Chapter 6 Intermodalism and Land Transport

Book: International Logistics: Global Supply Chain Management by Douglas Long
Slides made by Ta-Hui Yang
Outline

- What is intermodalism?
- Intermodal equipment
- Managing intermodal transport
- Roadway transport
- Railroad transport
- Inland shipping
- pipelines
1. Intermodalism

- What is intermodalism?
  - A system of coordinating different modes of transport for a shipment
  - One of the most revolutionary developments in logistics in this century
  - This point is not that multiple modes are being used, but that they are coordinated so one leg of the journey is coordinated with the next
1. Intermodalism

- Containerization
  - Containerization is the difference between just multimodalism and true intermodalism.
  - Intermodalism is most commonly understood as the use of intermodal containers in a coordinated shipment using multiple modes of transportation.
  - The important thing about containerization is that the equipment adheres to the same standards worldwide.
  - The most common modes of transport in an intermodal movement are trucking, rail, and ocean shipping.
  - Air cargo has intermodalism, but the containers are in air cargo are very different.
1. Intermodalism

- Benefits of intermodalism
  - Security
  - Safety
  - Efficiency
  - Speed

- Consequence of intermodalism
  - The ports are larger, but fewer
  - The trade lanes handle more cargo, but the number of trade lanes has decreased
2. Intermodal Equipment

- Cargo container
  - The basic element of intermodalism
  - Size
    - 8 feet wide, 8 feet 6 inches high
    - Majority are 20 feet long or 40 feet long
    - Also come in 45 feet long, or 48 feet long, and few others, but not conform to the universal standards
2. Intermodal Equipment

- **Cargo container**
  - Low value cargo tends to move in 40s, it is more important to keep costs low.
  - Higher value cargo tends to move in 20s.
  - Heavy cargo tends to move in 20s, because the weight limit
  - A trend toward more use of 40s
2. Intermodal Equipment

- Types of containers
  - Dry
  - Open top
  - Flat rack
  - Platform
  - Refrigerated
  - Live animals
  - Tank
  - Bulk
2. Intermodal Equipment

- **Cranes**
  - Used at ports to pick up and handle the containers

- **TEUs and FEUs**
  - The measurement of containerized volume
  - Twenty-foot equivalent units, TEUs
  - Forty-foot equivalent units, FEUs
3. Managing Intermodal Transport

- Cooperation and coordination
  - The most important aspect of intermodalism is not the equipment, but the operating and management issues.
  - Intermodalism requires the coordination of multiple carriers.
  - Intermodalism requires cooperation and coordination among a diverse group of companies on a level that is rarely seen in other industries.
3. Managing Intermodal Transport

- What are intermodal companies?
  - Sometimes they are asset-based carriers, such as a shipping company that expands into providing intermodal service.
  - There are companies that do not control any assets, but only provide intermodal services. They coordinate shipments between the other carriers.
  - One distinctive thing about intermodal carriers is their sophisticated information system.
  - They need to process a lot of information, under time pressure and in coordination with other carriers.
3. Managing Intermodal Transport

- Intermodal traffic patterns
  - There is a lot of required infrastructure to handle intermodal cargo.
  - Usually a few major trade lanes, and many minor trade lanes.

- Equipment balance
  - Problem of handling empty containers.
  - One way to deal with equipment balance issues is to lease containers instead of using one’s own.
4. Roadway Transport

- Trucking is an indispensable part of almost every shipment, both domestically and internationally.
- It is an important link in the intermodal chain, but it is also used in some regions for international trade.
- Its role in intermodalism is to link the ocean port or rail yard with the local origin or destination.
- Trucking is also used for some international shipments, and of course for non-intermodal shipping.
4. Roadway Transport

- Trucking has low entry requirements.
- Of all the different modes, this has the lowest entry costs.
- There are relatively many players in the field, which creates a highly competitive market.
- One of the newer developments is shipper-owned fleets offering contracts to other companies. They decide to offer trucking services to other shippers, maybe during their slow season, or maybe to earn extra money.
4. Roadway Transport

- regulations
  - Every transportation mode is influenced by regulations
  - Trucking is more influenced by local rules, such as speed limits, registration and so on.
  - The longer the trip, the more legal jurisdictions it passed through. This creates a strong disincentive for long distance trucking.
4. Roadway Transport

○ Safety issues are more important with road transport than any other mode.
○ In 1997, there were 711 fatalities by trucks in the US, which is low considering this is a very safe environment.
○ In other countries, truck-related accidents are much higher.
4. Roadway Transport

- Road capacity
  - Measured by a passenger car equivalent (PCE)
  - On level roads a truck may be only 1.2 PCE. But on curving, mountainous roads the same truck can be four PCEs.

- Weight laws
  - Partly for safety reasons, and partly because roads can only stand a certain amount of weight.
  - Road damage is based on weight per axle, known as equivalent standard axle load, or ESAL.
  - The damage drops off exponentially.
  - Pavement thickness also varies exponentially.
5. Railroad Transport

- Railroad are best for large loads going long distances.
- Rail is preferred for loads over 30000 pounds over distances exceeding 300 miles.
- Rail industry have the high entry barriers.
- Railroads have been in steady decline over the past several decades, mostly due to competition with trucks.
- Tax money pays for roads that benefit trucks, but the railroad industry has not benefited as much from public support.
5. Railroad Transport

- There are high fixed costs because of the tracks and the trains, but there are very low variable costs.
- There are also almost no weight or volume restrictions.
- There are restrictions on dimensions. Trains go through tunnels and bridges, which means that their load cannot exceed their dimensions.
- There tends to be high damage (about 3% of total tonnage) due to vibrations and shock from steel wheels on steel track.
5. Railroad Transport

- Piggybacking
  - Container-on-flatcar (COFC)
  - Trailer-on-flatcar (TOFC)

- Railroad service is not nearly as flexible for obvious reason. They can only go where there is track, and they only stop at railheads.

- Trains are much less dependable in keeping to a schedule, which is an important part of intermodalism.
  - Truckers: 95% on-time performance
  - Railroads: 70%
5. Railroad Transport

- Governments have traditionally kept close control over the railroad industry for military and social reasons.
- Railroads could not abandon lines just because they were not profitable.
- The European railroad system is well developed.
6. Inland Shipping

- Inland shipping includes rivers, lakes, and canals.
- The ships and their service are very different from maritime (ocean) shipping.
- There is a gray area between coastal shipping, which is in some ways like inland shipping but is in an ocean.
- The fundamental difference is that the service is mostly domestic for coastal shipping, so it is similar to inland shipping.
6. Inland Shipping

- One of the biggest limitations is geography.
  - Rivers may be too shallow
  - Depth changes with the shifting mud and sand
  - Seasonal variation can create problem
  - Water freeze
- Inland shipping companies have low fixed costs since they do not need to pay for the right-of-way, and government usually pays for dredging and navigational aids.
- The vessels are much more expensive than trucks, but not very different from trains, and less than ocean ships.
- The biggest competition is railroads and pipelines.
6. Inland Shipping

- Few areas that have the majority of inland shipping
  - US Great Lakes
  - Russia’s great rivers
  - Europe’s river system
  - Mississippi River
  - China’s great rivers
7. Pipelines

- Require very high investment, but with very low variable costs.
- One unique thing about pipelines is that the cargo only moves in one direction, with rare exceptions.
- Cargo safety is a strong point, with low loss and damage.
- Pipelines are very dependable, requiring low maintenance and are not affected by weather.
- Pipeline cargo is slow for a storage function.
- There is very limited accessibility since the cargo can only be delivered and accessed at certain places.
7. Pipelines

- Piped commodities are considered bulk.
- The commodities carried in pipes are quite limited.
  - Petroleum dominates the list.
  - Coal slurry
- Larger pipes are much more cost effective than smaller ones. There is slight friction the liquid and the inside of the pipe.