LOGISTICS MANAGEMENT
Transportation

Outline

- Transportation functions
- Transportation management
- Traffic management
- Trade and equipment balance
- Mode selection and carrier management

The Role of Transportation in a Supply Chain

- Movement of product from one location to another
- Products rarely produced and consumed in the same location
- Significant cost component
- Shipper requires the movement of the product
- Carrier moves or transports the product

Transport functionality primarily consists of product movement services

- **Product movement** is the movement of inventory to specified destinations
  - *Restrictive* element—in-transit inventory is "captive", usually inaccessible during transportation
  - *Flexible* element—inventory can be diverted during shipment to a new destination
- Transportation consumes time, financial, and environmental resources
  - Transportation is more than 40% of the cost of logistics
  - One of largest consumers of oil and gas in all countries
  - Impacts traffic congestion, noise and air pollution

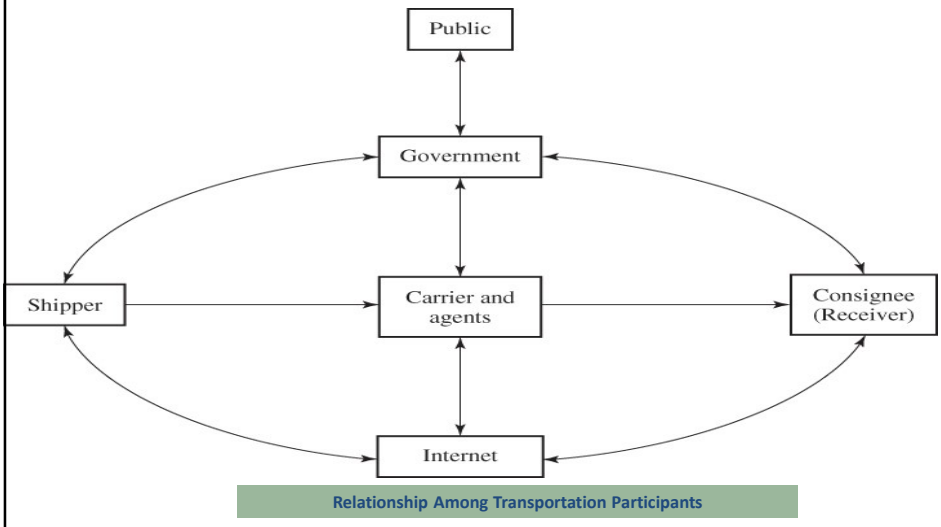
Transport also functions as storage services for products while in a vehicle

- **In-transit inventory** is captive in the transport system
  - Managers strive to reduce in-transit inventory to a minimum
- Product can also be stored in vehicles at origin or destination (trailers, trucks, railcars, etc)
  - Usually more expensive than traditional warehousing
    - Must pay rental or demurrage charges on vehicles used for storage
- **Diversion** occurs when a shipment destination is changed after a product is in transit

Transport participants

- Shipper
- Consignee (Receiver)
- Carrier and Agents
- Government
- Internet
- Public

Major relationships among transportation participants



Relationship Among Transportation Participants

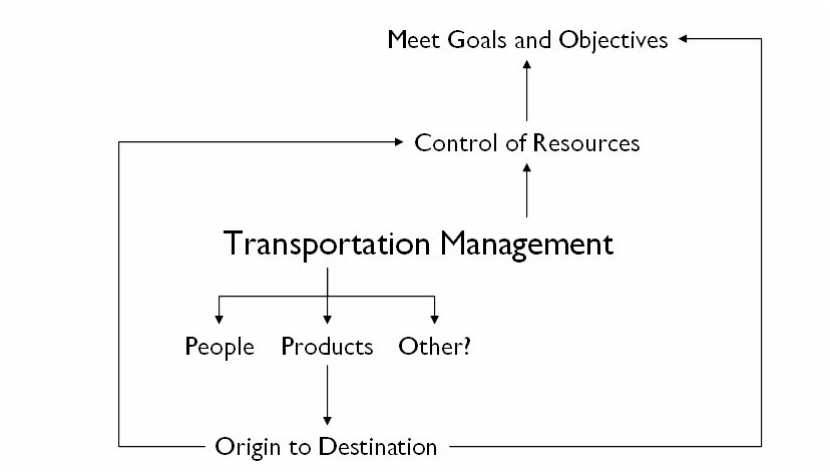
Role and perspective of participants

- **Shipper and consignee** have a common interest in moving goods from origin to destination within a given time at the lowest cost
- **Carriers** desire to maximize their revenue for movement while minimizing associated costs
- **Agents** (brokers and freight forwarders) facilitate carrier and customer matching
- **Government** desires a stable and efficient transportation environment to support economic growth
- **Public** is concerned with transportation accessibility, expense, and standards for security, safety and the environment

Role of the Internet in transportation

- The Internet now provides the vital communications links between the *transactional* participants (shipper-carrier-consignee)
  - Replacing phone and fax technologies
- Web-based enterprises provide information marketplaces
  - Freight matching
  - Fuel, equipment, parts and supplies purchases

What is Transportation Management?



- Transportation is the primary and most important part of logistics.
- In international logistics, the transportation function is even more important because the distances are greater and the difficulties with transport is greater.

Transportation Operations

Consolidated operations (CO)

- Bus/rail transit
- LTL
- Rail
- Airlines
- Ocean carriers/liner service
- Package delivery

Direct operations (DO)

- Taxi
- TL
- Unit trains
- Charter/private planes
- Tramp services
- Courier

DO conveyances on CO carriers (sub-consolidation)

- Rail cars
- Ocean containers
- Air "igloos"

Traffic Management

- Transportation provides two things
  - Physical movement
  - Storage
    - Storage is provided since the cargo is being held during transit, which could be days, weeks or even months.

Traffic Management

- Transportation allows for
  - Geographic specialization
  - Large scale production
  - Increased land values
- Transportation can be looked at as the means to an end, the way logistics is done, but it is also a major industry in itself.

CSCMP's Job Description of a Transportation Manager

- Directs the effectiveness of private, third party and contract carriage systems.
- Manages staff and operations to assure timely and cost efficient transportation of all incoming and outgoing shipments.
- Plans and assures adequate equipment for storage, loading, and delivery of goods.
- Responsible for scheduling, routing, budget administration, freight bill forwarders to streamline the flow of goods across international borders and through customs.

Key Duities of Transportation Manager

- Ensures that operations are conducted safely and within the law.
- Manages fleet and drivers.
- Solicits, evaluates and analyzes contractual bids.
- Negotiates and administers dedicated contract agreements.
- Budgets and controls expenses.
- Determines economical traffic patterns and specific routes.

Traffic Management

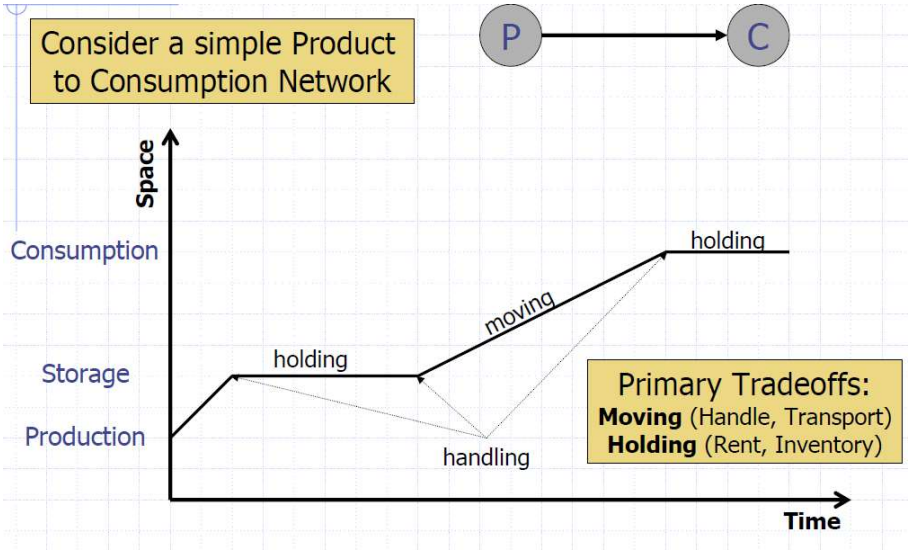
- Three key principles for transportation planning
  - Speed: the ability to go from origin to destination as fast as possible
  - Consistency: the ability for shipments to arrive at the same time, every time. The more consistent the transport, the less inventory needed.
  - Control: the ability to make changes before and during transport.

Traffic Management

Tradeoffs in cost versus service

- The total cost of transportation is more than just the freight bill.
- One must consider how much is gained from transporting something. Sometimes it is cost effective to ship something around the world. Other times something must be acquired locally or not at all.

Time Space Diagram

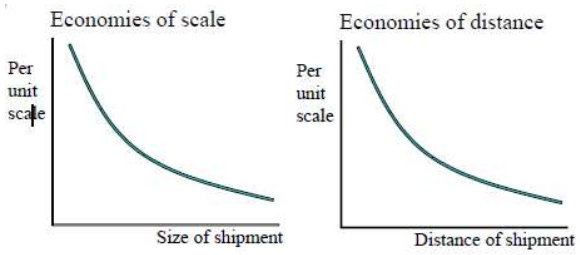


Two fundamental transport principles

- **Economy of scale** is the cost per unit weight decreases as the size of the shipment increases
  - At least until you totally fill the carrying vehicle!
  - Cost decreases because the *fixed* cost of the carrier is allocated over a larger weight of shipment
- **Economy of distance** is the cost per unit weight decreases as distance increases
  - Often called the **tapering principle**
  - Longer distances allow *fixed* cost of the carrier to be spread over more kilometers, lowering the per mile charge
- Goal is to maximize the size of the load and distance shipped while still meeting service expectations

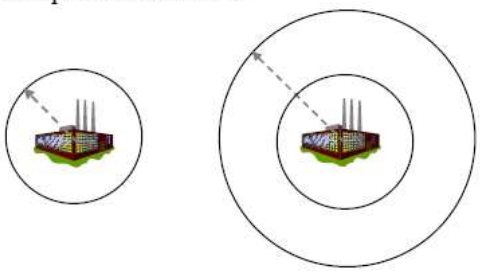
Traffic Management

- Economies of scale
  - Per unit costs go down as the size of the shipment increases.
- Economies of distance
  - As the distance of a shipment increases, the cost per unit distance go down.



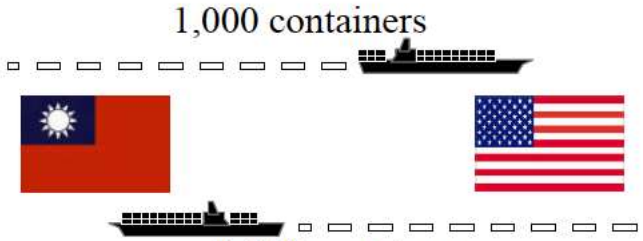
Lardner's Law

- Lardner's law
  - Also known as the law of squares in transportation and trade



Trade and Equipment Balance

- Equipment balance
  - When there is the same amount of cargo or equipment going in both directions of a trade lane.



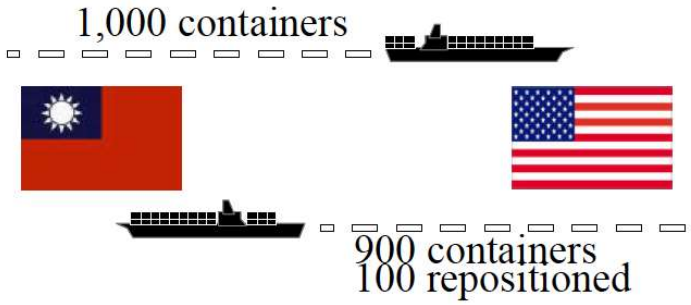
Equipment balance

Trade and Equipment Balance

- Why is balanced trade so important?
  - Balanced trade makes for the most efficient use of transportation assets.
  - When there is more cargo going in one direction than the reverse, either cargo is being left behind (excess demand), or the vehicle is moving at less than capacity. In either case, this inefficiency costs money.

Trade and Equipment Balance

- Imbalanced trade in containerized cargo
  - There is a surplus of containers on one side, and a deficit of containers on the other side.
- In order to fulfill demand on the deficit side, empty containers need to be moved from the surplus side, known as empty repositioning. This can be very expensive.



Trade and Equipment Balance

- In reality, the situation is much more complex. Instead of a two-port example, ports trade with many other ports.
- From a logistics perspective, what is more important is whether a given port or region is balanced overall.
- Resolve imbalance
  - Price adjustment
  - Transport capacity adjustment

Trade and Equipment Balance

- Trade balance also has seasonal variations. The summer season is generally slower, which means that carriers will move less than full.
- Container pools or chassis pools
  - Common method of managing equipment imbalance
  - The participating companies agree to share their equipment. At the end of a period, such as a month or a quarter, the companies look at balance and pay for any difference.

Mode Selection and Carrier Management

- Four factors in transportation decisions
  - Shipper
  - Cargo
  - Carrier
  - Consignee
- Cargo characteristics determine the best way to ship it.
- The shipper can only choose from the carriers that are offering their services, and often the choices are quite limited.
- Finally, the consignee often influences the method of delivery when the purchase was made.

Mode Selection and Carrier Management

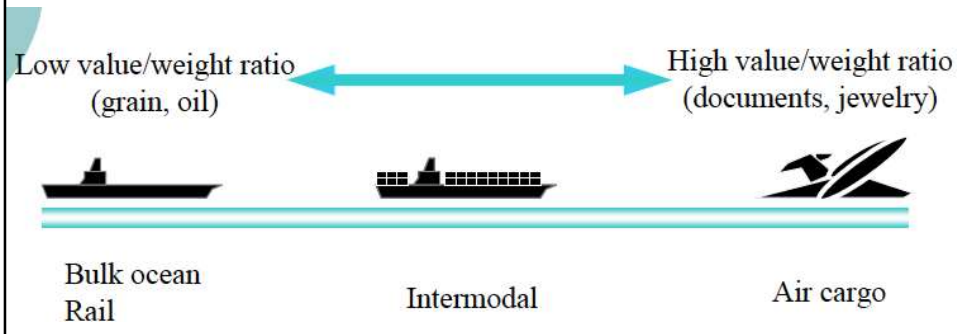
- Transportation ownership
  - Private
  - Contract
  - Common carriage
- The choice depends on a variety of factors, but the most important is the level of commitment and risk the shipper is willing to accept.

Mode Selection and Carrier Management

- Cargo transport characteristics
  - Size
  - Weight
  - Density
  - Stowability
  - Handling
  - Liability
  - Dangerous goods
  - Special service requirements

Mode Selection and Carrier Management

- Choice of transportation mode (spectrum)



Mode Selection and Carrier Management

- Criteria for selecting transportation provider
  - Pricing 31%
  - On-time performance 22%
  - Customer service 13%
  - Document quality and accuracy 13%
  - Shipment tracking 11%
  - Global coverage 5%