Intermodal Railroad Freight

FINOPT 341
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Intermodal Railroad Freight

- Real World Applications
- History of Railroad
- Intermodal Rail Freight
  - What?
  - Why?
  - Who?
- Issues and Problems
- Conclusion
Real World Applications

- How does our study of transportation networks and logistics apply to the real world?
Green Incentives

- Real world S-O and U-O transportation networks:
  - Objective:
    - To lower travel times
    - To lower user costs
  - “Green” Benefits:
    - Lower energy consumption
    - Lower emissions
    - Lower impact on environment
The Train

http://tinyurl.com/733h4a4
History of Railroad: Shipments

- First rail completed in 1830
  - Minerals, timber, and agriculture
- Boxcar 1830s to 1960
  - Coal, grains, automotive products, and many other consumer goods
- Containerization 1960s
  - Doublestack intermodal 1970s
- Intermodal
  - Industrial, agricultural, electronics, foods, and a vast array of consumer products
Boxcar to Intermodal
Intermodal Freight
What?

- More than one mode of transportation
- No handling of goods between modes
- Businesses leverage efficiency of different modes
  - Lower cost means cheaper goods
  - Green incentives
Intermodal Rail Freight

Why?

• Fuel efficient
• Cost efficient
• Environmentally friendly

Premise: It is advantageous to ship intermodal (or any freight) by rail when traveling long distances.

Therefore, it is beneficial to move a percentage of long-haul truck intermodal onto rail networks.
Why? Economic Benefits

- The average employee earned $98,500 in salary and benefits
- Rail handles a third of all US exports
- Rates for shipping freight are among the lowest in the world
- Almost all investments made on rail infrastructure are done by owning company. Highways are public and must be funded publicly.
- Private vs. Public
Why? Economic Benefits

• The cost of shipping is about half of what it was 30 years ago
• Staggers Act
Environmental Benefits

- Rail is four times more efficient than trucks
- Rail has lower emissions
- One train can carry the equivalent of several hundred trucks (280 on avg.)
- Lower highway congestion

![Gallons of Fuel Consumed Hauling One Ton of Freight Coast-to-Coast]

- Trains: 7 gallons
- Trucks: 28 gallons

*AAR estimate based on U.S. DOT data.*
Benefits cont. Congestion Reduction

- In 2010, highway congestion cost $101 bill. and 4.8 bill. hours wasted
- 1.9 bill. gallons of fuel wasted in congestion
- Supporting premise-
  - Move 10% of long-haul truck to rail, greenhouse emissions fall by 12 mill. Tons
  - Equivalent of removing 2 mill. Cars off highways
Who?

- Burlington Northern
- Union Pacific
- Norfolk Southern
- CSX
Who? Revenue by Intermodal

- BNSF: 37%
- UP: 19%
- CSX: 14%
- NS: 20%

Rail companies should expect to see continued gains in intermodal profits over the next 30 years...if they can keep up with increasing demands by increasing capacity.
Intermodal Video

http://tinyurl.com/7867sz6
0% of intermodal in rail networks are imports and exports
Intermodal Network

Export Network Topology

EXTRACTION

\[ w = (1, 5) \]

\[ a = \text{Short-Haul Truck} \]
\[ b = \text{Barge} \]
\[ c = \text{Barge} \]
\[ d = \text{Long-Haul Truck} \]
\[ e = \text{Train} \]

\[ P_1 = (a, c) \]
\[ P_2 = (a, d) \]
\[ P_3 = (a, e) \]
\[ P_4 = (b, c) \]
\[ P_5 = (b, d) \]
\[ P_6 = (b, e) \]
Problems and Issues

- Transporting hazardous materials
- Checking containers on a sample base
- Thorough check of shipment at origin
- Loss prevention
Problems and Issues

- Ability to expand intermodal freight capacity
  - Tonnage will increase 88% by 2035
  - Need over $148 billion to maintain current congestion levels through 2035
- Investing in intermodal freight
  - Should rail continue to wholly foot the bill? Will they be able to keep up with growth?
  - Do they have the financial means necessary to continue making large investments?
Conclusion

• What will rail transportation look like in 30 years?
• Will railroads alone have enough investment power to keep add sufficient capacity in order to meet demand?
For anyone that breathes...

http://tinyurl.com/7ey7xyz