INDUSTRIAL MINERAL TRANSPORTATION and MARKETING
TRANSPORTATION CONCEPTS

- Overall transport is 21% of US economy
- Often >50% of delivered IM cost
- Bulk *versus* value
- Place value
- Value added
- Quality retention or “do no harm”
- Efficiency, luck, and risk
## Transport

Often exceeds 50% of delivered cost (highest except food)

<table>
<thead>
<tr>
<th>Industrial Mineral</th>
<th>Mine As $ per short ton</th>
<th>Shipping $</th>
<th>$ End User</th>
<th>% of del $</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction aggregates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial glass/foundry sand</td>
<td>4–7</td>
<td>2–6</td>
<td>6–13</td>
<td>27–52</td>
</tr>
<tr>
<td>frac sand</td>
<td>7–12</td>
<td>6–10</td>
<td>13–22</td>
<td>39–51</td>
</tr>
<tr>
<td>Cement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>domestic</td>
<td>40–50</td>
<td>8–14</td>
<td>48–64</td>
<td>15–24</td>
</tr>
<tr>
<td>imported</td>
<td>26–30</td>
<td>8–14</td>
<td>34–44</td>
<td>22–33</td>
</tr>
<tr>
<td>Pumice (import)</td>
<td>10–15</td>
<td>9–12</td>
<td>19–27</td>
<td>42–49</td>
</tr>
<tr>
<td>Coal</td>
<td>19–28</td>
<td>10–17</td>
<td>29–45</td>
<td>30–42</td>
</tr>
<tr>
<td>Feldspar (ground)</td>
<td>40–50</td>
<td>40–60</td>
<td>80–110</td>
<td>47–57</td>
</tr>
<tr>
<td>Lime</td>
<td>35–50</td>
<td>15–25</td>
<td>50–75</td>
<td>26–37</td>
</tr>
<tr>
<td>Kaolin (slurry)</td>
<td>30–45</td>
<td>20–35</td>
<td>50–80</td>
<td>45–48</td>
</tr>
</tbody>
</table>
GEOLOGY

existence

Development

⇓

TRANSPORTATION

Production

profit

MARKET
# TRANSPORTATION AS MARKETING

<table>
<thead>
<tr>
<th>7 R’s of Transport</th>
<th>4 P’s of Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right product</td>
<td>Product</td>
</tr>
<tr>
<td>Right quantity</td>
<td></td>
</tr>
<tr>
<td>Right condition</td>
<td>Place</td>
</tr>
<tr>
<td>Right place</td>
<td></td>
</tr>
<tr>
<td>Right time</td>
<td></td>
</tr>
<tr>
<td>Right customer</td>
<td></td>
</tr>
<tr>
<td>Right cost</td>
<td>Price</td>
</tr>
<tr>
<td></td>
<td>Promotion</td>
</tr>
<tr>
<td></td>
<td>Service</td>
</tr>
</tbody>
</table>
“THE MARKETING CONCEPT”

• Focus all activities towards total customer management and satisfaction
• Make products consumers want vs making consumers want a product
• Transportation can ↑ customer satisfaction
• Industrial marketing better for IMs than consumer marketing approach
• Industrial marketing focuses on customer satisfaction
IM TRANSPORT COST FACTORS

- IM volume & processing
- Wet or dry; bulk or packaged
- Transport distance
- Availability, schedule & transit time
- Equipment & support facilities
...more factors

- Distribution, terminal, & port facilities
- Support services or lack thereof
- Ex-Im tariffs, bonding & customs
- Governmental & environmental regs.
- Cultural or regional differences
- Insurance & risk-avoidance
TRANSPORT RISK

Truck  Lower Risk
Rail
Barge
Ship  Higher Risk
TRUCK TRANSPORT

- Unlimited year-round movement
- Load & unload quickly
- Operate independently with small crew
- Flexible
  - Small lots & variable sizes
  - Infrequent shipment
- Very expensive; 10–25¢ per ton-mile
TRUCKING 2

- Transports about 60% of US cargo
- Highest cost per ton mile
- Very flexible
- Rates fixed (common carrier) or negotiation
- States set common or contract carrier
- Common carrier serves all = highly regulated
- Contract carrier negotiates with each customer
  - separate, confidential contract rates
  - based on many economic and competitive factors
RAIL TRANSPORT

- Slow; limited to track
- Inflexible
- Expensive, 2–4¢ per ton-mile
- Time, volume, distance interaction
- Railcars/service often unavailable
- Railroads often difficult to deal with
Rail 2

- Subsidized or nationalized except in U.S.
- Haul about 25% of freight
- Railroads restrict interchange points & reciprocal switching agreements with other railroads
- Today most material moves under commodity, scale, or contract rates held confidential for competitive advantage
- Hauls from producer to user over a single railroad are cheaper than joint-line movement
  - profits are shared
  - some expenses duplicated
Railcar service

- Mingle car—100 t or less, very slow, high rates
- Multiple car—1200 t or more, slow, moderate rates
- Trainload—4000 t or more, cars loaded and unloaded together, fast, low rates
- Unit train—contract tons per time in set number of cars, continuous turnaround service, very fast, lowest rates
- Some railcar types used by IM producers are:
  - hopper
  - rapid discharge
  - gondola
  - covered
  - pressure differential
  - and special service
Railroad Cost Factors

- Loading time
- Volume moved
- Distance
- Unloading time
- Rail equipment
- Rail equipment owner
- Competing transport
- Competing rates
- Value of service
BARGE TRANSPORT

- Slow
- Inflexible
  - needs river, canal or waterway and locks
  - oriented to large bulk cargoes
- Limited access; grain season (Aug.–Nov.)
- Inexpensive; 0.75–1¢ per ton-mile
Barge 2

- Relatively unregulated rates; private contracts
- Contracts negotiated via market forces
- Inland waterways carry 12% of US freight for 2% of US freight billings
- Inland waterway is about 23,200 km of which the lower 400 km are accessible to ocean-going vessels
- Coastal seaways (Gulf Intracoastal Waterway from Texas to Florida) is also important
- The Rhine, and its feeder ports on the North Sea (Rotterdam, Antwerp, Amsterdam), connect via canal to the Danube and the Black Sea
SHIP TRANSPORT

- Slow
- Needs extensive infrastructure
- Very inflexible
  - not now geared to IM cargoes
  - not usually a factor inland
- Seasonal (grain, iron, coal, fertilizer; E↔W)
- Very inexpensive; 0.1–0.15¢ per ton mile
# SHIP TYPES AND SIZES

<table>
<thead>
<tr>
<th>TYPE</th>
<th>GROSS DWT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CAPESIZE</strong></td>
<td>100,000–200,000+</td>
<td>Too big for Panama Canal; transits Cape of Good Hope or Cape Horn</td>
</tr>
<tr>
<td><strong>PANAMAX</strong></td>
<td>60,000–80,000</td>
<td>Maximum to transit Panama Canal; 32.2 m beam and 275m length</td>
</tr>
<tr>
<td><strong>HANDYMAX</strong></td>
<td>40,000–52,000</td>
<td>Inexact term</td>
</tr>
<tr>
<td><strong>HANDYSIZE</strong></td>
<td>20,000–35,000</td>
<td>Inexact term</td>
</tr>
</tbody>
</table>
SHIPPING CONTRACT RISK

Through Rate  
Liner
Trip Time *or* Voyage Charter
Contract of Affreightment
Time Charter
Bare Boat
...more risks

- Accidents
- Weather (time to avoid)
- Breakdowns
- Stowage errors
- Port problems (either end of voyage)
- Political problems
Shipping

- **Tramp**
  - **Voyage:** single voyage, rates from spot market
  - **Contract of affreightment:** lift specific tonnage over several voyages for a set period
  - **Time:** voyages for a specified time under direction of charterer who bears most costs except wages, victuals, and insurance as "disponent owner"
  - **Bare boat:** charterer takes vessel for specified time, staffing and operating it without restriction

- **Liner (schedule with conference)**
- **Coastal or coaster**
- **Short sea**
- **Long sea**
Shipping, cont.

- Underutilized in past by industrial minerals
- Big 3+ = wheat, iron ore, coal, (fertilizer)
- Brokers critical; history of ship helpful to limit contamination and other problems
- Bulk shipping
  - Unregulated
  - Cyclical
  - Fixtures by negotiation
Shipping, even more

- Control over commodity transport greatest if shipping FOB load port and fixing a vessel
  - Leaves control in hands of IM producer
  - Ensures vessel type, contamination level, ship-owner reliability, on-time arrival
  - Flexibility to respond to the freight market

- Charter on a delivered basis
  - Cost and freight, or C&F
  - Leaves control in the hands of the ship-owner
  - Causes some uncertainty and lowers flexibility
Shipping Brokers

• Cable, cargo, and ship brokers lessen risk
  – canvass the shipping market,
  – evaluate freight offers and services,
  – provide relatively unbiased opinions

• Worldwide shipping market
  – cyclical
  – dominated by supply and demand
  – operates 24/7

• Correct choice of discharge port is critical
  – based on distance to customer and transport available
  – shortest distance is not always the cheapest
TRENDS

⬆ Deregulation & integration
⬆ Marketing & transport distance
⬆ Just in time delivery; mostly by truck
⬆ Use of brokers, traders, trade groups
⬆ Distribution centers
⬆ Bulk or container terminals
...more trends

- Use of rail & water transport
- Large ships serving fewer ports
- Use of containers on inland waterways
- Importance of transport managers
- Internet information & commerce
## SUMMARY OF TRANSPORTATION TYPES

<table>
<thead>
<tr>
<th></th>
<th>TRUCK</th>
<th>RAIL</th>
<th>BARGE</th>
<th>SHIP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US cents/ton-mile</strong></td>
<td>10-25 (high)</td>
<td>2-4 (moderate)</td>
<td>0.75-1 (low)</td>
<td>0.1 (very low)</td>
</tr>
<tr>
<td><strong>Rates &amp; Regulation</strong></td>
<td>Negotiated (→ regulated)</td>
<td>Negotiated (→ regulated)</td>
<td>Negotiated (↓ regulated)</td>
<td>Negotiated (~ free market)</td>
</tr>
<tr>
<td><strong>Flexibility</strong></td>
<td>Very high</td>
<td>Moderate</td>
<td>Low</td>
<td>Very Low</td>
</tr>
<tr>
<td><strong>Capacity US</strong></td>
<td>25 t</td>
<td>100 t</td>
<td>1200 t (15-40)</td>
<td>60,000 dwt</td>
</tr>
<tr>
<td><strong>(Typical) Europe</strong></td>
<td>Varies</td>
<td>Varies</td>
<td>1500 t (4-6)</td>
<td>150,000 dwt</td>
</tr>
<tr>
<td><strong>Subsidy type</strong></td>
<td>Roadway</td>
<td>Track</td>
<td>Locks</td>
<td>Ports</td>
</tr>
<tr>
<td><strong>Containers</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Negotiations</strong></td>
<td>Easy; often via regional</td>
<td>Hard; RR often not very</td>
<td>Easier with broker, harder</td>
<td>Less hard with broker, very</td>
</tr>
<tr>
<td><strong>(Mostly confidential)</strong></td>
<td>dispatcher</td>
<td>responsive</td>
<td>without</td>
<td>hard without</td>
</tr>
</tbody>
</table>

**Note:**
- RATINGS: (high), (moderate), (low), (very low)
- NEGOTIATIONS: Negotiated (→ regulated), Negotiated (↓ regulated), Negotiated (~ free market)
- FLEXIBILITY: Very high, Moderate, Low, Very Low
- CAPACITY: US (Typical), Europe (Per Customer)
- SUBSIDIES: Roadway, Track, Locks, Ports
- CONTAINERS: Yes, No
- NEGOTIATIONS: Easy; often via regional dispatcher, Hard; RR often not very responsive, Easier with broker, harder without
North American Perlite
A transport example

- Greek imports to East Coast of USA
- Trans-loading from ship to railcars
- Market focus reversal to West Coast
- Containers to Pacific Rim
- Also Gulf access (Mobile; Houston)
- Panama Canal, Cape Horn
Perlite containers to Pacific Rim

Perlite to South America

Future perlite from China?

Future perlite from Greece?

Perlite from Greece

St. Lawrence

Baltimore

Brunswick

Rail

Perlite mine (surface)

Plant (screen/expansion)

Prospect or inactive mine