AGEC 632: AGRIBUSINESS LOGISTICS

Chapter 14. Transportation in the Supply Chain

2021

Manhattan, Kansas



Learning Objetives

 Understand the role of different transportation modes in a supply chain

INCOTERMS

 Evaluate trade-offs that shippers need to consider when designing a transportation network

What is Transportation?



What is Transportation?

- Transportation refers to the movement of product from one location to another as it makes its way from the beginning of the supply chain to the consumer.
- It is significant because it is where the majority of costs are incurred at most supply chains.
- Supply chain success is closely linked to the appropriate use of transportation to support its competitive strategy



Introduction

- 1. Transportation decisions critically affect supply chain profitability and influence inventory and facility network decisions.
- 2. Importance of transportation growing with
 - a. Increased globalization
 - b. Information revolution, such as e-commerce

Benefits of Improved Transportation

Directly--lower transport cost

- for inputs
- for final products

Indirectly--enlarge geographic markets

- greater market competition
- goods made available from markets once not feasible
- Lower cost of production by more fully exploiting economies of scale—decouple markets from production sites
 - more intense use of facilities
 - more labor specialization



The Role of Transportation in the Supply Chain

The Role of Transportation in the 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 between two points in the supply chain
- Carrier moves or transports the product (outsource)



The Modes of Transportation



Six Modes Of Transportation

- 1. Air
- 2. Package carriers—FedEx, UPS, etc.
- 3. Truck--motor carrier
 - TL—truck load
 - LTL—less than truck load
- 4. Rail
- 5. Water
- 6. Pipeline
- Intermodal



Package Carriers



Small packages up to about 150 pounds

Expensive

Rapid and reliable delivery

Small and time-sensitive shipments

Provide other value-added services Consolidation of shipment a key factor

Truck

- Significant fraction of goods moved
 - Truckload (TL or FTL)
 - Low fixed cost
 - Imbalance between flows
- Less than truckload (LTL)
 - Small lots
 - Hub and spoke system
 - May take longer then TL



Rail

Rail hauling is much more energy efficient than truck.

 With no intermediate loads to drop or take, such trains will outrun a truck to a distant terminal.

Still have door-to-door service

Water

- Limited to certain geographic areas
- Ocean, inland waterway system, coastal waters
- Very large loads at very low cost
- Slowest
- Dominant in global trade
- Containers

Vessel Types & Terms

Cargo ships/freighters can be divided into six groups, according to the type of cargo they carry. These groups are:

- **1. General Cargo Vessels:** carry packaged items like chemicals, foods, furniture, machinery, motor- and military vehicles, footwear, garments, etc.
- Container Ships: are cargo ships that carry all of their load in truck-size intermodal containers, in a technique called containerization. They are a common means of commercial intermodal freight transport and now carry most seagoing non-bulk cargo. Container ship capacity is measured in twenty-foot equivalent units (TEU).
- **3. Tankers:** Carry petroleum products or other liquid cargo.
- 4. Dry Bulk Carriers: carry coal, grain, ore and other similar products in loose form.
- **Multi-Purpose Vessels:** as the name suggests, carry different classes of cargo e.g. liquid and general cargo at the same time.
- **Reefer Ships:** (or Refrigerated) ship is specifically designed and used for shipping perishable commodities which require temperature-controlled, mostly fruits, meat, fish, vegetables, dairy products and other foodstuffs.

Specialized Cargo Ship Types

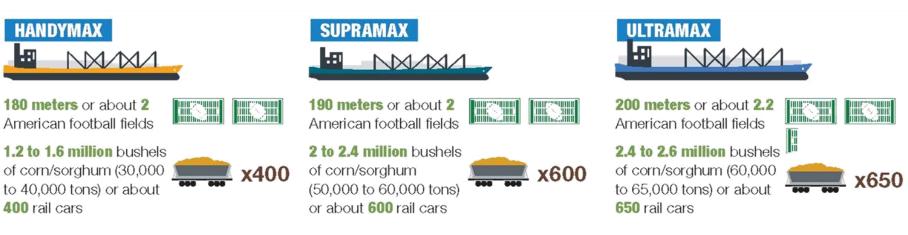
Specialized types of cargo vessels include container ships and bulk carriers (technically tankers of all sizes are cargo ships, although they are routinely thought of as a separate category).

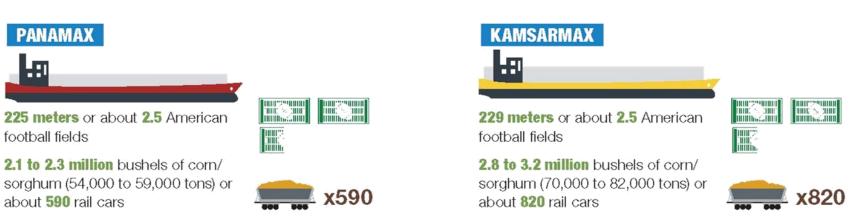
Cargo ships fall into two further categories that reflect the services they offer to industry:

- ➤ **Liner Services** Those on a fixed published schedule and fixed tariff rates. Cargo Liners run on fixed schedules published by the shipping companies. Each trip a liner takes is called a voyage.
- > Tramp Ships do not have fixed schedules. Users charter them to haul loads.

Generally, the smaller shipping companies and private individuals operate tramp ships.

Common Grain Vessel Sizes







WWW.GRAINS.ORG



Pipeline

- High fixed cost
- Primarily for crude petroleum, refined petroleum products, natural gas.
- Best for large and stable flows.
- Pricing structure encourages use for predictable component of demand

Intermodal

Use of more than one mode of transportation to move a shipment.

- Grown considerably with increased use of containers.
- May be the only option for global trade.
- More convenient for shippers one entity.
- Key issue exchange of information to facilitate transfer between different modes.

Choice Of Shipping Mode

Determined by cost-service trade-off

- Cost per mile, in increasing order—water, rail, truck, package carrier, air.
- Responsiveness (Transport time), starting with fastest—air, package, truck, rail, water.
- Intermodal can provide high service responsiveness at low cost, e.g. ocean freight to merchandise train to truck.



Intermodal

- Combined rail and truck (and ship for overseas shipments)
- Takes advantage of
 - low cost of rail and water, and
 - the service responsiveness of truck

Rail Intermodal Benefits

- Rail hauling is much more energy efficient than truck.
- With no intermediate loads to drop or take, such trains will outrun a truck to a distant terminal.

Still have door-to-door service.

For example:

Containers from Asia arrive at Long Beach, CA.

Off-loaded to merchandise trains.

Each such train is destined for a single, distant terminal such as Chicago, Dallas or Denver.

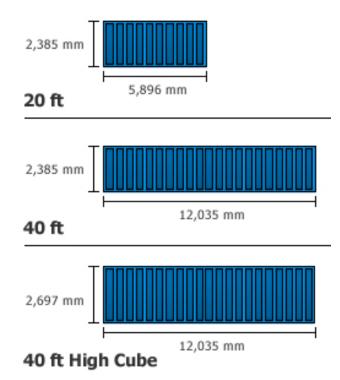
With no intermediate stops, such trains will outrun trucks making same trip.

Containers provides better safety and security of goods over the whole route.

Containers and Inter-Modal Shipping

Most frequently used container sizes – 20' and 40' GP Container

40' GP Container Dimensions		Millimeters	Feet
Inside Dimensions	Length	12033	39'6"
	Width	2350	7'8"
	Height	2394	7'10"
Door Opening	Width	2338	7'8"
	Height	2280	7'6"
		Kilograms	Pounds
Weight	Max. Gross	30480	67200
	Tare	3800	8377
	Max. Payload	26680	58823
		Cube Metres	Cube Feet
Capacity		67,7	2390





USDA Weekly Transportation Reports

Grain Transportation Report

A weekly publication of the Agricultural Marketing Service www.ams.usda.gov/GTR

Weekly Highlights

Snapshots by Sector

- Export Sales For the week ending ...
- Rail Transportation
- Barge Transportation
- Ocean Transportation
- Truck Transportation
- Grain Exports and Inspections



Transportation Costs

Transportation Cost

- Transportation cost is the cost occurred during transporting the freight from one place to another. The following are the elements of transportation costs
- 1. Tariff of transportation mode: It depends on-
 - Nature of the product
 - Distance to be covered
 - Quantity of the shipment
 - Transit time
 - On route handling needs
 - Trade relationship

Transportation Cost

- Transit Time Cost:
 - Working Time Cost
 - Customer Service Cost
- Obsolescence & Deterioration Cost:
 - Changes in physical features of the products resulting in value reduction, especially perishable items
 - Milk, Vegetables, Fruits, Fish, Eggs
- Protective Packaging Cost
 - To avoid breakage and pilferage
 - To avoid damage due to rain
 - It depends on the mode of transport or multi-modal needs

TRANSPORTATION: Shipper Viewpoint



Shipper's Goal:

Minimize Total Cost Of Satisfying its Customers

Shipper's decisions include design of transportation network, choice of means of transport and assignment of shipments. Costs to account for are

- Transportation cost
- Inventory cost
- Facility cost
- Processing cost
- Service level cost



Transport Factors Impacting Number and Location Of Facilities

- Responsiveness needed
- Intra-firm competition on part of shippers
- Backhaul potential
- Value-added logistics desired
- Railroad restructuring—move to just trunk lines
 - Deregulation--Drop branch lines (some to short line RRs)
 - Unit trains
 - Intermodal: container cars and trailers on flatbed cars



Transportation Network Design Alternatives

- Direct shipping
 - Full loads to destination
 - Milk runs

- Ship first to distribution center (DC)
 - From DC to destination

Tailored transportation network



Shippers Decisions

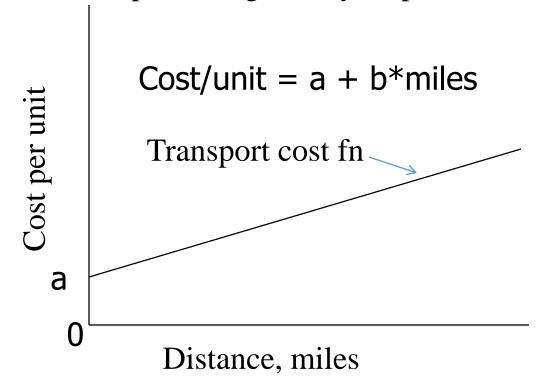
Consider trade-off between cost and responsiveness

Search continuously to reduce cost and improve responsiveness



Components Of Transport Cost

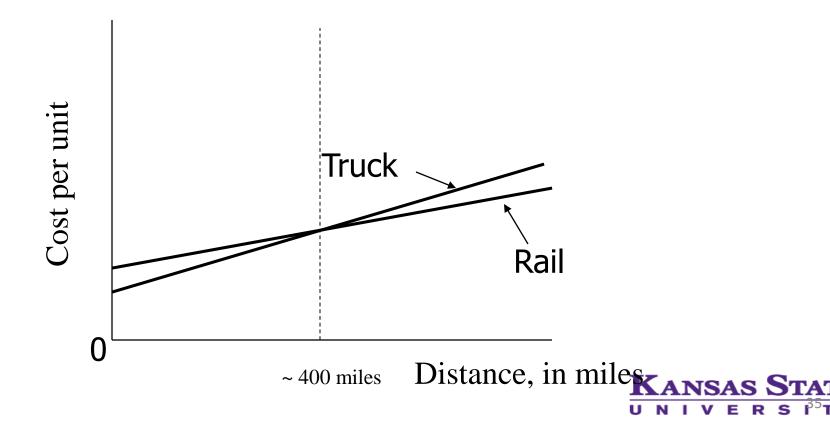
- Loading/Unloading and assembly cost = a
- •Travel cost per mile given by slope of line





Truck vs Rail Cost

- Loading/Unloading
- •Travel distance



Industry Shipping Arrangements

Wal-Mart

- Carries low inventories because it has responsive, efficient transportation system, including
 - Cross docking
 - Store-to-store exchanges

7-Eleven Japan

- Multiple deliveries per day to match customers needs
- Aggregate products in trucks according to required temperature

Amazon

 Centralize inventories at a few warehouses, uses package carrier

Dell

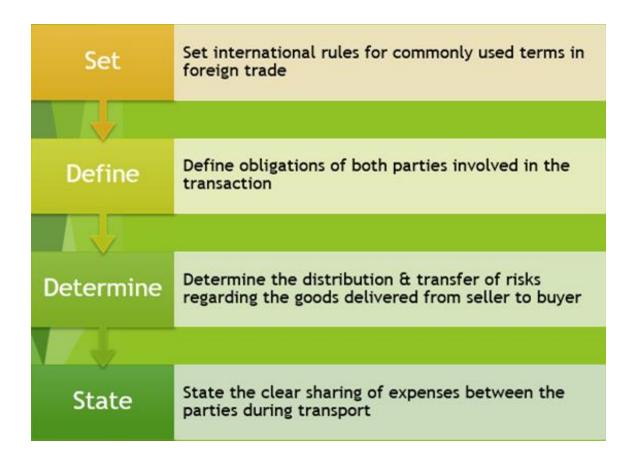
Pull manufacturing, use responsive transportation



INCOTERMS...?



Give the "why" behind Incoterms





Who Publishes the Incoterms Rules?

International Chamber of Commerce

www.iccwbo.org

International Sales - Incoterm

 INCOTERM (International Commercial Terms) provide a common set of rules used for defining the responsibilities of sellers and buyers in the delivery of goods under sales contracts.

They are widely used in international commercial transactions.

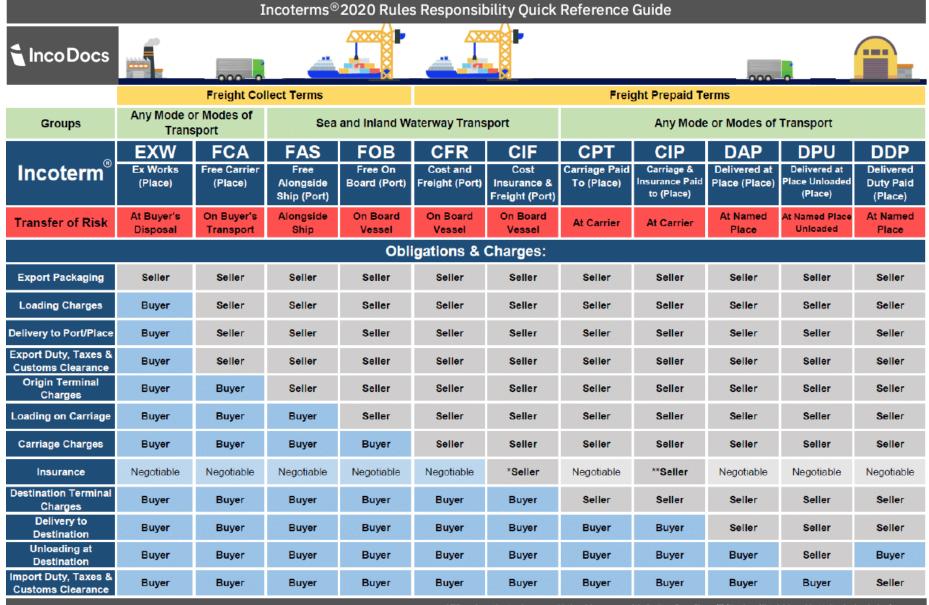


RULES FOR ANY MODE OR MODES OF TRANSPORT

- EXW | Ex Works
- FCA | Free Carrier
- CPT | Carriage Paid To
- CIP | Carriage and Insurance Paid To
- DAP | Delivered at Place
- DPU | Delivered at Place Unloaded
- DDP | Delivered Duty Paid
- RULES FOR SEA AND INLAND WATERWAY TRANSPORT
- FAS | Free Alongside Ship
- FOB | Free On Board
- CFR | Cost and Freight
- CIF | Cost Insurance and Freight

INCOTERMS 2020

Incoterm Obligations





Billing Terms

An important point to make is that the billing does not determine when the goods within a shipment pass ownership from the seller to the buyer. All billing terms indicate is when the freight invoice is to be paid.

Account	Payment due on last day of the month following the one in which the invoice is dated
PIA	Payment in advance
Net 7	Payment seven days after invoice date
Net 10	Payment ten days after invoice date
Net 30	Payment 30 days after invoice date
Net 60	Payment 60 days after invoice date
Net 90	Payment 90 days after invoice date
EOM	End of month
21 MFI	21st of the month following invoice date
1% 10 Net 30	1% discount if payment received within ten days otherwise payment 30 days after invoice date
COD	Cash on delivery
Cash account	Account conducted on a cash basis, no credit
Letter of credit	A documentary credit confirmed by a bank, often used for export
Bill of exchange	A promise to pay at a later date, usually supported by a bank
CND	Cash next delivery
CBS	Cash before shipment
CIA	Cash in advance
cwo	Cash with order
1MD	Monthly credit payment of a full month's supply
2MD	As above plus an extra calendar month
Contra	Payment from the customer offset against the value of supplies purchased from the customer
Stage payment	Payment of agreed amounts at stage

International Billing Terms

Letter of Credit

 Confirmed, Irrevocable, Silent Confirmation, Revolving, Transferable, Back-to-Back, Standby, etc.

Documentary Collection (D/C)

- Cash Against Documents
- Documents Against Acceptance

Open Account

Net - # of days from DATE

Credit Insurance Types for Open Account Transactions

Multi-Debtor

A credit insurance policy that covers the insured's total credit sales

Key buyer / named buyer

Cover for the insured's largest or selected buyer only

Excess of Loss

Insurance, cover or indemnification in excess of an annual aggregate amount of first loss to be borne by the insured

Contract Frustration

Insuring the risk of the impossibility to perform a trade contract

Specific Account

Cover for all sales to one debtor or for a single contract with one debtor

Bonds and Guarantees

Bonding facilities to replace or sit in excess of existing bank bond facilities, Letters of Credit and guarantees Trade Credit Insurance protects sellers of goods and services on credit against the risk of customer non-payment due to customer insolvency, protracted default, political events, or acts of war that prevent contract performance.

Top Up

Additional coverage in excess of primary credit limit on a single buyer or selected buyer basis



Benefits of Credit Insurance

Empowers Business Growth

- Promotes sales growth whilst maintaining controls
- Directs and supports sales to higher margin markets (high risk regions)
- Supporters' mergers and acquisitions

• Embeds Credit Management Discipline

- Enables companies to extend credit terms
- Reinforces credit management processes
- Access to credit risk expertise and analysis

Enhances Working Capital

- Facilitates access to finance
- Balance Sheet Engineering
- Cost effective security provision

Protects from Bad Debt

- Identified potential losses
- Greater insight into customers' likelihood to fail
- Transfers risk to insurer's balance sheet
- Reduces bad debt provisions

Payment Delay Reasons (The downfall of Credit Insurance)

- Insufficient availability of funds
- Disputes over the quality of goods delivered or service provided
- Goods delivered or service didn't correspond with what was agreed in the contract
- Complexity of the payment procedure
- Inefficiencies of the banking system
- Incorrect information on invoices
- Buyer using outstanding debts/invoices as a form of financing
- Formal insolvency of the buyer
- Invoice was sent to the wrong person

Force Majeure

A party will not be liable for any failure of or delay in the performance of this agreement for the period that such failure or delay is beyond the reasonable control of a party, materially affects the performance of any of its obligations under this agreement, could not reasonably have been foreseen or provided against, but will not be excused for failure or delay resulting from only general economic conditions or other general market effects.



Transportation Carrier Viewpoint

Carrier's Goal: Maximise Returns on Assets

- Cost Factors (Carrier)
 - Vehicle related costs
 - Fixed operating costs
 - Trip-related costs
 - Quantity-related costs
 - Overhead costs
- High asset utilization with uniform steady business, not seasonal nor variable business.
- Carriers search, continuously, to improve customer service
 - ↑Efficiency of operation → more competitive prices
 - ↑ Effectiveness → Better able to address shipper needs.

Risk Management in Transportation

- Three main risks to be considered in transportation are
 - 1. Risk that the shipment is delayed
 - 2. Risk of disruptions
 - 3. Risk of hazardous material
- Risk mitigation strategies
 - Decrease the probability of disruptions.
 - Alternative routings.
 - In case of hazardous materials, the use of modified containers, a low-risk transportation model, modification of physical and chemical properties can prove to be effective.

Making Transportation Decisions in Practice

- 1. Align transportation strategy with competitive strategy
- 2. Consider both in-house and outsourced transportation
- 3. Use technology to improve transportation performance
- 4. Design flexibility into the transportation network

AGEC 632: Agribusiness Logistics

2021 Manhattan, Kansas



Readings for Assignment #2. Evergreen Suez Canal Crisis (5 links) and Containerization Video

Assignment #2 will be solve in class (Friday Sept 10, 2021)



Suez Canal Crisis

Reading for Assignment #2. (5 links)

- 1. Impact of Suez Canal Crisis on Companies Around the World Could Last Weeks.
- https://www.forbes.com/sites/edwardsegal/2021/03/31/impact-of-suez-canal-crisis-on-companies-around-the-world-could-last-weeks/?sh=3c658e4842d8
- 2. Suez Canal mishap puts battered supply chains under more pressure
- https://www.washingtonpost.com/us-policy/2021/03/27/suez-canal-economy
- 3. From toilet paper to coffee, here are some of the products that could soon be in short supply because of the Suez Canal blockage
- https://www.businessinsider.com/toilet-paper-coffee-products-delayed-suez-canal-blockage-impact-2021-3

Suez Canal Crisis

Reading for Assignment #2.(5 links)

- 4. The ship that blocked the Suez Canal may be free, but experts warn the supply chain impact could last months.
- https://www.cnbc.com/2021/03/29/suez-canal-is-moving-but-the-supply-chain-impact-could-last-months.html
 - 5. Will the Giant Containerships Cause More Supply Chain Disruptions?
- https://www.supplychainbrain.com/articles/33074-will-the-giant-containerships-cause-more-supply-chain-disruptions

Containerization



