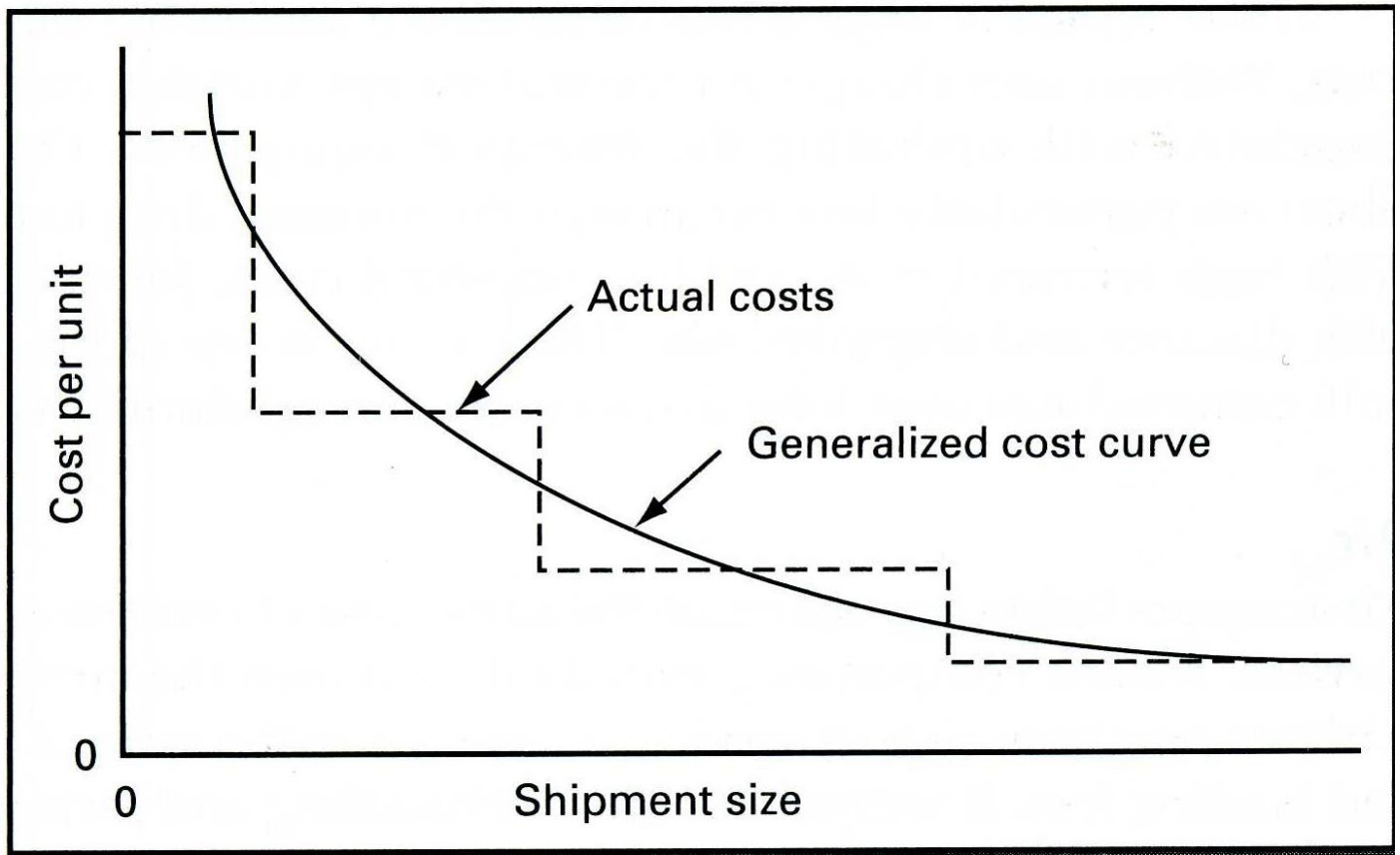
**Figure 6-4**
Generalized Railroad Costs (and Revenues) As Functions of Volume and Distance



- Cost characteristics by mode
  - **Rail**
    - Terminal cost
    - To add to fixed cost
    - Rail road
    - Economies of scale
    - To maximize time utilization

# Shipment size

**Figure 6-5**
Generalized Surface Carrier Cost Structure Based on Shipment Size

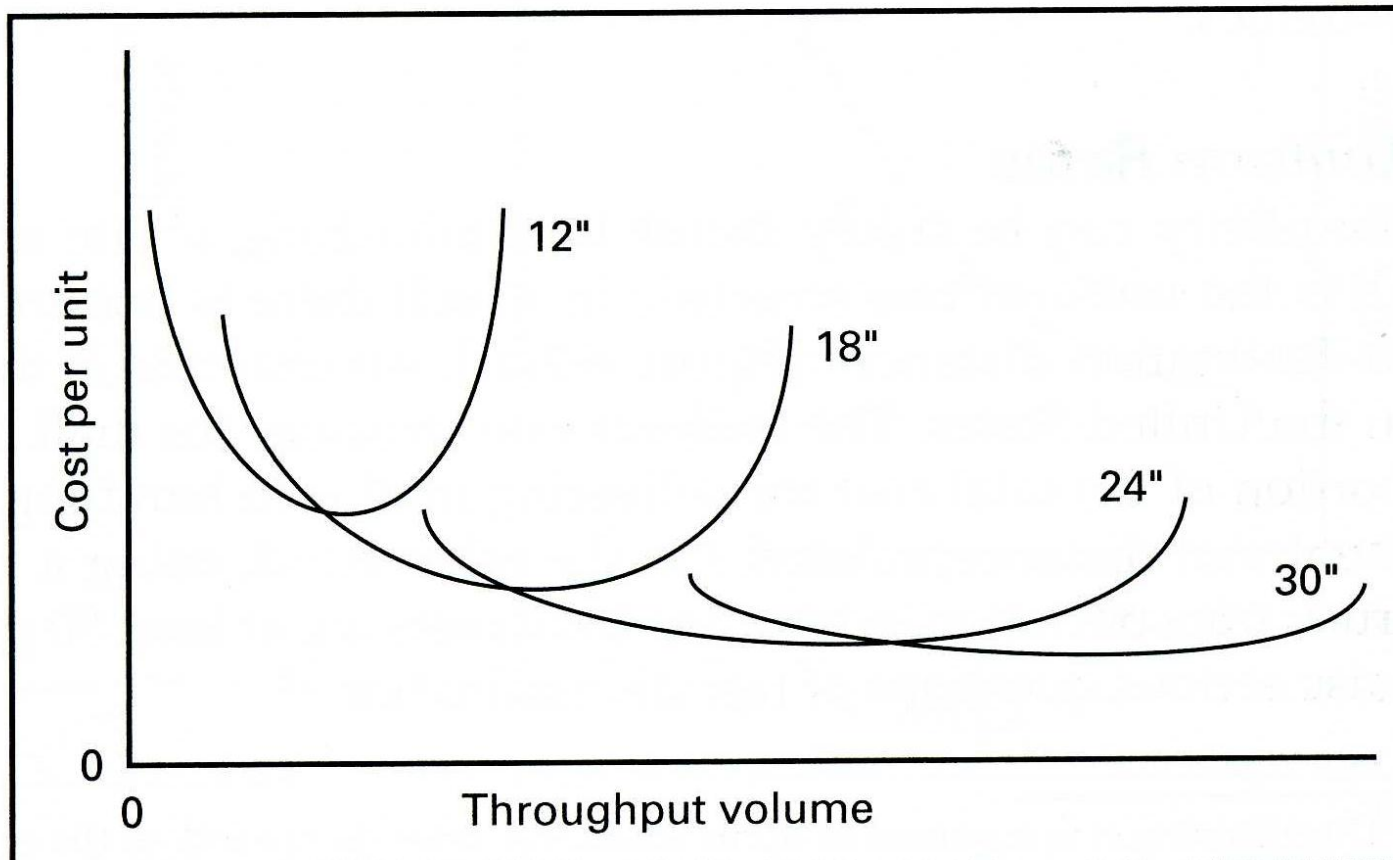


- **Costs and rates in Europe**
  - Highway
    - Variable cost
  - Water
    - Equipment and terminal
    - Loading and unloading : slow and high cost
  - Air
    - Includes usually air space and terminal
    - Variable cost influenced **by distance**
  - Pipeline

# Pipeline

17% in the U.S.

**Figure 6-6**
Generalized Pipeline Costs As Functions of Pipe Diameter and Throughput Volume

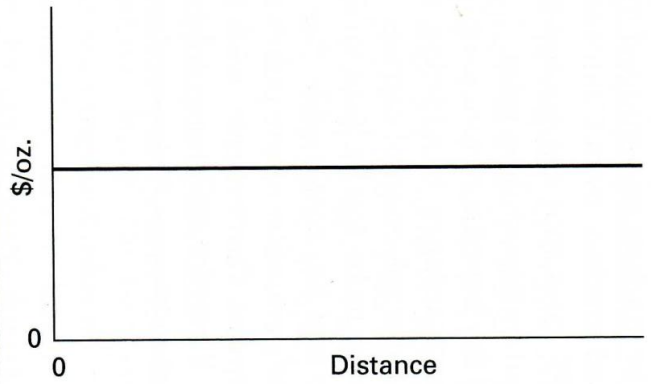


- **Rate profiles**
  - Volume related rates
    - Any quantity rate
  - Distance related rates
    - Uniform rates
      - Example Mail and handling

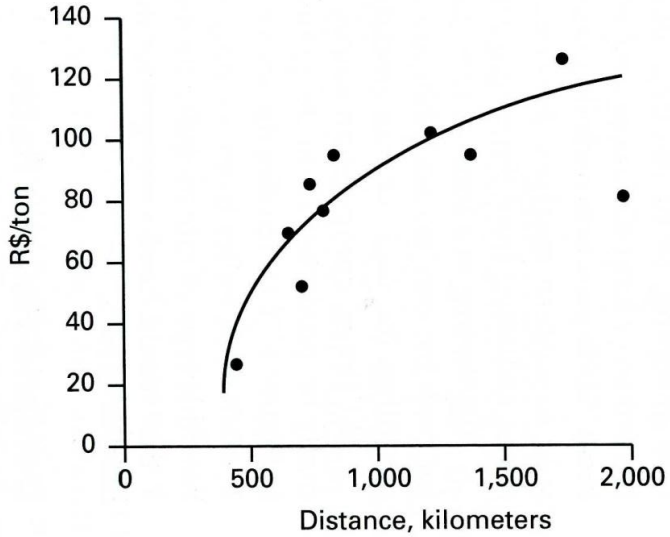
# Uniform rates

**Figure 6-7** Four Distance-Related Freight Rate Structures

(a) Uniform rate—First class mail




(c) Tapering rates—Brazilian less than truckload



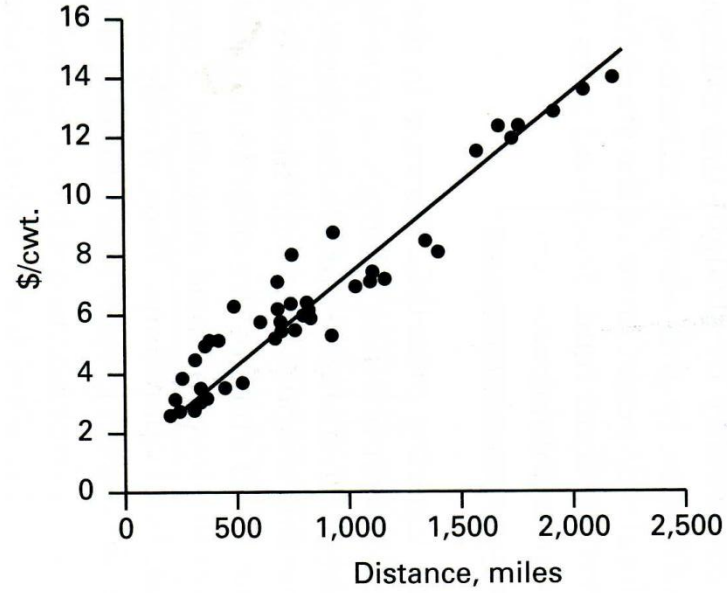
Tapering rates cost

increasing with distance but at a decreasing rate

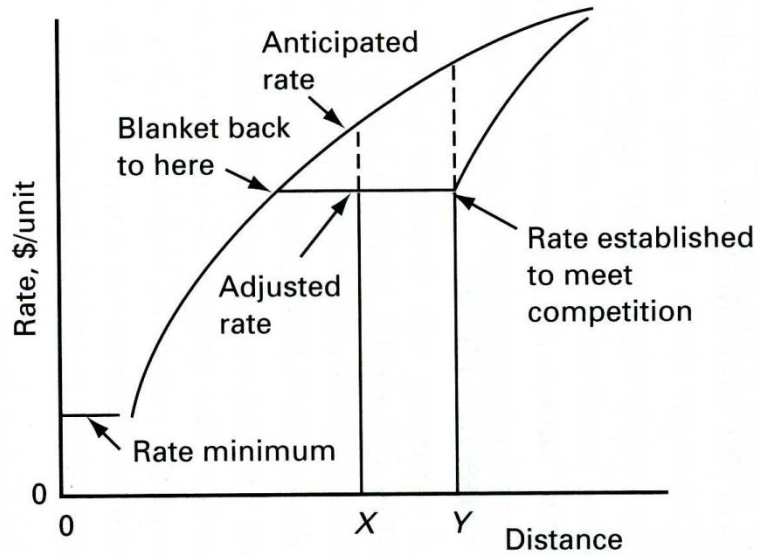
Blanket rates, area

Demand-related rates

(b) Proportional rates—Truckload

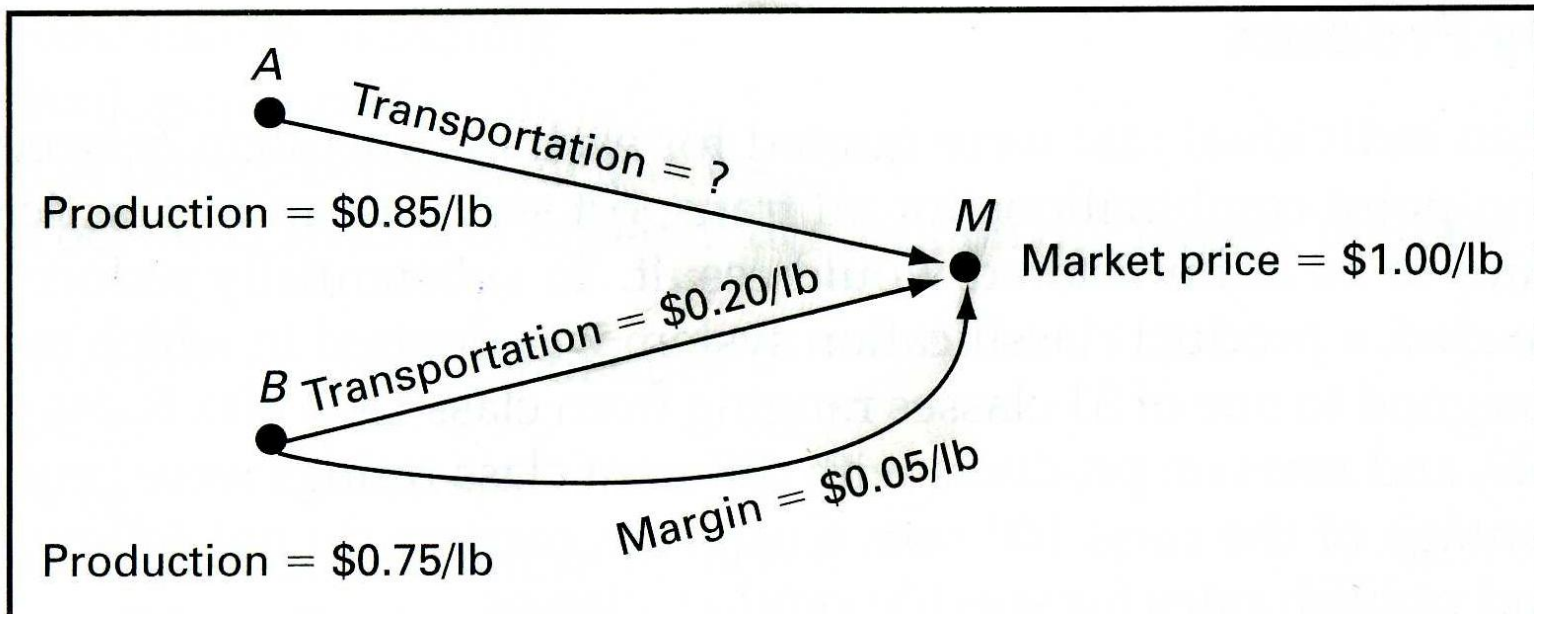



(d) Blanketing rates



# Transport added value

**Figure 6-8**
Value of Transportation Service



## By product

- Uniform freight classification
- Factors as density, stowability, ease of handling and liability
- Ratings of analogous articles
- Other factors : value, injury to other goods, risks, kind of package

## Class rates

- Break weight
- Next rate x next weight divided by current rate

**Table 6-4** National Motor Freight Classification for Selected Products

| Item Number | Description | Less-Than Truckload | Truckload | Minimum Weight, lb |
|---|---|---|---|---|
| | ABRASIVES GROUP: | | | |
| | Alundum, Corundum, Emery or other Natural or Synthetic Abrasive Material, consisting chiefly of aluminum oxide or silicon carbide: | | | |
| 1070-00 | Crude or lump, LTL, in bags, barrels or boxes: TL, loose or in packages | 55 | 35 | 50,000 |
| 1090-00 | Flour or grain, in packages | 55 | 35 | 36,000 |
| 2010-00 | Refuse, including broken wheels, wheel stubs or wheel grindings, in packages; also TL, loose | 55 | 35 | 40,000 |
| 2030-00 | Wheels, pulp grinding, on skids or in boxes or crates | 55 | 40 | 30,000 |
| 2055-00 | Cloth or Paper, abrasive, including Emery Cloth or Paper or Sandpaper, in packages | 55 | 37.5 | 36,000 |
| 2070-00 | Accessories or Furniture, cat or dog, in boxes and having a density on pounds per cubic foot of: | | | |
| 2070-01 | Less than 1 | 400 | 400 | AQ[a] |
| 2070-02 | 1 but less than 2 | 300 | 300 | AQ[a] |
| 2070-03 | 2 but less than 4 | 250 | 250 | AQ[a] |
| 2070-04 | 4 but less than 6 | 150 | 100 | 12,000 |
| 2070-05 | 6 but less than 8 | 125 | 85 | 15,000 |
| 2070-06 | 8 but less than 10 | 100 | 70 | 18,000 |
| 2070-07 | 10 but less than 12 | 92.5 | 65 | 20,000 |
| 2070-08 | 12 but less than 15 | 85 | 55 | 26,000 |
| 2070-09 | 15 or greater | 70 | 40 | 36,000 |
| | ADVERTISING GROUP: | | | |
| | Advertising Matter, NOI, prepaid, in packages | | | |
| 4660-01 | Cloth or oilcloth | 85 | 55 | 24,000 |
| 4660-02 | Paper or paperboard, other corrugated or fluted | 70 | 40 | 30,000 |
| 4740-00 | Almanacs, prepaid, in packages | 77.5 | 55 | 24,000 |

| | |
|---|---|
| Contract rates | • Special rates |
| Freight all-kinds | |
| By shipment size | • Minimum quantity |

**Table 6-6** Selected Class Truck Rates in $ per cwt. by Classification Number and Weight-Break Quantity in lb for Shipments from Louisville, Kentucky, to Chicago, Illinois

| MC[a] $75.40 CLASS | <500 | ≥ 500 | ≥ 1,000 | ≥ 2,000 | ≥ 5,000 | ≥ 10,000 | ≥ 20,000 | ≥ 30,000 | ≥ 40,000 |
|---|---|---|---|---|---|---|---|---|---|
| 500 | 165.39 | 132.31 | 99.26 | 82.70 | 59.51 | 54.44 | 28.67 | 28.67 | 28.67 |
| 400 | 139.03 | 111.22 | 83.43 | 69.51 | 50.03 | 45.76 | 24.10 | 24.10 | 24.10 |
| 300 | 110.26 | 88.21 | 66.17 | 55.13 | 39.68 | 36.68 | 19.11 | 19.11 | 19.11 |
| 250 | 95.88 | 76.70 | 57.54 | 39.55 | 34.50 | 31.56 | 16.62 | 16.62 | 16.62 |
| 200 | 79.10 | 63.28 | 47.47 | 39.55 | 28.46 | 26.04 | 13.71 | 13.71 | 13.71 |
| 175 | 69.51 | 55.61 | 41.72 | 34.76 | 25.01 | 22.88 | 12.05 | 12.05 | 12.05 |
| 150 | 62.32 | 49.86 | 37.40 | 31.16 | 22.43 | 20.51 | 10.80 | 10.80 | 10.80 |
| 125 | 52.73 | 42.19 | 31.65 | 26.37 | 18.98 | 17.36 | 9.14 | 9.14 | 9.14 |
| 110 | 52.34 | 40.27 | 30.21 | 25.17 | 18.11 | 16.57 | 8.73 | 8.73 | 8.73 |
| 100 | 47.94 | 38.35 | 28.77 | 23.97 | 17.25 | 15.78 | 8.31 | 5.69 | 4.37 |
| 92.5 | 45.54 | 36.43 | 27.33 | 22.77 | 16.39 | 14.99 | 7.89 | 5.41 | 4.15 |
| 85 | 42.19 | 33.75 | 25.32 | 21.09 | 15.18 | 13.89 | 7.31 | 5.01 | 3.85 |
| 77.5 | 39.79 | 31.83 | 23.88 | 19.90 | 14.32 | 13.10 | 6.90 | 4.72 | 3.63 |
| 70 | 37.39 | 29.91 | 22.44 | 18.70 | 13.46 | 12.31 | 6.48 | 4.44 | 3.41 |
| 65 | 35.48 | 28.38 | 21.29 | 17.74 | 12.77 | 11.68 | 6.15 | 4.21 | 3.23 |
| 60 | 34.04 | 27.23 | 20.43 | 17.02 | 12.25 | 11.20 | 5.90 | 4.04 | 3.10 |
| 55 | 32.60 | 26.08 | 19.56 | 16.30 | 11.73 | 10.73 | 5.65 | 3.87 | 2.97 |
| 50 | 31.16 | 24.93 | 18.70 | 15.58 | 11.21 | 10.26 | 5.40 | 3.70 | 2.84 |

[a] MC = minimum charge in $

*Source*: Southern Motor Carriers' CZAR-LITE software.

- **Other incentive rates**
  - In excess rates, quantity exceeding the vehicle minimum load
  - Unit trains example
    - Single commodity trains

**Table 6-7** Examples of Transportation Charge Computations for Different Shipment Combinations of Class Ratings, Distances, and Shipment Weights

| Example | Shipment Specifications | Calculation Rate, $/cwt. | Actual Freight of Charges | Charges | Comments |
|---|---|---|---|---|---|
| A | Item 2070-02; Louisville, KY, to Chicago, IL; Volume = 300 lb. | MC = $75.40, $110.26 | $110.26 × 3 = $330.78 | $330.78 | Class = 300 from Table 6-4; Rate from Table 6-6 |
| B | 200 lb of paper calendars; Louisville, KY, to Chicago, IL | MC = $75.40, $37.39 | 37.39 × 2 = $74.78<br>Pay minimum charge | $75.40 | Class = 70 for item 4800-02 in Table 6-4; Rate from Table 6-6 |
| C | Cat furniture; New York, NY, to Portland, OR; Volume 15,000 lb at a density of 5 lb/cu. ft. | MC = $197.25, $58.19 | $58.19 × 150 = $8,728.50<br>Break quantity is 17,680 lb[a] | $8,728.50 | Class = 100 for item 2070-05 from Table 6-4; Rate from Table 6-5 |
| D | 150 lb of books printed on glossy paper; Louisville, KY, to Chicago, IL | MC = $75.40, $39.79 | $39.79 × 1.5 = $59.69<br>Pay minimum charge | $75.40 | Class = 77.5 for item 4860-02 from Table 6-4; Rate from Table 6-6 |
| E | 18,000 lb. of bags with advertising; Louisville, KY, to Chicago, IL | LTL: $15.78 @100<br>TL: $6.48 @70[b] | LTL: $15.78 × 180 = $2,840.40<br>TL: 6.48 × 200 = $1,296.00 | $1,296.00<br>Ship TL at lower class and rate | Class = 100 LTL and 70 TL for item 4745-00 from Table 6-4; Rates from Table 6-6 |
| F | Grain in packages; Louisville, KY, to Chicago, IL: Volume 27,000 lb | $5.65@20,000<br>$3.87 @30,000 | $3.87 × 300 = $1,161.00<br>Break quantity is 20,549 lb | $1,161.00 | Class = 55 for item 1090-00 from Table 6-4; Rates from Table 6-6 |
| G | Class 100 item; New York, NY, to Little Rock, AR; Volume = 40,000 lb; 40% rate discount | $17.56 less 40% = $10.54 | $10.54 × 400 = $4,216.00 | $4,216.00 | Rate from Table 6-5 |
| H | 40,000 lb of refuse; Louisville, KY, to Chicago, IL | TL Class = 35<br>Rate @35% of 4.37 = 1.52[c] | $1.52 × 400 = $608.00 | $608.00 | Class = 35 for item 2010-00 from Table 6-4; Base rate from Table 6-6 |
| I | Class 100 item; New York, NY, to Dallas, TX; 45,000 lb; Minimum volume for truckload = 36,000 lb; in-excess rate offered = $15.00/cwt.[d] | TL: Rate = $20.52 | TL: $20.52 × 360 = $7,387.20<br>EX: $15.00 × 90 = $1,350.00<br>Total $8,737.20 | $8,737.20 | Rate from Table 6-5 |

[a]Break quantity = (51.44 ÷ 58.19) × 20,000 = 17,680 lb
[b]Rate for class 70 and shipping weight of 20,000 lb
[c]Rate is approximate as a percent of class 100 rate. A truckload rate is likely to be quoted separately from the tabled rates.
[d]Rate applies to all weight in excess of the minimum volume. The minimum volume moves at the CL rate.

By route

Miscellaneous rates

- Cube rates
- Import/export rates
- Deferred rates : increasing delays
- Released value rates

Ocean rates

special service charges

- Diversion and reconsignement, waiting for the ultimate destination
- Special line Haul services
- Transit privileges

# STOP OFF PRIVILEGE

**Figure 6-9**
Example of Stop-Off Privilege to Complete Loading

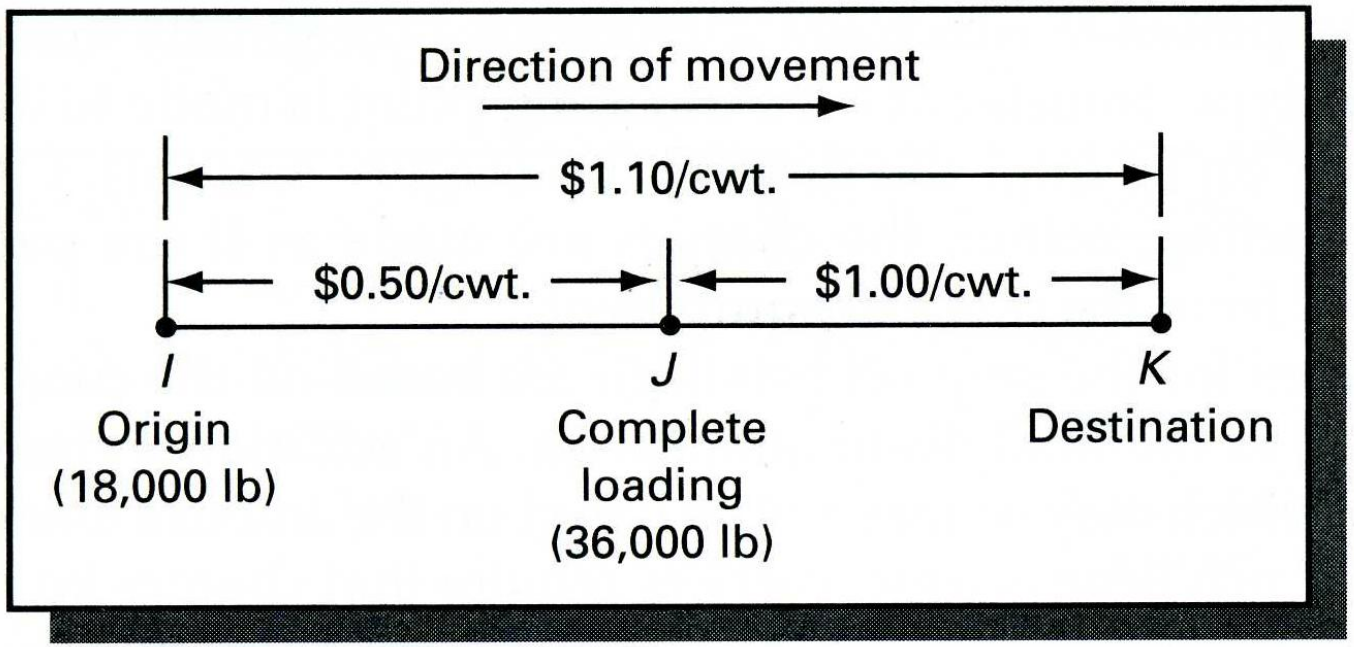


**Table 6-8** Freight Charges for Example Problem with and Without a Stop-Off Privilege

| Loading | Route | Rate | Charges Without Stop-Off Privilege | Rate | Charges With Stop-Off Privilege |
|---|---|---|---|---|---|
| 18,000 lb at *I* | *I* to *J* | $0.50/cwt. | $ 90.00 | — | — |
| additional | *I* and *J* | $1.00/cwt.[a] | 540.00 | $1.10/cwt.[b] | $594.00 |
| 36,000 lb at *J* | to *K* | stop-off charge | — | stop-off charge | 25.00 |
| | | Total charges | $630.00 | Total charges | $619.00 |

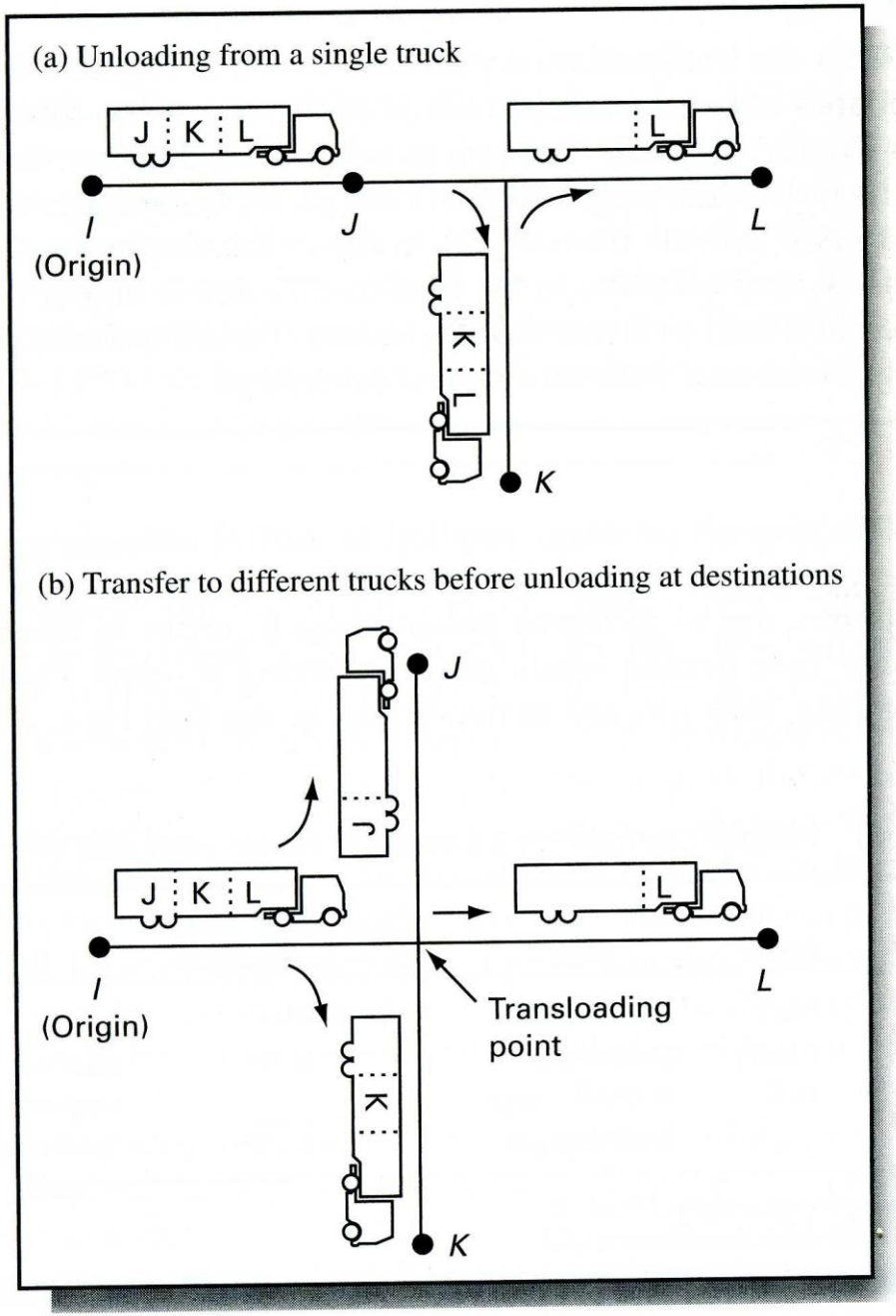
[a]Based on the combined weight of 54,000 lb.
[b]Rate applies from point *I* on complete load.

**Table 6-9** A Comparison of Total Charges for Partial Unloading of Two Points With and Without a Stop-Off Privilege

| | Without Stop-Off Privilege | | | | With Stop-Off Privilege | | | |
|---|---|---|---|---|---|---|---|---|
| | Load, lb | Points | Rate, $/cwt. | Freight charges | Load, lb | Points | Rate $/cwt. | Freight charges |
| | 8,000 | *I* to *J* | 3.05 | $ 244.00 | 30,000 | *I* to *J* | 3.00 | $900.00 |
| | 12,000 | *I* to *K* | 3.35 | 402.00 | | | 3 stops @ $15/stop[a] | 45.00 |
| | 10,000 | *I* to *L* | 3.60 | 360.00 | | | | |
| Total | 30,000 | Total charges | | $1,006.00 | | | Total charges | $945.00 |

[a]The endpoint *L* also incurs the stop-off charge.

**Figure 6-10**
Examples of Stop-Off Privilege for Partial Unloading



Also …

- Protection
  - Particular physical characteristics
- Interlining
- Terminal service
- Pick up and delivery
- Switching from sidings
- Demurrage and detention
- Private carrier costing

# 4- Multimodal Transport Operator

- Emergence of **horizontally linked global corporations** that, through acquisitions and mergers
  - similar operating companies in different markets.

- development of **vertically integrated corporations** that have grown by merger and acquisition
  - control several segments of the transport chain, namely modes and terminals.

- I**ntermediaries** that provide transport services on a global scale
  - 3PL companies operate in many markets and are major actors in the transport chain.

- **Alliances**, informal groupings of transport providers that pool resources and offer joint services between major global markets
  - partners combine their respective regional networks.

# 4- MULTIMODAL Transport Operator

MT Convention

- "Any person who on his own behalf or through another person acting on his behalf concludes a multimodal transport contract and who acts as a principal, not as an agent or on behalf of the consignor or of the carriers participating in the multimodal transport operations, and who assumes responsibility for the performance of the contract."

Acts as Principal/Carrier who enters into the contract of carriage for the entire route of transport

- There are two types of MTO:

- NVO-MTO: a non vessel operating common carrier multimodal transport operator

- VO-MTO : a vessel operating common carrier multimodal transport operator

# Difference between

Multimodal Transport Operator as Principal is the party who assumes responsibility for the performance of the contract of carriage commencing from the goods have been handed over to and accepted for carriage by him until delivery at the place of destination.

• Therefore, the responsibility of Principal is to carry the goods from origin point to destination point according to the contract of carriage. • MTO who acts as Principal is the party who issues the Transport Document

• Principal responsibility is cover to acts and omissions of his servants or agents, when any such servant or agent is acting within the scope of his employment, or of any other person of whose services he makes use for the performance of the contract

# Difference between

- **Principal liability** may be based on
  - a) Sea Transport :such as Hague Rules 1924, Hague Visby Rules 1968, **Hamburg Rules** 1978, Domestic laws or Back Clause of the Bill of lading
  - b) Air Transport: Warsaw Convention 1929, (**Montreal Convention**)
  - c) International Road Transport: **CMR 1956**
  - d) International Rail Transport: COTIF 1980 e) Any local applicable laws and regulations or oversea applicable law and regulations including Tort.
  - Multimodal Transport : **UNTAC/ICC Rules**, AFAMT (ASEAN Framework Agreement on Multimodal Transport), national laws where applicable.
  - when **performing Multimodal Transport Principal is liable on loss**, damage and delay in delivery of the goods after taken in charge until the time of delivery and/or any tort done by him or his agent, servant or other person of whose services he makes use for the performance of the contract

# Difference between

- **Agent in Multimodal Transport concept** is the party who acts on behalf of either
  - Consignor – as Customs broker or traditional Freight Forwarder
  - Consignee – as Customs broker or traditional Freight Forwarder
  - MTO Principal – as servant or subcontractor or Agent
  - If Agent signs bill of lading on behalf of MTO, shall he liable for the third party? Please refer to MTO definition of AFAMT.

Agent **liability** may be based on

- Consignor – Tort / wrongful act, infringement of a right, error and omission when he acts as Agent for Consignor
- Consignee – Tort / wrongful act, infringement of a right, error and omission when he acts as Agent for Consignee
- Principal – Tort / wrongful act, infringement of a right, error and omission when he acts as Agent for MTO.
- Third Party – Tort or any applicable laws

# Difference between

- Agent liability may be based on
  - Consignor when **Agent signs on MT Doc on behalf of MTO** (Principal)
  - Consignee when **Agent delivers the goods on behalf of MTO** (including Transit Agents who perform mode shift.)
  - AFAMT Article 24 para 2 **Claim can be made against** servant, agent or other person whose services the multimodal transport operator has used in order to perform the multimodal transport contract of MTO.

Other persons who are involved with Multimodal Transport

**Other person whose services the multimodal transport operator** has used in order to perform the multimodal transport contract of MTO can be referred as Airline, Shipping Line, MTO Agent is the party that possibly the claim could be filed according to Article 24 para 2 in AFAMT.

# M.T.O.

• SUBCONTRACTOR OR AGENTS/PARTNERS OF MULTIMODAL TRANSPORT OPERATOR **who is Principal**:

- Transit Subcontractor or Agents/Branches who performs transit procedure on behalf of MTO Principal
- Destination Subcontractor or Agent/Partner of MTO Principal who performs delivery at destination as Delivery Agent/break bulk Agent (including own branch offices)

- **Other related Services acting as MTO** (or either Freight Forwarder)
  - 1. Customs Broker including **hiring truck for local delivery** – As Agent of Consignor or Consignee.
  - 2. International Forwarding **by assisting Traders** to deal with Common Carriers moving the goods internationally and invoice only his Service charge and Handling charges, not freight charges – As Agent of Consignor or Consignee.

# M.T.O.

- Acting as **FREIGHT FORWARDER** Transport Service Provider:
  - Air Transport : become Agent of Airlines
  - Sea Transport : becomes principal or carrier as NVOCC taking responsibility as Common Carrier for FCL shipment
  - Truck Transport: international and Local service - Agent or Principal
  - Rail Transport: International & (Local service) – Principal
- Other related Services acting as FREIGHT FORWARDER
  - **Auxiliary Services**: Packing Service – non Transport sector
  - Cargo Consolidation:
    - a) provides LCL consolidation services acting as Carrier
    - b) performs Buyer Consolidation Service on behalf of Single Consignee acts as either Agent or Principal
    - c) perform on behalf of Shipper making consolidation for various consignees at destination, acts as Principal or Agent

# M.T.O.

- Acting as FREIGHT FORWARDER

  **Ship Broker**/Chartering Broker – acts as Agent

  Tank / Container Operator - acts as Principal

  Project Cargo Transport Operator – act as Principal or Agent

  Removal Service – act as Principal

  Exhibition Service - act as Principal

  Dangerous Goods Transport Operator - act as Principal

  Perishable & Live Animal Transport Service - act as Principal

  Warehouse Service – act as Principal or Agent - Common warehouse operator - Distribution & Cross Dock Service - act as Principal or Agent - Free zone and Bonded warehouse - In house warehouse operation and management

  Cold Chain and distribution service - act as Principal or Agent

# M.T.O.

- acting as FREIGHT FORWARDER
  - **Stevedoring Service** – acts as Principal or Agent
  - Related Logistics Services such as VMI, Cross dock, In house Customer service, 3PLs, 4PLs, and Lead Manager – act as Principal
  - Last Mile Delivery - act as Principal
  - Courier Service - act as Principal
  - Business Consultant – Free service
  - Insurance Broker - As Agent

# Registration of an MTO

- In ASEAN context, **MTO is required to make registration with competent national body**:
  - MTO shall possess the legal capacity as required by the provision where he applies and MTO shall have domicile where he applies
  - MTO shall have an insurance policy or P&I club (Protection and Indemnity) or alternative financial character
  - MTO **shall have an insurance policy**, a coverage from a protection and indemnity club, or an alternative of a financial character to cover payment of obligations for loss, damage or delay in delivery of goods under multimodal transport contracts, as well as contractual risks;
  - MTO shall maintain minimum assets equivalent to 80,000 SDR or provide an equivalent guarantee

# Registration of an MTO

- **Form of Multimodal Transport Documents**
  - House Multimodal Transport Bill of Lading
  - FIATA Multimodal Transport Document
  - Sea Waybill
  - Air Waybill
  - e- Bill of Lading
  - Memo Bill of Lading for cross trade shipment

Registration of transport documents might be needed according to countries

# 4- Selection methods

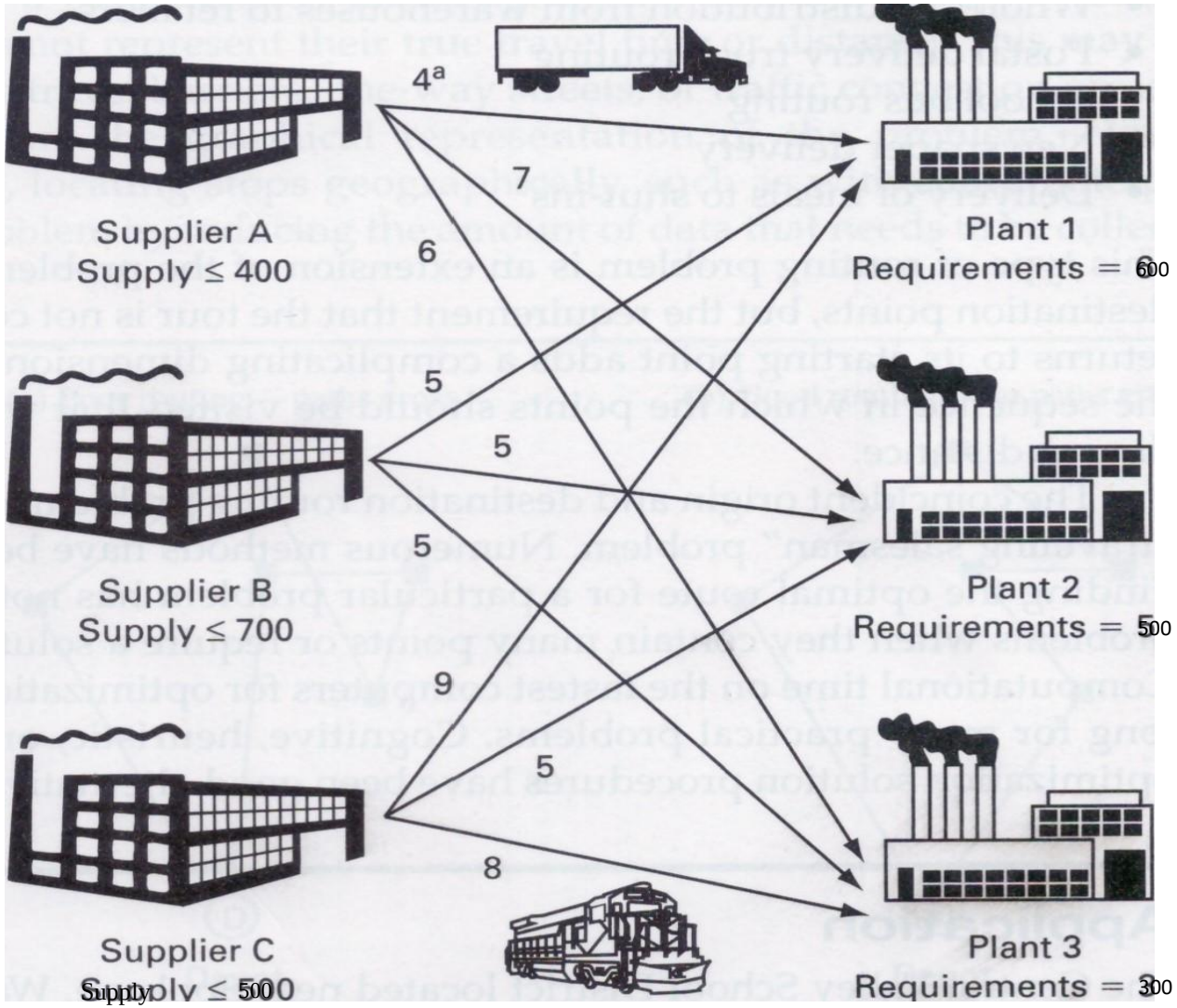
- Effective cooperation between supplier and buyer about price and service is **doubful** when separate entities are concerned
- A competing supplier in the distribution channel
- High quality service connected to … **price**
- Changes in conditions
- Inventories impact

# Shortest way

- The shortest route method
- **Comparing the total times to reach the unsolved nodes**
- Than to identify the solved nodes and to use the solved one for next iterations and to compare it with unsolved nodes
- Minimizing
  - Time
  - Distance

# Multiple origin and destination points

- More than one vendor, plant, or warehouse to serve more than one customer for the **same product**
- When the source points are restricted to the amount of the total customer demand that can be supplied from each location
- A special class of the **linear programming** algorithm
- Familiar examples
  - Beverage delivery to bars and restaurants
  - Currency delivery and scheduling at ATM machines
  - Dynamic sourcing and transport of fuels
  - Home appliance repair, service, and delivery
  - Internet-based home grocery delivery
- Example
  - Three soda ash (used in glassmaking) suppliers at various locations to supply three manufacturing facilities

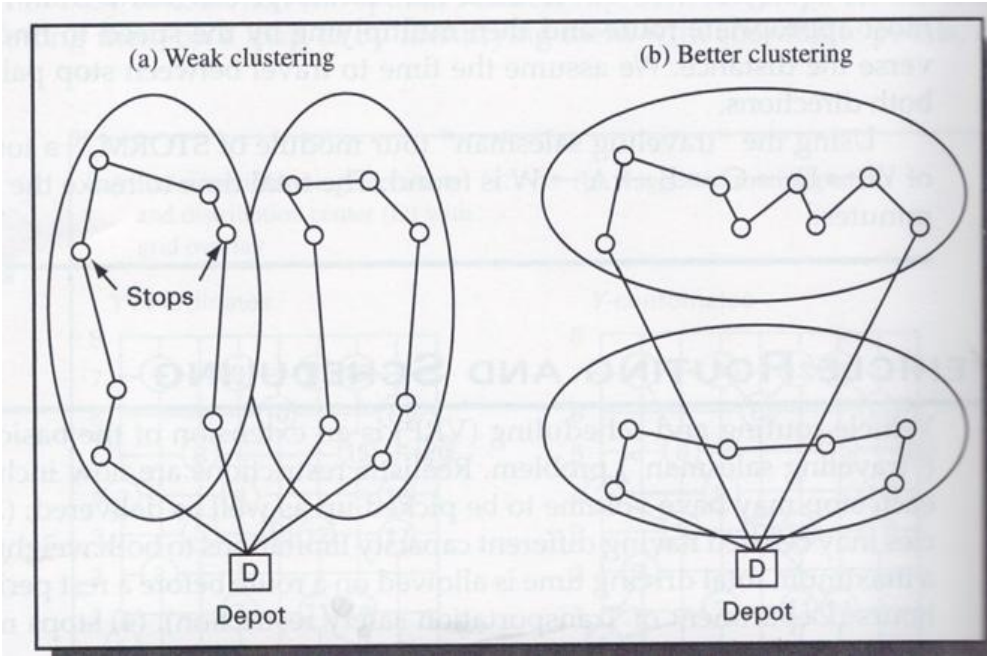

4ª
7
6
5
5
5
9
5
8
Supplier A
Supply ≤ 400
Supplier B
Supply ≤ 700
Supplier C
Supply ≤ 500
Plant 1
Requirements = 600
Plant 2
Requirements = 500
Plant 3
Requirements = 300

# Vehicle routing

- Points are spatially related
  - We know that **good stop sequences** are formed when the paths of the route **do not cross**
  - Clustering Stops by Day of the Week
    - When stops are to be served **during different days of the week**, the stops should be segmented into separate routing
  - Build routes beginning with **the farthest stop** from the depot.
  - Once the farthest stop is identified, selecting the volume from the tightest cluster of stops around this key stop

# Principles for good routing and scheduling

- Load trucks with stop volumes that are in the **closest proximity to each other**
- The sequence of stops on a truck route should form a **teardrop pattern**
- Time window restrictions and the forcing of stop pickups after **deliveries may cause route paths to cross**
- **Minimizing total distance cluster**



# Principles for good routing and scheduling

The most efficient routes are built using the largest vehicles available

P**ickups** should be mixed i**nto delivery** routes rather than assigned to the end of routes

A stop that is greatly removed from a route cluster is a good candidate for an alternate means of delivery (stops isolated with low volume)

**Time window restrictions** on narrow stops have to be avoided, can force stop sequencing away

Example

# The Case Casket Company manufactures and distributes a complete line of burial caskets to funeral homes

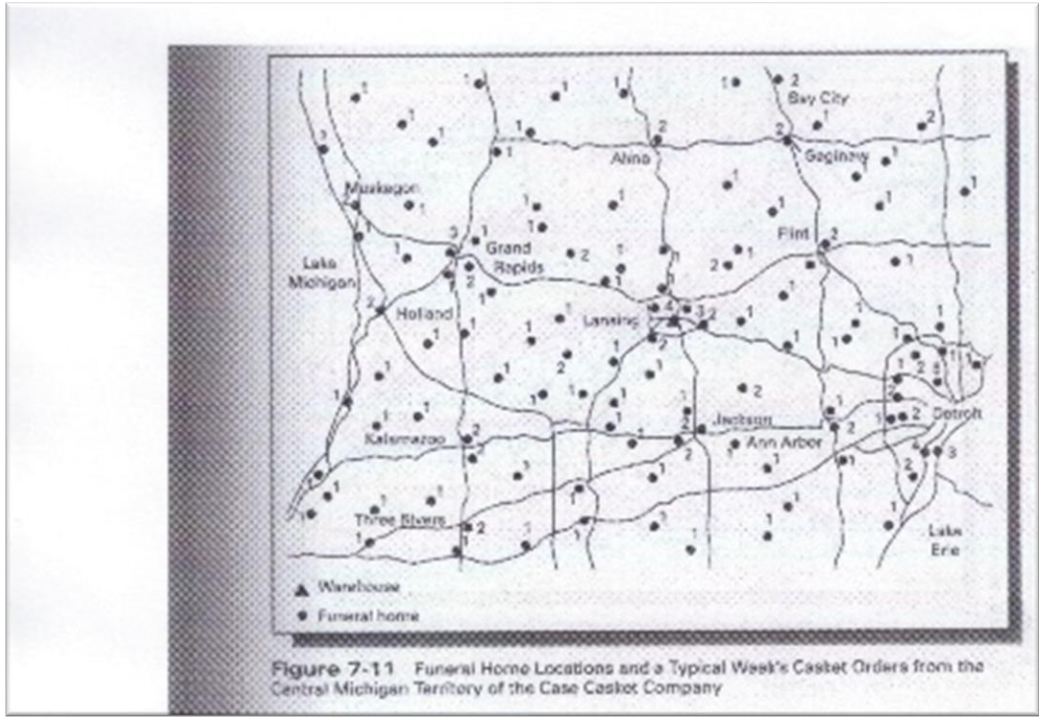
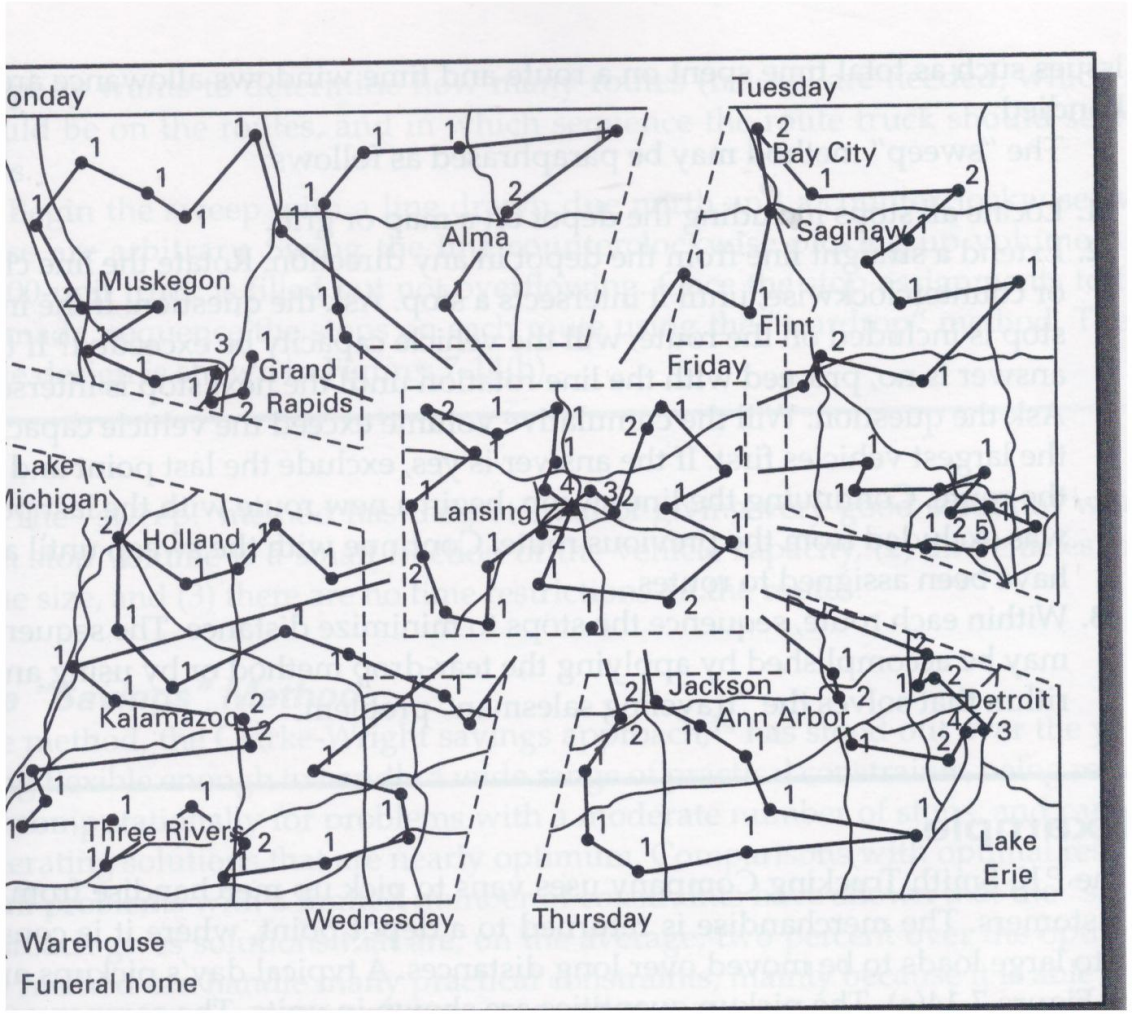


Figure 7-11 Funeral Home Locations and a Typical Week's Casket Orders from the Central Michigan Territory of the Case Casket Company

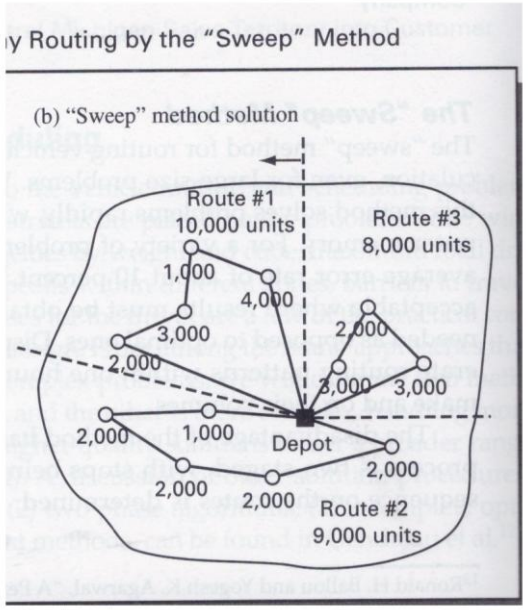
- Begin by **segmenting the territory** into five daily customer clusters based on five delivery days per week.
- Customers should be clustered starting with the **farthest customer** and then adding customers by progressively moving toward the warehouse
- Four customer groups for outlying stops for the first four days of the week, and one group for the fifth day that serves stops close to the warehouse

# And the result …



# The Sweep method

- Locate all stops including the depot **on a map grid**
- Extend a straight line from the depot in all directions
- **Rotate the line until it intersects a stop**
- If the inserted stop is on the route, check the truck capacity
  - Use the largest vehicle first
- Continue the line sweep, begin a new route with the last point excluded from the previous route
- **Within each route, sequence stops to minimize distance** (tear drop method)
- Constraints : total **time** spent on the route and time windows allowance



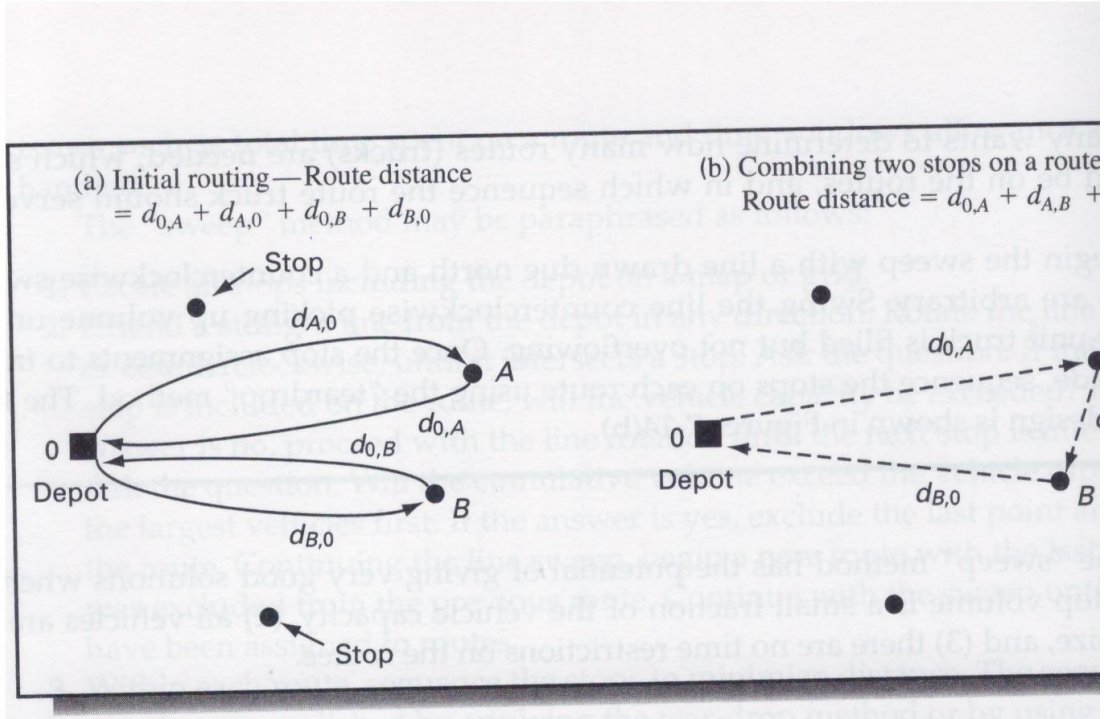



**Figure 7-15** Reduced Travel Distance Through Stop Consolidation on a

# The savings method

- More precise : **to minimize** the distance and minimize number of vehicles
- To begin with a dummy vehicle serving each stop and returning to the depot
  - Resulting in the **maximum distance to be experienced**
  - Next two stops are combined on the same route so that one vehicle can be eliminate et the distance reduced
- Example A and B
  - Saving result : doa+dbo-dab
  - This calculation is carried out for all stop pairs and we continue to combine
  - If a point is inserted on the same route, example :
    - S= doc +dco+dab-dac-dcb

Regalado in Toledo, Ohio, U.S.
x= 460 y= 720
5 trucks with a hauling capacity fo 40,000 lb each

| Construction Site | X | Y | Order Size, lb |
|---|---|---|---|
| Milwaukee, WI | 220 | 800 | 3,000 |
| Chicago, IL | 240 | 720 | 31,500 |
| Detroit, MI | 470 | 790 | 16,500 |
| Buffalo, NY | 670 | 860 | 6,000 |
| Cleveland, OH | 540 | 730 | 4,500 |
| Pittsburgh, PA | 630 | 680 | 6,750 |
| Cincinnati, OH | 420 | 570 | 3,750 |
| Louisville, KY | 370 | 490 | 6,000 |
| St. Louis, MO | 130 | 500 | 7,500 |
| Memphis, TN | 180 | 270 | 9,000 |
| Knoxville, TN | 480 | 360 | 5,250 |
| Atlanta, GA | 480 | 210 | 18,000 |
| Columbia, SC | 660 | 250 | 3,000 |
| Raleigh, NC | 760 | 390 | 6,750 |
| Baltimore, MD | 810 | 640 | 11,250 |
| Total | | | 138,750 lb |

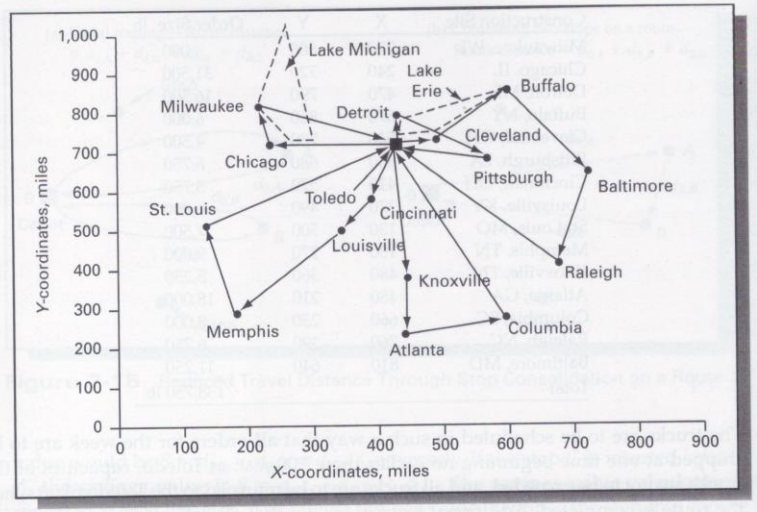



**Figure 7-16** Routing Plan for Regal Metal's Deliveries As Generated by the "Savings" Method in ROUTER

**Table 7-5** Arrival Time Summary for Regal Metals' Deliveries

| Stop | Arrival Time | Day | Stop | Arrival Time | Day |
|---|---|---|---|---|---|
| Milwaukee | 3:49 P.M. | 1 | St. Louis | 5:16 P.M. | 2 |
| Chicago | 1:19 P.M. | 1 | Memphis | 9:28 A.M. | 2 |
| Detroit | 8:47 A.M. | 1 | Knoxville | 4:43 P.M. | 1 |
| Buffalo | 3:17 P.M. | 1 | Atlanta | 8:51 A.M. | 2 |
| Cleveland | 8:57 A.M. | 1 | Columbia | 2:49 P.M. | 2 |
| Pittsburgh | 4:27 P.M. | 1 | Raleigh | 5:46 P.M. | 2 |
| Cincinnati | 10:45 A.M. | 1 | Baltimore | 10:05 A.M. | 2 |
| Louisville | 2:32 P.M. | 1 | | | |

# Result

| Stops[a] | Time: Start | Day | Return | Day | Route Distance, mi | Route Time, (Hr) | Route Weight, (lb) | Truck Size, lb |
|---|---|---|---|---|---|---|---|---|
| 2,1 | 7:00 A.M. | 1 | 1:44 P.M. | 2 | 787 | 30.7 | 34,500 | 40,000 |
| 3,6 | 7:00 A.M. | 1 | 9:11 A.M. | 2 | 609 | 26.2 | 23,250 | 40,000 |
| 5,4,15,14 | 7:00 A.M. | 1 | 5:03 P.M. | 3 | 1,503 | 58.1 | 28,500 | 40,000 |
| 7,8,10,9 | 7:00 A.M. | 1 | 3:22 P.M. | 3 | 1,418 | 56.4 | 26,250 | 40,000 |
| 11,12,13 | 7:00 A.M. | 1 | 3:40 P.M. | 3 | 1,459 | 56.7 | 26,250 | 40,000 |
| | | | | | 5,776 mi. | 228.1 hr. | 138,750 lb | |

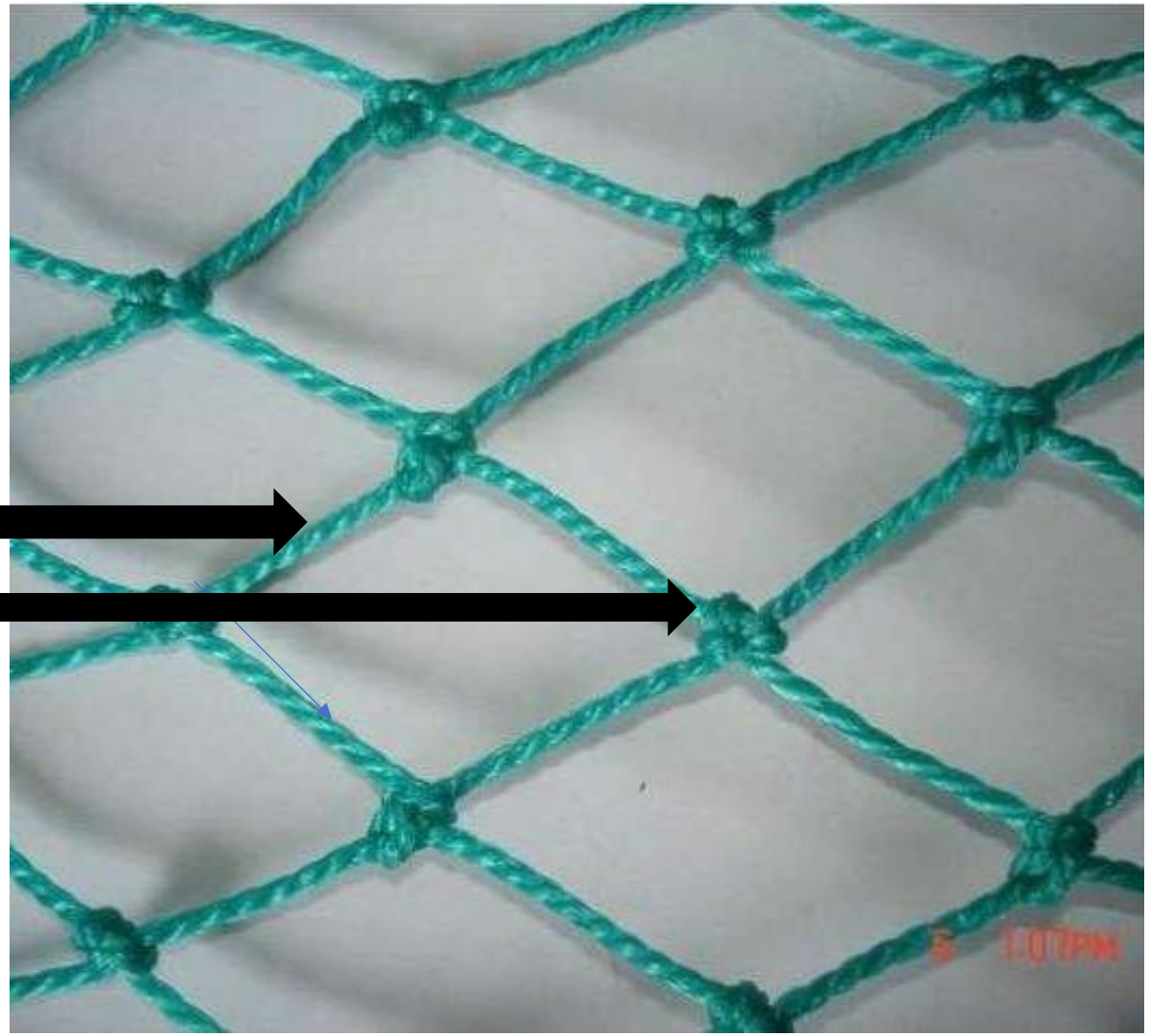
s in sequence of their delivery.

# NETWORK FLOW

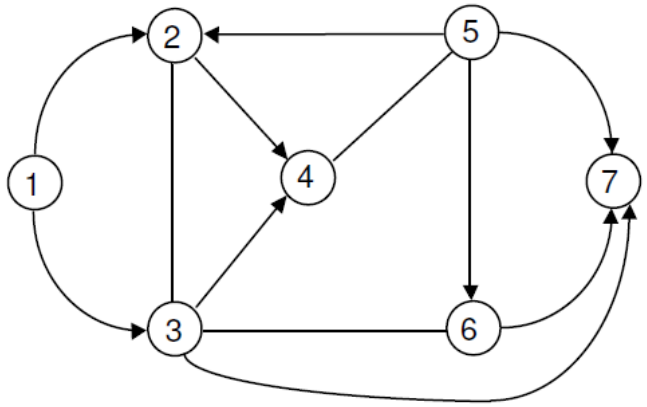
- A network
- The shortest way
- Minimum spanning tree
- Maximum flow

- From origin to destination, oriented or not
- Each edge is labelled
- Is able to connect nodes

  (i,j)
- A minimum spanning tree (MST) or minimum weight spanning tree is a subset of the edges of a connected, edge-weighted undirected graph



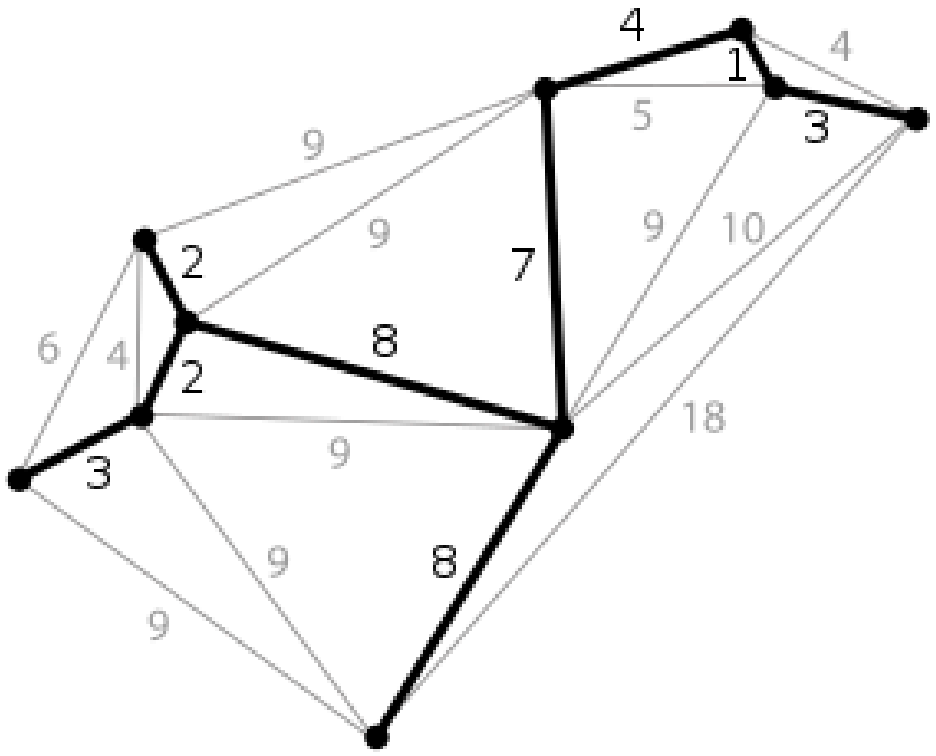
# Definition




- Each edge might be
  - A length
  - A cost
  - A capacity
  - A duration …
- Resulting in possible algorithms

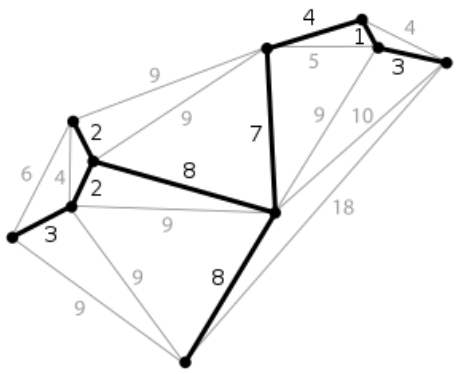
# Shortest way

- The shortest route method
- Comparing the total times to reach the unsolved nodes
- Than to identify the solved nodes and to use the solved one for next iterations and to compare it with unsolved nodes
- Minimum
  - Time
  - Distance



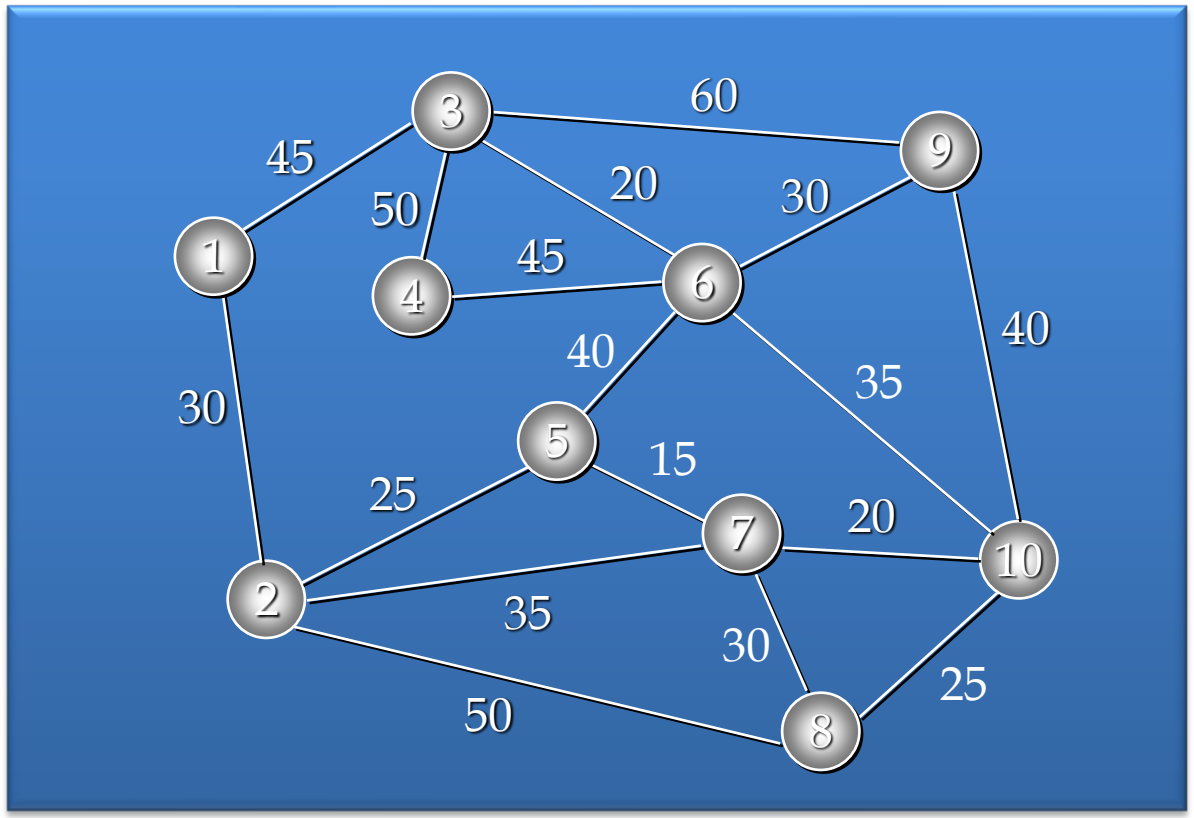

# Minimum spanning tree

# A network connection




- Examples would be a telecommunications company trying to lay cable in a new neighborhood. If it is constrained to bury the cable only along certain paths (e.g. roads),…
- Also gas or electric cables, computer, telecom, transportation, water …
- Is a minimum length of the linked network without any loop in a graph
- Starting point : anywhere as all points will be connected

# Let’s do it …



# Let’s do it by yourself

Suppose that we have the problem shown in Figure 7-2. We seek a minimum-time route between Amarillo and Fort Worth, Texas. Each link has an associated driving time between nodes, and the nodes are road junctions.

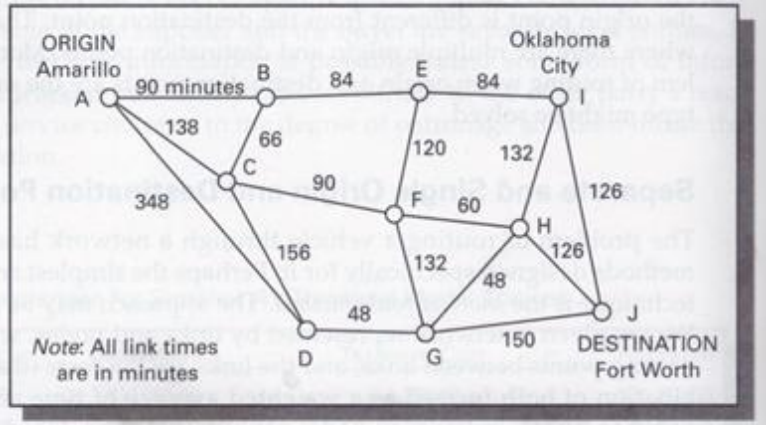



**Figure 7-2**
A Schematic Representation of the Highway Network Between Amarillo and Fort Worth, Texas, with Driving Times

# Performance indicators in Multimodal

## freight density.

- standard measure of transport efficiency represents the number of passengers or freight units per distance unit

## Mean distance traveled

- measure of the ground covering capacity of networks and different transport modes and used to assess the relative performance of transport modes

## Mean per capita ton output (freight)

- measure of the material intensity of an economy. Economies having an important manufacturing sector tend to have more tonnage output per capita than service-based economies

## Mean utilization coefficient

- measure comparing the frequency a transport asset is used over the total period this asset is available. Especially useful with the increasing complexity of logistics associated with containerization, such as the problem of empty returns

# Performance indicators in Multimodal

- Transport time/speed/turnover
  - expression of the velocity of  freight along segments (speed) and at terminals or distribution centers (turnover)
- Reliability
  - consistency of operations within defined parameters such as capacity, safety, duration, and punctuality
- Punctuality
  - on-time performance of transport services. Particularly important for scheduled services such as containerized maritime shipping, transiting
- Load factor
  - level of transport asset utilization of modes and terminals in relation to their capacity. High load factors may indicate congestion and limited capacity to handle additional traffic

# Performance indicator on flights

- Air carrier delay (5.15%)
  - cause of the cancellation or delay was due to circumstances within the airline's control (e.g. maintenance or crew problems, aircraft cleaning, baggage loading, fueling, etc.)
- Extreme weather (0.51%)
  - Significant meteorological conditions (actual or forecasted) that, in the carrier's judgment, delay or prevent the operation of a flight, such as a tornado, thunderstorm, blizzard, or hurricane
- National Aviation System (5.80%)
  - Delays and cancellations attributable to the national aviation system refer to a broad set of conditions, such as non-extreme weather conditions, airport operations, heavy traffic volume, and air traffic control.
- Late-arriving aircraft (6.75%).
  - previous flight with the same aircraft arrived late, causing the present flight to depart late. This is the outcome of propagation effects on schedule integrity since a plane is usually scheduled for several flights during the day
- Security (0.04%)
  - Delays or cancellations caused by evacuation of a terminal or concourse, re-boarding of aircraft because of a security breach, inoperative screening equipment, and long lines in excess of 29 minutes at screening areas

# Performance indicators on road

- Road conditions
  - Physical attributes of the road such as its type (paved, non-paved), number of lanes, width of lanes, design speed, and vertical and horizontal alignment
- Traffic conditions
  - Attributes of the traffic using the road, such as its temporal distribution and direction
- Control conditions
  - Attributes of the control structures and existing traffic laws such as speed limit, one-ways, and priority
- Speed is the rate of distance covered per unit of time
  - The average speed is the most commonly used measure to characterize traffic on a road.
- Volume
  - number of vehicles observed at a point or a section over a time period
- Density
  - number of vehicles occupying a section at any time. For example, a road section having a volume of 1,000 vehicles per hour with an average speed of 50 km/hour will have a density of 20 vehicles/km

# 5- Asset based benchmarking

- *Vehicle fill:* - measured by payload weight, pallet numbers and average pallet height.
- *Empty running:* measured as the number of miles the vehicle travelled empty and the number of miles the vehicle travelled with only returnable items.
- *Time utilisation:* measured on an hourly basis as one of seven activities (running on the road; rest period; loading or unloading; preloaded and awaiting departure; delayed or otherwise inactive; maintenance and repair; and empty and stationary) over a 48-hour period.
- *Deviations from schedule:* measured as problem at collection point, problem at delivery point, own company actions, traffic congestion, equipment breakdown and lack of driver.
- *Fuel efficiency of tractor and trailer:* measured as km per litre, ml fuel required to move one standard industry pallet 1 km.

# Infrastructure based benchmarking

Creation of an information system for electronic exchange and data transfer for combined freight transport.

Creation and implementation of UN/EDIFACT form.

Development of a decision support system for intensified utilization of combined transport.

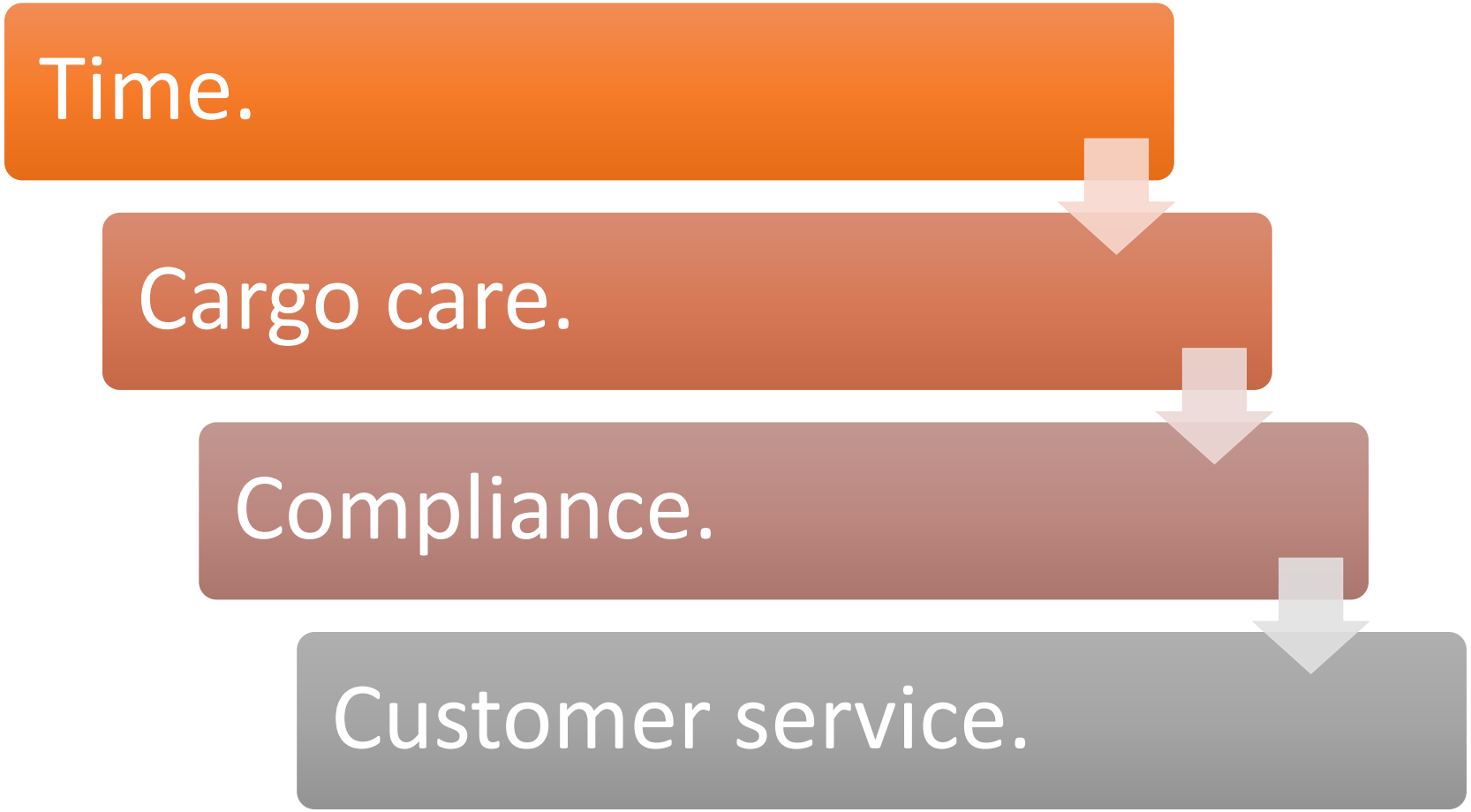
Investigation of infrastructure conditions of combined and integrated transport from the standpoint of wider exploitation in transport and logistic systems.

Research into changes in the vehicles fleet-split needed for combined transport use.

# Indicators to airfreight

- Delivery to the airline.
- Collection by/delivery to the agent.
- Flown as booked.
- Arrived as agreed.
- Aircraft arrival.
- Collection.

# Indicators to shortsea shipping



# Logistics chain

Performance indicators on logistics costs.

Logistics-related social costs and charges.

Benchmarking on road safety

# Logistics cost and service

Transport cost.

Inventory cost.

Sorting and packing cost.

Packaging cost.

Quality indicators include the following:

Knowledge of goods and customer services.

Availability of goods.

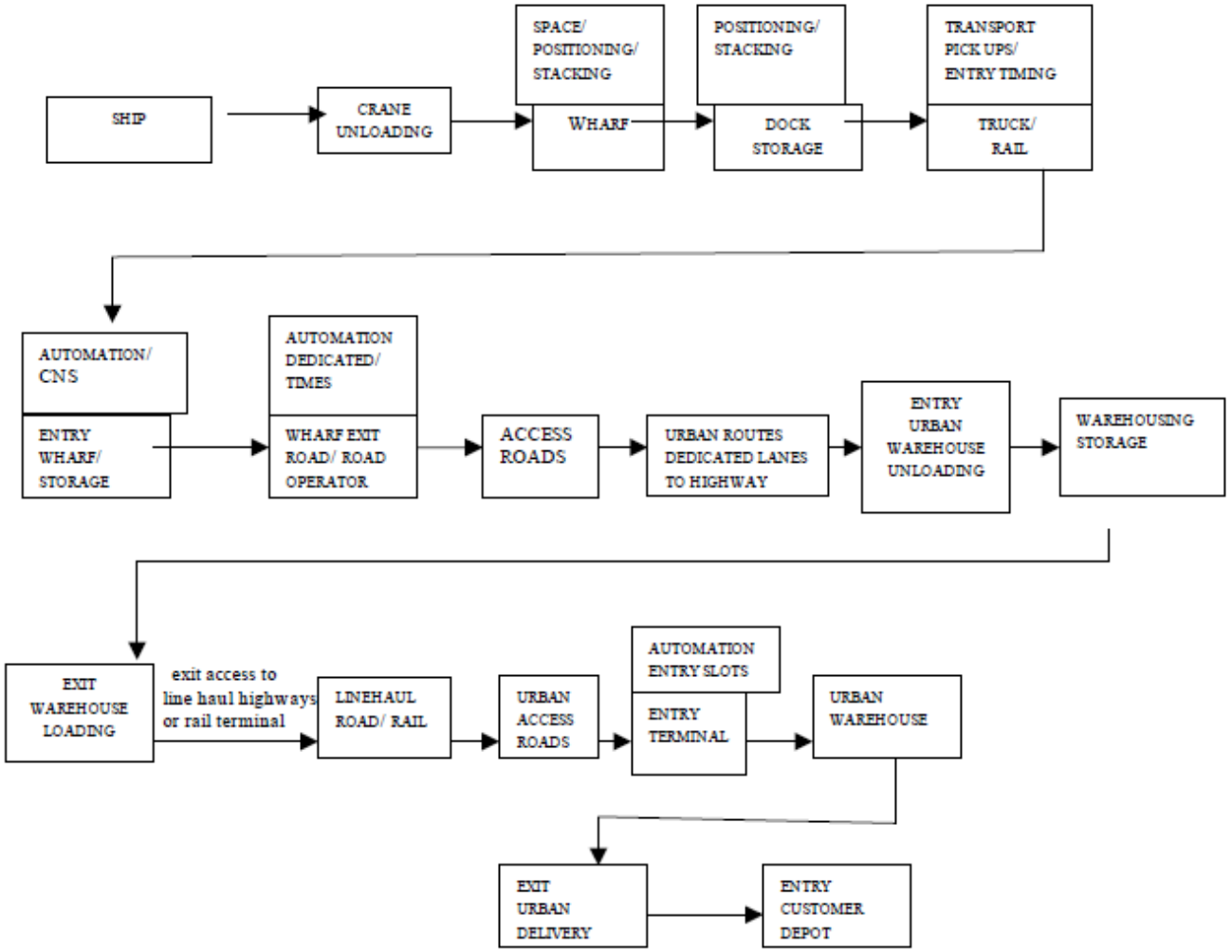
Lead-time from order to delivery, and its accuracy.

Flexibility: response time to special orders.

Ability to organise information: time, accuracy, and details of contents.

Response and restoration time when a mistake or problem occurs.

# Importer intermodal supply chain example

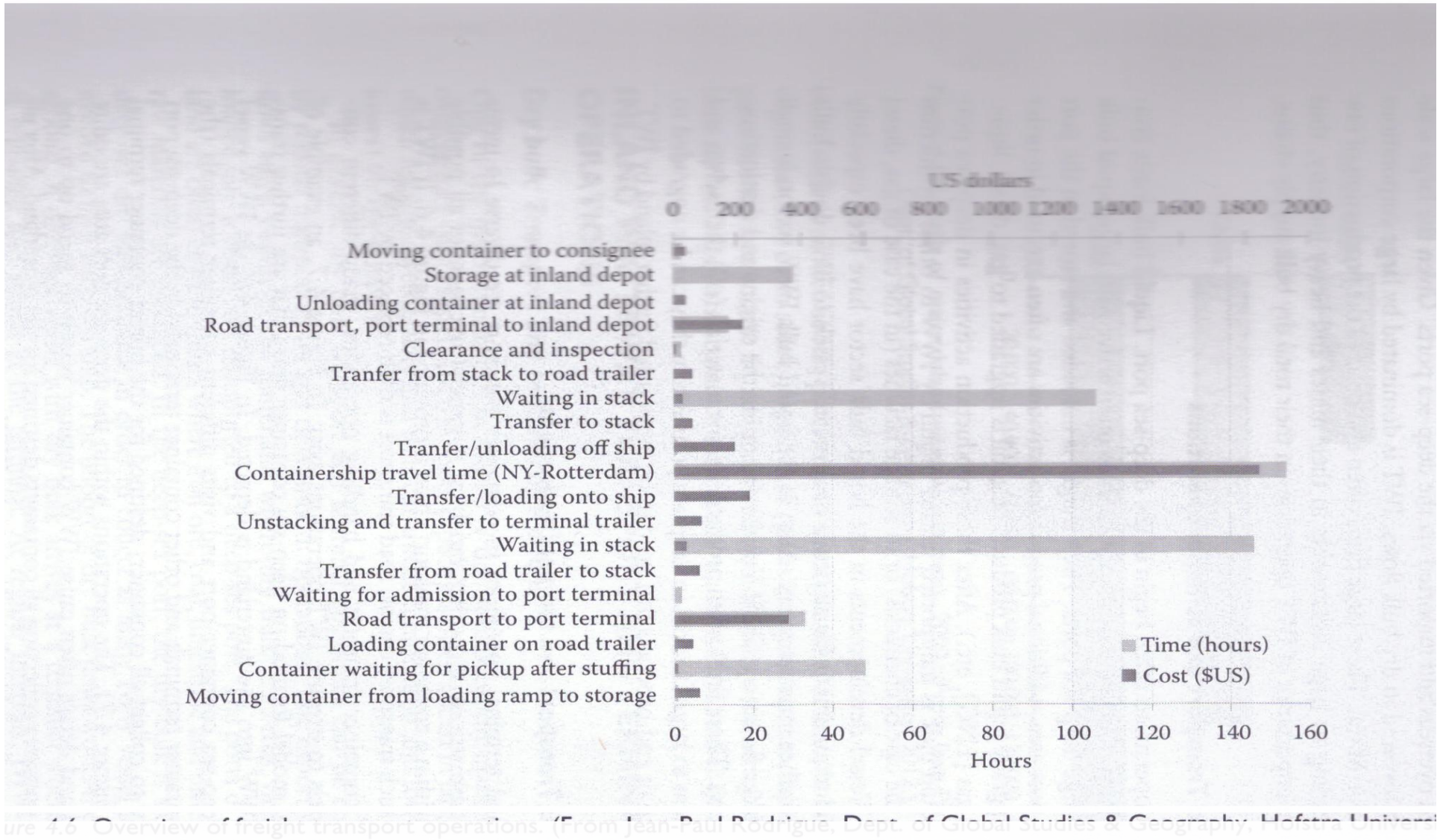


# 6- multimodal transport operator

- Freight forwarder
- Integrator
- Non vessel operating common carriers

# Inland waterway market

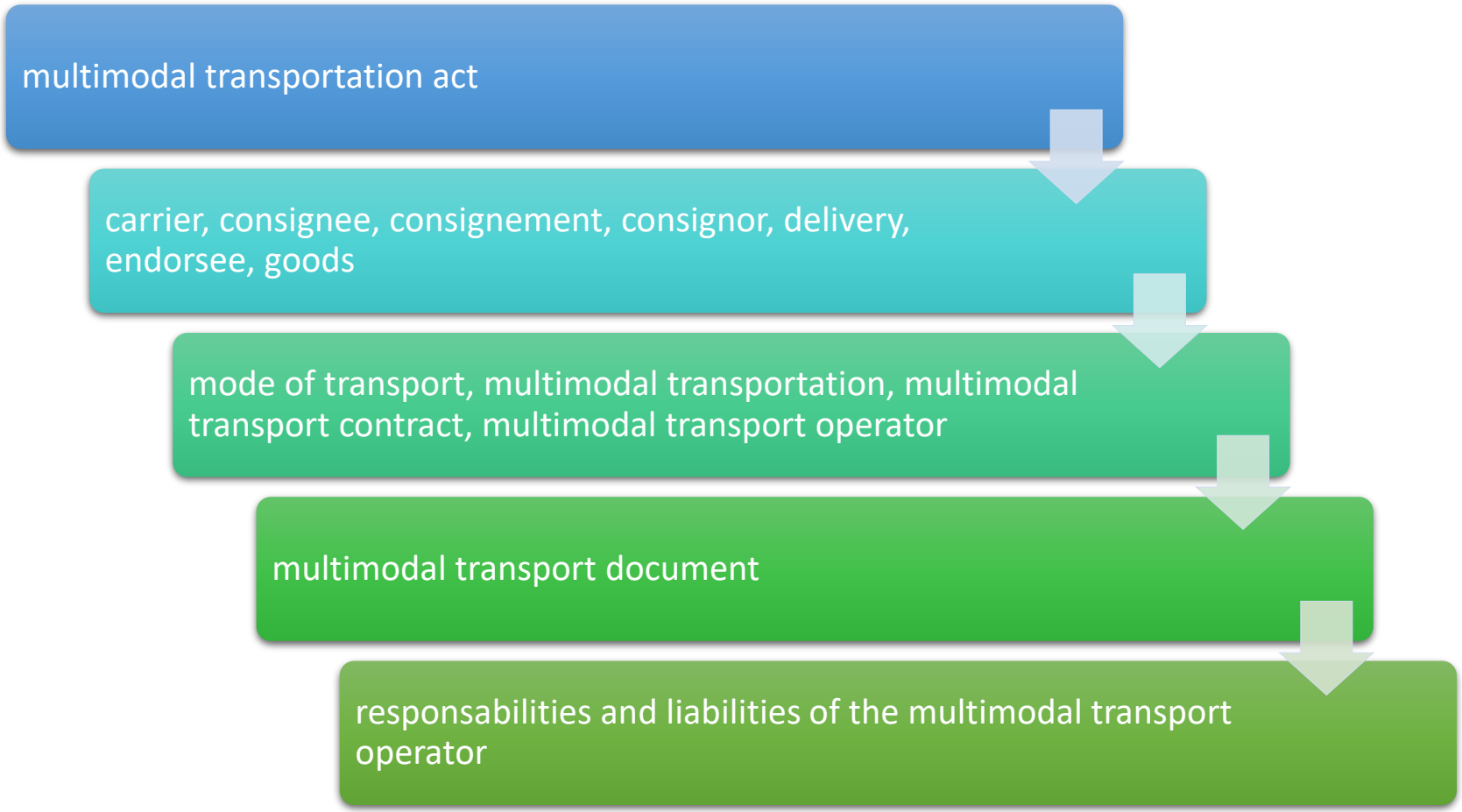
- **Freight flows**
  - Dry bulk, regular transport flow
    - Ore , coal, limestone to deep sea
    - Then semi manufacture goods, steel products, construction material
    - Arcelor Mittal
  - Liquid bulk
    - Start in deep sea
    - Gas, diesel, liquefied gas
    - Shell, Vopak
  - Rising sector : containers
    - Connection and by the way collecting time is long : till one week
- USA
  - 5 majors 50% of the market
- Europe
  - Majority owns 1 to 3 vessels
- China
  - Both models




ure 4.6 Overview of freight transport operations. (From Jean-Paul Rodrigue, Dept. of Global Studies & Geography, Hofstra Univers

# Break down cost

# 2- Transport documents



# Content

- **Example:**
  a) Intended journey route, modes of transport and places of transshipment if known
  b) Freight of Each mode of transport including currency, if expressly agreed between the parties including the extent payable by consignee
  c) Date or Period of delivery at the place of delivery if expressly agreed upon between the parties
  d) About consignee name
  e) Nature of goods

     The nature of the goods is related to: which type of transport modes and means are suitable for such transportation of such goods. Bulk, Container, RO/RO, Project Cargoes, Dangerous Goods

# Content

- FUNCTIONS
  1. Evidence of Contract - Contract of Carriage
  2. Document of title – negotiable
  3. Cargo receipt – taken in charge by the carrier
  4. Financial instruments – string sales

  **CONTRACT OF CARRIAGE**

  Multimodal transport contract is the contract of carriage between WHO and WHO?

  In INCOTERM 2020 term EXW, FCA, FOB and FAS states that Buyer is the party who enters into the contract of carriage.

  The rest of terms is Seller. It is the fact that Buyer will deal with MTO for the carriage and cost of transportation and is the party who pays the freight charge, nominating MTO as carrier to pick up the goods at Seller premise or nominated precise point of pick up the freight.

# Content

- **Consignor**
  - AFAMT: "Consignor" means the person who concludes the multimodal transport contract with the multimodal transport operator.
  - FIATA: “Consignor“ means the person who concludes the multimodal transport contract with the Carrier
  - UNCTAC/ICC Rules is same as AFAMT
- **Consignee**
  - AFAMT: "Consignee " means the person entitled to receive the goods from the multimodal transport operator
  - FIATA: “Consignee“ means the person entitled to receive the goods from the Carrier.
  - UNCTAC/ICC Rules is same as AFAMT "Consignee" means the person entitled to receive the goods from the multimodal transport operator

# Content

- Contract of carriage
  - **Hague-Visby Rules Art. 3.4** • Such a bill of lading shall be **prima facie evidence of the receipt by the carrier of the goods** as therein described in accordance with paragraph 3 (a), (b) and (c). However, proof to the contrary shall not be admissible when the bill of lading has been transferred to a third party acting in good faith.
  - With respect to the responsibility for information in the MT document, the expression in art. 3.4 of the Hague-Visby Rules, "third party", shall not be used, since the governing factor is whether or not the consignee has relied and acted upon the information and not his position as a "party" or "third party" in relation to the MTO. In particular, such an expression may be misleading where the seller has handed over the goods to the carrier and the buyer under an FOB or an FCA contract has concluded the contract of carriage. In such a case, the **FOB/FCA buyer- although relying on the information in the MT document - could not be considered a "third party"**.

# Content

- Contract of carriage

  The information in the MT document shall be **prima facie evidence of the taking in charge by the MTO** of the goods as described by such information unless a contrary indication, such as “shipper’s weight, load an count”, “shipper-packed container” or similar expressions, has been made in the printed text or superimposed on the document. Proof to the contrary shall not be admissible when the MT document has been transferred, or the equivalent electronic data interchange message has been transmitted to and acknowledged by the consignee who in good faith has relied and acted thereon.

  FIATA MT Doc is applicable for unimodal transport - There is nothing state in AFAMT so.

  - **The Carrier shall be responsible for the acts and omissions of his servants or agents acting within the scope of their employment**, or any other person of whose services he makes use for the performance of the contract evidenced by this BL, as if such acts and omissions were his own.

# Content

- Contract of carriage
  - **FIATA MT Document**

    Method and Route of Transportation

    • Without notice to the Merchant, **the Carrier has the liberty to carry the goods on or under deck** and to choose or substitute the means, route and procedure to be followed in the handling, stowage, storage and transportation of the goods

    **Consignor fails to inform dangerous goods**

    • The goods may at any place be unloaded, destroyed or rendered harmless, as circumstances may require, without compensation.

    The Merchant shall indemnify the Carrier against all loss, damage, liability, or expense arising out of their being taken in charge, or their carriage, or of any service incidental thereto.

# Content

- **MTO liability**
  - AFAMT: covers the period from the time the multimodal transport operator has taken the goods in his charge to the time of their delivery.
  - FIATA: The responsibility of the Carrier for the goods under these conditions covers the period from the time the Carrier has taken the goods in his charge to the time of their delivery.
  - UNCTAC/ICC Rules: The responsibility of the MTO for the goods under these Rules covers the period from the time the MTO has taken the goods in his charge to the time or their delivery.
  - **for his servants, agents and others persons**
    - AFAMT: The **multimodal transport operator** shall be responsible for the acts and omissions of his servants or agents, when any such servant or agent is acting within the scope of his employment, or of any other person of whose services he makes use for the performance of the contract, as if such acts and omissions were his own.
    - FIATA: **Carrier shall be responsible** for the acts and omissions of his servants or agents acting within the scope of their employment, or any other person of whose services he makes use for the performance of the contract evidenced by this BL, as if such acts and omissions were his own.
    - UNCTAC/ICC Rules: **responsible for the acts and omissions of his servants or agents**, when any such servant or agent is acting within the scope or his employment, or of any other person of whose services he makes use for the performance of the contract, as if such acts and omissions were his own.

# Content

- MTO liability
  - **for loss, damage and delay in delivery**
    - AFAFMT: The multimodal transport operator shall be liable for loss resulting from loss of or damage to the goods, as well as loss resulting from delay in delivery, if the occurrence which caused the loss, damage or delay in delivery took place while the goods were in his charge, unless the multimodal transport operator proves that he, his servants or agents or any other person took all measures that could reasonably be required to avoid the occurrence and its consequences.
      - The multimodal transport operator shall not be liable for loss following from delay in delivery unless the consignor has made a declaration of interest in timely delivery which has been accepted by the multimodal transport operator
    - FIATA
      - FIATA: Similar to AFAMT and in accordance to UNCTAC/ICC Rules The Carrier shall be liable for loss of or damage to the goods as well as for delay in delivery if the occurrence which caused the loss, damage or delay in delivery took place while the goods were in his charge, unless the Carrier proves that no fault or neglect of his own, his servants or agents or any other person has caused or contributed to such loss, damage or delay.
      - However, the **Carrier shall only be liable for loss following from delay in delivery if the Consignor has made a declaration of interest in timely delivery** which has been accepted by the Carrier and stated in this BL

# Content

- MTO liability
  - **Delay in Delivery**
    - AFAMT: Delay in delivery occurs when the goods have not been delivered **within the time expressly agreed upon o**r, in the absence of such agreement, within the time which it would be reasonable to require of a diligent multimodal transport operator, having regard to the circumstances of the case.
    - FIATA: Arrival times **are not guaranteed by the Carrier**, however, delay in delivery occurs when the goods have not been delivered within the time expressly agreed upon or, in the absence of such agreement, within the time which would be reasonable **to require of a diligent Carrier**, having regard to the circumstances of the case.
- What is Delivery.
  - UNCTAD/ICC Rules: "Deliver", "Delivered" or "Delivery" means

    **a. The handing over of the goods to the consignee,**

    b. The placing of the goods at the disposal of the consignee in accordance with the multimodal transport contract or with the law or usage of the particular trade applicable at the place of delivery,

    c. The handing over of the goods to an authority or other third party to whom, pursuant to the law or regulations applicable at the place of delivery, the goods must be handed over. NOTE: non of this clause in FIATA Bill of Lading

    MTO ensure delivery of the goods When MT document has been issued in a Non-Negotiable form, to the person named as Consignee in the document upon proof of his identity. When no document has been issued, to a person as instructed by the consignor or by a person who has acquired the consignor or consignee ‘s right under MT contract to give such instruction

# Content

- **MTO liability**
  - **Delivery of the goods**
    - When MT document has been issued in negotiable Form to 'Bearer' to the person surrendering one original Document 'to order', to the person surrendering one original Document duly endorsed. "a named person" to that person upon proof of his identity and surrender one original document.
  - **Non Delivery within 90 Consecutive days**: Treat the goods as lost.
    - AFAMT: If the goods have not been delivered within ninety consecutive days following the date of delivery determined in accordance with the preceding paragraph, any person entitled to claim the goods may, in the absence of evidence to the contrary, treat the goods as lost.
    - FIATA: If the goods have not been delivered within ninety consecutive days following such date of delivery as determined in Clause 6.3., the claimant may, in the absence of evidence to the contrary, treat the goods as lost.
  - **Exclusion of Liability AFAMT vs. FIATA back clause**

    a. force majeure (appear in Hague Visby Rules as Act of God and AFAMT) •

    b. Act or neglect of the consignor, the consignee or his representative or agent;

    c. Insufficient or defective packaging, marking, or numbering of the goods;

    d. Handling, loading, unloading, stowage of the goods effected by the consignor, the consignee or his representative or agent;

    e. Inherent or latent defect in the good

# Content

- **MTO liability**
  - **Exclusion of liability**

    f. Strikes or lockouts or stoppage or restraint of labour from whatever cause, whether partial or general;

    g. With respect to goods carried by sea or inland waterways, when such loss, damage, or delay during such carriage has been caused by: (i) act, neglect, or default of the master, mariner, pilot or the servant of the carrier in the navigation or in the management of ship, or (ii) fire unless caused by the actual fault or privity of the carrier.

  Proof

    **FIATA**

      • **Claimant shall prove**

      a) an act or omission of the Merchant,

      b) insufficiency or defective condition of the packaging or marks and/or numbers;

      c) handling, loading, stowage or unloading of the goods by the Merchant or any person acting on behalf of the Merchant;

      d) inherent vice of the goods;

      e) strike, lockout, stoppage or restraint of labour.

      unseaworthiness of the ship, the MTO has to prove their due diligence

  **Loss of damage**

    • Unless the nature and value of the goods have been declared by the consignor before the goods have been taken in charge by the multimodal transport operator and inserted in the multimodal transport document, the multimodal transport operator shall in no event be or become liable for any loss or damage to the goods in an amount exceeding the equivalent of 666.67 SDR per package or unit or 2.00 SDR per kilogram of gross weight of the goods lost or damaged, whichever is the higher.

# Content

- **MTO liability**

  **Loss of damage**

  • If the multimodal transport does not, according to the contract, include carriage of goods by sea or by inland waterways, the liability of the multimodal transport operator shall be limited to an amount not exceeding 8.33 SDR per kilogram of gross weight of the goods lost or damaged. FIATA apply US-COGSA limitation of liability shall not exceed US$ 500 per package or, in the case of goods not shipped in packages, per customary freight unit. (Paramount clauses)

  Delay in delivery FIATA

  FIATA An amount not exceeding the equivalent of twice the freight under the multimodal contract

  **Localized damage**

  When the loss of or damage to the goods occurred during one particular stage of the multimodal transport, in respect of which an applicable international convention or mandatory law would have provided another limit of liability if a separate contract of carriage had been made for that particular stage of transport, then the limit of the multimodal transport operator's liability for such loss or damage shall be determined by reference to the provisions of such convention or mandatory law.

  Assessment of compensation for loss and damage

  1. Assessment of compensation for loss of or damage to the goods shall be made by reference to the value of such goods at the place and time they are delivered to the consignee or at the place and time when, **in accordance with the multimodal transport contract**, they should have been so delivered.

  2. The value of the goods shall be determined according to the current commodity exchange price or, if there is no such price, according to the current market price, or if there is no commodity exchange price or current market price, by reference to the normal value of goods of the same kind and quality

# Content

- MTO liability

  **Loss of right to limit liability**

  The Carrier is not entitled to the benefit of the limitation of liability if it is proved that the loss, damage or delay in delivery resulted from a personal act or **omission of the Carrier done with the intent to cause such loss**, damage or delay, or recklessly and with knowledge that such loss, damage or delay would probably result.

  FIATA MT document

  Freight and Charge:

  • **Cash and not to be return in any event**

  • Currency at Carrier's option and highest exchange rate • Demurrage on equipment is for Merchant account if it is not due to a fault or neglect of the Carrier.

  • Cost of deviation or delay or any other increase of costs of whatever nature caused by War, Warlike operation, epidemics, strikes, government directions or force majeure.

  Inspection of the carriers

  The Merchant warrants the correctness of the declaration of contents, insurance, weight, measurements or value of the goods but the Carrier has the liberty to have the contents inspected and the weight, measurements or value verified**. If on such inspection it is found that the declaration is not correct** it is agreed that a sum equal either to **five times the difference** between the correct figure and the freight charged, or to double the correct freight less the freight charged, whichever sum is the smaller, shall be payable as liquidated damages to the Carrier for his inspection costs and losses of freight on other goods, notwithstanding any other sum having been stated on this BL as freight payable

  **Freight collect responsibility**

  Despite the acceptance by the Carrier of instructions to collect freight, charges or other expenses from any other person in respect of the transport under this BL, the Merchant shall remain responsible for such monies on receipt of evidence of demand and the absence of payment for whatever reason.

# Content

- MTO liability

  FIATA MT document

  **General average**

  The Merchant shall indemnify the Carrier in respect of any claims of a General Average nature which may be made on him and shall provide such security as may be required by the Carrier in this connection.

  Applicable laws

  UNCTAD/ICC Rules - FIATA

  • These rules shall only take effect to the extent that they are not contrary to the mandatory provisions of international conventions or national law applicable to MT contract.

  Actions against the Carrier may be instituted only in the place where the Carrier has his place of business as stated on the reverse of this BL and shall be decided according to the law of the country in which that place of business is situated.

# Content

- MTO **insurance and claim**
  - AFAMT – Insurance is one of elements for registration of MTO Registered MTO shall have an insurance policy, **a coverage from a protection and indemnity club**, or an alternative of a financial character to cover payment of obligations for loss, damage or delay in delivery of goods under multimodal transport contracts, as well as contractual risks. The Coverage of Insurance Policy has not been fixed in AFAMT and it leaves to the national laws of ASEAN Member States.
  - Do not indicate exact coverage amount Vietnam:
    - Have a liability insurance policy for multimodal transport operator or an equivalent guarantee. Thailand:

    1. NVO-MTO – acts as Individual Principal 2 Million Baht

    2. NVO-MTO – acts as Principal & Agent 3 Million Baht 3. NVO-MTO – acts as Principal & Agent under Group Liability Insurance 5 Million Baht

# Coverage under policy South East Asia

- 1.Cargo Liability/Bill of Lading Liability Cover loss, damage, delay in delivery under issuance of FIATA Bill of Lading and acting as Agent for Overseas MTO **including packing, international road transport and or storage that related to export**
- 2.**Errors&Omissions** Cover the delay in performing duty and failure so performed according to the contract, mis-declaration in documents, any failure transport performance under the contract or bill of lading.
- 3.**Third Party Liability** Cover injury, death, loss in properties of the third party during the operation of insured.
- 4.**Customs Liability Cover** fine, penalties of Customs, seize of the cargoes by competent authorities caused by unintentional act of insured provided for export / import in Thailand TRANSPORTATION SPECIALIST LEGAL LIABILITY INSURANCE

# Transportation Specialist legal liability incurance

| Coverage option I (Maritime Transport) | Coverage option II (All mode) | Coverage option III (All mode) |
|---|---|---|
| Insured Services :<br><br>Operations – Customs broker, Freight forwarder, Consolidator, MTO, NVOCC<br><br>Excluded Cargoes – Bulk, Flexitank, project cargo, tank<br><br>Excluded Transportation by Air Freight | Insured Services :<br><br>Operations – Customs broker, Freight forwarder, Consolidator, MTO, NVOCC and NAOCC<br><br>Excluded Cargoes – Bulk, Flexitank, project cargo, tank<br><br>Including Transportation by Air Freight | Insured Services :<br><br>Operations – Customs broker, Freight forwarder, Consolidator, MTO, NVOCC and NAOCC<br><br>Excluded Cargoes – Bulk, Flexitank, project cargo, tank<br><br>Including Transportation by Air Freight<br>Issuance a HB/L, Agent B/L as per Principle |

# Limitation of liability example

- 1.Cargo Liability/Bill of Lading Liability 10 Million Baht per event and annual aggregation
- 2.Errors&Omissions 2.5 Million Baht per event and annual aggregation
- 3.Third Party Liability 10 Million Baht per event and annual aggregation
- 4.Customs Liability 2.5 Million Baht per event and annual aggregation
  Maximum limitation per member 20 Million Baht

# Option 1 example

- **Option I Export**
- Issue FIATA BL for export **by Sea Transport to destination**.
- Cross Boarder Transport by road vehicle using Truck waybill with FIATA back clauses excepts Local Transport (pure trucking) Import
- Insured's Principals BL as Agent
- Import by international road transport connected to sea transport under FIATA Bill of Lading
- Non-cover import by road transport between neighboring country (only two countries as non documents are issued)
- Not cover Pure Trucking locally
- Not cover Stand Along Customs Clearance

# Option 2

- **Option II Export**
  - Issue FIATA BL **for export by Sea Transport to destination**.
  - Cross Boarder Transport by road vehicle using Truck waybill with FIATA back clauses excepts Local Transport (pure trucking)
  - House Air waybill for export under MTO Act. Import
  - Insured's Principals BL as Agent - Not cover import by road transport between neighboring country (only two countries as non documents are issued)
  - Not cover Pure Trucking locally
  - Not cover Stand Along Customs Clearance - Insured's Principal AWB under MTO Ac

# Option 3

- Export
  - **Issue FIATA BL for export by Sea Transport to destination**
  - Cross Boarder Transport by road vehicle using Truck waybill with FIATA back clauses excepts Local Transport (pure trucking)
  - House Air waybill for export under MTO Act.
  - House BL / Agent BL for export under MTO Act.
- **Import**
  - **Insured's Principals BL as Agent**
  - Non-cover import by road transport between neighboring country (only two countries as non documents are issued)
  - Not cover import by road transport between neighboring country (only two countries as non documents are issued)
  - Not cover Pure Trucking locally
  - Import by Agent AWB Air under MTO act. - Cover Stand Alone Custom Clearance

# Claim of claimant

- Unless notice of loss of or damage to the goods, specifying the **general nature of such loss or damage, is given in writing by the consignee** to the multimodal transport operator when the goods were handed over to the consignee, such handing-over is prima facie evidence of the delivery by the multimodal transport operator of the goods as described in the multimodal transport document.
- Where the loss or damage is not apparent, the same prima facie effect shall apply if notice in writing is not given within six consecutive days after the day when the goods were handed over to the consignee.

# Arbitration

- FIATA The Carrier shall, unless otherwise expressly agreed, **be discharged of all liability under these conditions unless suit is brought within 9 months after the delivery of the goods**, or the date when the goods should have been delivered, or the date when in accordance with clause 6.4. (90 days) failure to deliver the goods would give the consignee the right to treat the goods as lost.

# Proceedings

- FIATA
  - Actions against the Carrier may be instituted only in the place where the Carrier has his **place of business** as stated on the reverse of this BL and shall be decided according to the law of the country in which that place of business is situated.
- UNCTAC/ICC Rules:

  These Rules shall only take effect to the extent that they are not contrary to the mandatory provisions of international conventions or national law applicable to the multimodal transport contract.

# Filing the claim

- It is depended on process of insurance company for MTO to file the claim against them.
- In normal practice, **once MTO receives the claim, he should**:

  a) Checking what, when, where and how the event happened.

  b) By who makes such event happening

  c) Collecting information and consider whether he should pass the claim to insurance company

  d) Determine his obligation if he shall be the party who has to responsible for such claim. In many cases, the event may happen on “Shipper’s load weight and counted” Inherent or latent defect in the goods MTO could response claimant by issuing reject claim letter.

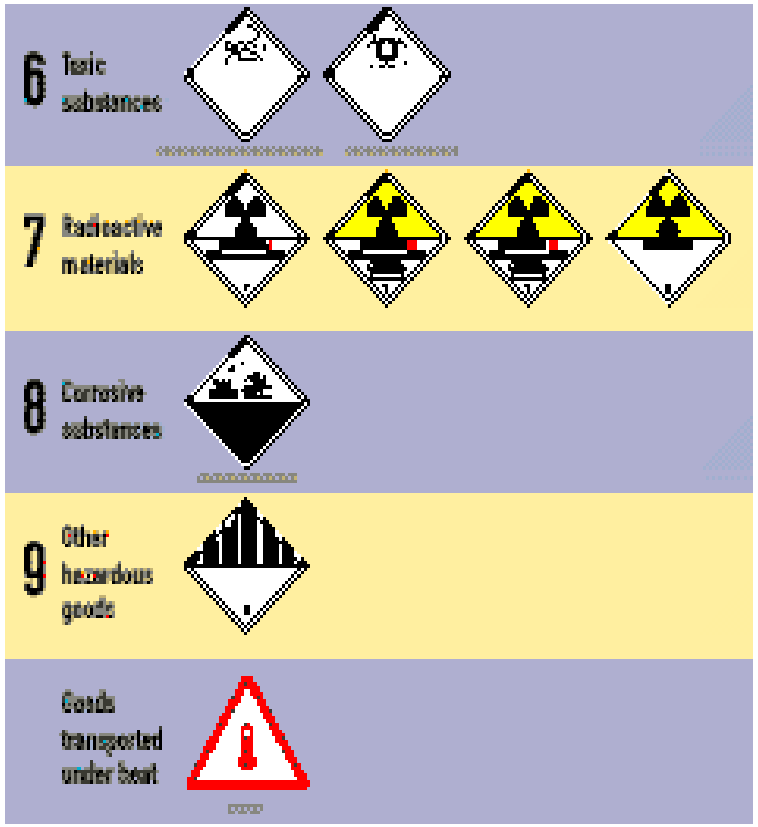
  e) Apparently, MTO should take responsibility, then pass the claim to insurance company.

# 4- multimodal transport of hazardous goods

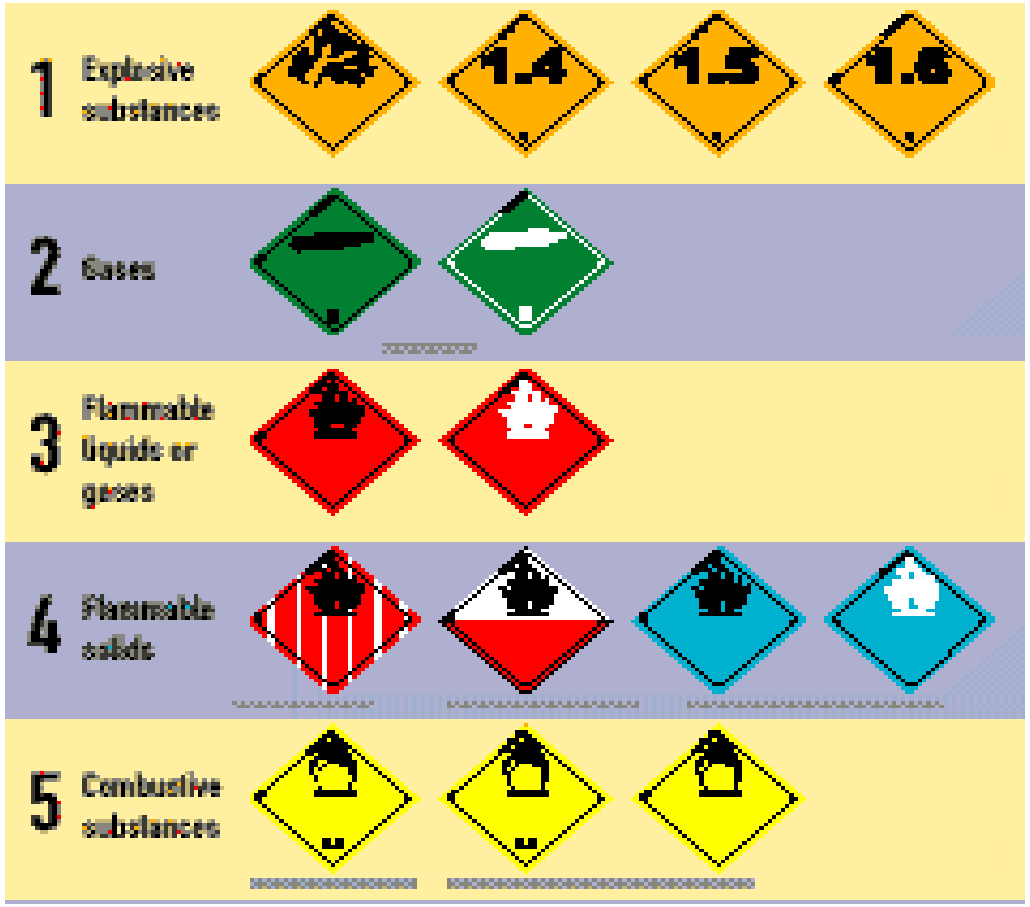
- UN packaging
  - Dangerous substances
  - Risk of accidents
  - Legislation and regulation
  - Association of america railroad

  www.aar.org
- Performance packagings for the transportation of dangerous goods
- Permits of equivalent level of safety
- **Depending on transport modes**

# Carriage of dangerous goods



# Carriage of dangerous goods



# 5- Political issue

- CMI and multimodal transport
- Multimodal contracts reality
- Containerization
- Carriage by air
- Electronic commerce environment
- Multimodal COGSA
- Door to door scope – performing carrier
- Error in navigation defence

| Shipowner and cargo insurance | package definition - Container | Singapore conference then Rotterdam |
| --- | --- | --- |
| | | • Door to door<br>• Inland segments<br>• Liability network basis<br>• Conflict of laws<br>• Electronic commerce implications<br>• A per kilo basis |

# Transport policy

## Economic Regulations

- Investments in transportation infrastructure (modal and intermodal).
- Control of routes, ports of entry, pricing, and scheduling.
- Level of ownership and competition.

## Operating Regulations

- Safety and operation regulations (speed and design).
- Labor regulations (work hours).
- Security (passengers and cargo).

## Environmental Regulations

- Transportation of hazardous materials (HAZMAT).
- Pollutant and carbon emissions.

# Transport security

## integrity of

- cargo
- Route
- information systems (IT security) managing the transport chain.

## set of procedures that can be implemented to

- maintain the integrity of cargo, namely inspections
- the security of facilities and personnel
- the data and the supporting cybersecurity measures

# Issues and customs

- **Reduced risk of disruptions** of trade in response to security threats.
- Improved security against theft and diversion of cargo, with reductions in direct losses (cargo and sometimes the vehicle) and indirect costs (e.g. higher insurance premiums).
- **Improved security against illegal transport** of freight such counterfeits, narcotics and weapons, and of persons.
- Improved **reliance of the information systems** supporting the complex transactions generated by transport activities.
- Reduced **risk of evasion of duties and taxes**
- Increased confidence in the international trading system by current and potential shippers of goods.
- Improved screening process (cost and time) and simplified procedures.

- Security-based measures could increase total costs between 1% and 3%

# Issues

- emphasis on freight transport security is gradually shifting into a more comprehensive but complex approach
- **An Automated Identity System (AIS**) is required for all vessels between 300 and 50,000 dwt
  - vessels to have a permanently marked and visible identity number, and there must be a record maintained of its flag, port of registry, and address of the registered owner.

- Each port must undertake a security assessment
  - assessment of its assets and facilities and an assessment of the effects of damages that might be caused
  - The port must then evaluate the risks and identify its weaknesses in features such as physical security, communication systems, and utilities.

- All cargoes destined for the United States must receive customs clearance before the departure of the ship

- **I.S.P.S.** International ship and port security
- **T.S.A.** Transportation Security Administration

# Transport resilience to

- **Transportation supply**
  - Ensuring that transportation modes, routes, terminals, and information systems can satisfy national security needs
- **Transportation readiness**
  - Maintaining the readiness of transportation to face time-sensitive national security needs.

- **Transportation vulnerability**
  - Reducing the vulnerability of transportation modes, terminals, and users to intentional harm, accidents, or disruption from natural events.

- **Illegal use of transportation**
  - Reducing the trade of restricted or illegal goods (e.g. drugs, endangered species), and illegal immigration.

# To anticipate

- Extreme weather events
- Geophysical events
- Climate change
- Conflicts, terrorism and piracy
- Economic and political shocks
- Cybersecurity
- Sanitary threats
  - Risk assessment
  - Preparedness (warehousing …)
  - Mitigation
  - Response
  - Recovery

# Physical internet and Multimodal transport

http://www.etp-logistics.eu/alice/en/news___events/video/

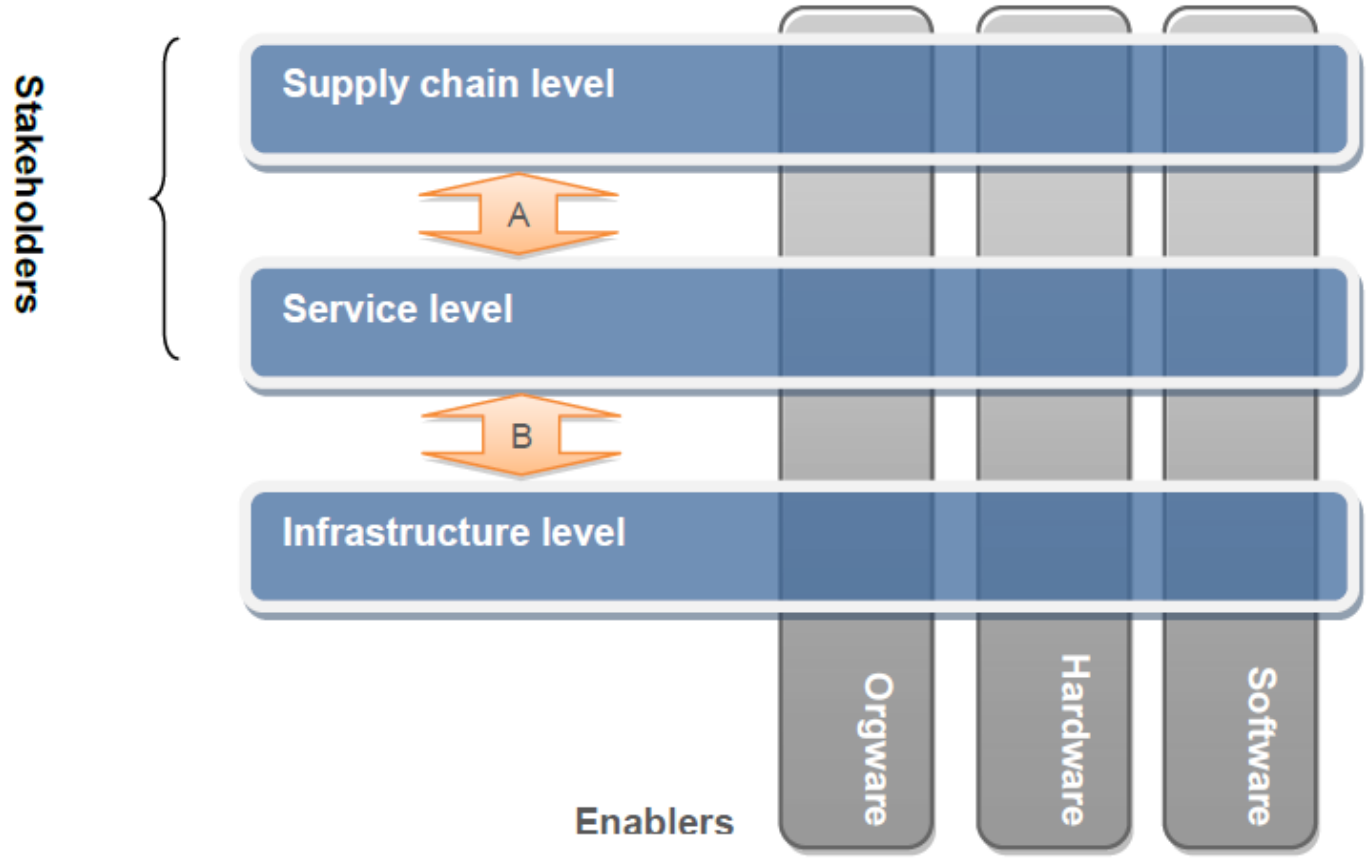



Figure S-1: Stakeholders levels and enablers

# Physical internet