An Economic Framework for Domestic Short Sea Shipping

Moderator: Jennifer Zeien, Slater & Zeien, L.L.P.
Panelists: Alan Gray, MetroMarine Holdings, Inc.
Michael Gordon, U.S. Maritime Administration
William Hockberger, Independent Consultant
Peter Wallace, AMSEC LLC / M.Rosenblatt & Son

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SNAME Panel O-36 & Transportation Research Board/Marine Board
Session objectives

- Examine the economic parameters that underlie the domestic market for short sea shipping services and differentiate it from other global and domestic markets.
- Outline the factors that jointly establish the requirements for short sea shipping and alternatives for meeting those requirements, with particular consideration to availability of competing marine and non-marine transportation options.
- Explore reasons for market segmentation, the operational considerations impelling the selection of vessels and service attributes, and factors contributing to formulation of a cohesive business plan for a service.
- Gain appreciation for the factors driving existing services which make them uniquely suited to their particular market niches.
Definition

Domestic Short Sea Shipping:

Freight service operations carrying either containerized or trailerized cargoes via the coastal waters, lakes, and river systems of North and Central America, having at least one port of call in the United States, and in particular those services where the shipper has a true intermodal choice to make between moving units by water and using one or more land alternatives (highway and/or rail) or, in some cases, air transportation.
Basic economic elements of a domestic short sea shipping service

• Markets
  – Demand for transportation services
  – Opportunities for marine components

• Revenues
  – Demand for short sea shipping specifically
  – Services’ responsiveness to market needs

• Costs
  – Establishing the operation
  – Acquiring or building vessels, terminals, etc.
  – Operating the service

• Profits
  – Revenues exceed costs long-term
  – Sufficient return to attract investment
Markets for domestic short sea shipping

• Existing domestic “short sea shipping” services
  – Totem Ocean Trailer Express (TOTE) -- RO/RO -- Washington-Alaska
  – Horizon Lines -- LO/LO -- Washington-Alaska, California-Hawaii, East Coast & Puerto Rico
  – Alaska Marine Lines + Northland Services -- COB -- Washington-Alaska
  – Foss Maritime Co. + Tidewater Barge Lines -- COB -- Columbia/Snake River System
  – Columbia Coastal Transport -- COB -- East Coast, Bahamas & Cuba
  – Osprey Line (TECO Ocean Shipping) -- COB -- Gulf Coast & Mississippi
  – Bridgeport Feeder Service -- RO/RO barge -- New York-Bridgeport
  – Matson Navigation Co., Inc. -- LO/LO & RO/RO -- West Coast-Hawaii
  – Trailer Bridge, Inc. -- RO/RO -- Jacksonville-San Juan
  – Crowley Maritime Corp. -- LO/LO, RO/RO, RO/RO barge -- E.Coast, Caribbean, Mexico, Central America

• Existing services mostly low-speed, non-urgent, time-indefinite

• Where are markets for more-time-sensitive freight?
  – Alternatives to I-95, I-5, etc.
  – More as highway congestion grows
  – Still more as cost of highway expansion increases
Comparison to “short sea shipping” in other regional markets

<table>
<thead>
<tr>
<th>“Domestic” US</th>
<th>Europe/UK</th>
<th>Japan</th>
<th>Asia</th>
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<tbody>
<tr>
<td>• road and rail infrastructure has been preeminent.</td>
<td>• long history of inter-European freight movements on sea and river routes.</td>
<td>• long history, well-developed coastal shipping market backed by government.</td>
<td>• long history of freight movements on sea and river routes.</td>
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<tr>
<td>• little geographic impetus for coastwise shipping.</td>
<td>• earlier pressure due to inadequacy of road system and congestion.</td>
<td>• road and rail alternatives exist, except inter-island.</td>
<td>• hub and spoke feeder ship traffic used extensively – fallout of E/W linehaul containership services.</td>
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<tr>
<td>• niche markets exist.</td>
<td>• EU backs services (including start-ups) with subsidies.</td>
<td>• cabotage laws protect trade.</td>
<td>• many locations have non-existent or underdeveloped road/rail alternatives.</td>
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<td>• worsening congestion and larger vessels on E/W trades may impel development.</td>
<td>• many sea routes have historically faced no land-based competition.</td>
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<td>• cabotage laws protect some trades.</td>
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</table>
Inserting a marine alternative into the freight transportation system

- Provides a new alternative
  - Attracts freight from other modes
  - Stimulates additional shipping
- Reduces pressure on other modes
- Adds flexibility and resilience to the transportation system
Projecting demand in a particular market

- What are existing and projected levels of traffic for which marine transportation might be practicable?
- Against what other modes and services would the marine service be competing?
- What market share might be achieved by alternative forms of the marine service?
  - Demand is a function of price and quality-of-service attributes
  - Alternative marine forms have different prices & attributes
- Is there a niche favoring a marine service?
  - Long distance around body of water
  - Freight riding on top of a bulk service
  - Passengers riding a freight-based service
  - ?
What shipping customers want

- Move freight from origin to final destination
- Predictability and reliability
- Reasonable transit time
- On-time delivery
- Service hours & frequency
- Reasonable cost
- Probability of getting space when needed
- High probability of damage-free delivery
- Security
- Shipping convenience:
  - Pick-up, drop-off, terminal locations, accessibility
  - Services: bills of lading, insurance, tracking, etc.
- Environmental compatibility
- Information: timely, correct, complete

*Shippers and consignees are basically indifferent to mode choice or route, as long as their needs and concerns are met.*
<table>
<thead>
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<th>Potential for disruption &amp; delay</th>
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<tr>
<td><strong>Highway</strong></td>
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<td>Weather-related</td>
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<td>Wind</td>
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<td>Rain</td>
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<td>Hurricane</td>
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<td>Tornado</td>
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<td>Flooding</td>
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<td>Obstructions</td>
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<td>Trees</td>
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<td>Power lines, lights</td>
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<td>Objects, debris</td>
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<td>Signage down/out</td>
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<td>Volume congestion</td>
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<td>Origin, destination</td>
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<td>Routes between</td>
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<td>Sabotage</td>
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<td>Vehicle</td>
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<td>Origin/dest. facilities</td>
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<td>Routes between</td>
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<td>Control systems</td>
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# Potential for cargo damage or loss

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<th></th>
<th>Highway</th>
<th>Rail</th>
<th>Air</th>
<th>Marine</th>
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<td><strong>Loss</strong></td>
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<td>Fire in-transit</td>
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<td>Theft</td>
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<td>Hijacking</td>
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<td>Crash/collision</td>
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<td>Overboard at sea</td>
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<td>Sinking</td>
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<td>Sabotage</td>
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<tr>
<td><strong>Damage</strong></td>
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<td>Fire in-transit</td>
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<td>Crash/collision</td>
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<td>Accelerations/movement in-transit</td>
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<td>Water/moisture intrusion</td>
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Alternative origin-to-destination paths
Alternative marine systems

Origin

Truck

Truck

Truck

Truck

Truck

1 Large ship

2 Medium ships

5 Small ships

TB + Super barge

TB + Conv. barges

Train

Train

Train

Destination
Alternative small ship fleets

Origin

- Truck
- Truck
- Truck
- Truck
- Truck

Destination

- Truck
- Truck
- Truck
- Truck
- Truck

3 Ships, 45 kts
5 Ships, 33 kts
7 Ships, 25 kts
10 Ships, 21 kts
12 Ships, 18 kts
The economic perspective

*Economics is about making decisions that meet society’s needs while making the best possible use of scarce resources.*

- The economic perspective
  - What will I get?
  - What will it cost me to get it?
  - Is it worth that to me?

- Want to achieve best possible balance between what we will get and what it will cost
  - Profit is the economic measure that tells when we've achieved it
  - Indicates efficient resource use, not exploitation or cheapness

- Profitability is essential
  - Means revenues exceed costs by enough to attract investors
  - Subsidies can relieve somewhat—but must be minimized
  - Marine services vs. other investments

- Incorporate risks and external impacts in projections
- Base decisions on total system over the long term
The profitability target: final cash flow

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Operating Costs</th>
<th>Loan Interest</th>
<th>Depreciation</th>
<th>Net Income Before Tax</th>
<th>Profit</th>
<th>Tax</th>
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**Final cash flow is what the company has left, after all is said and done.**

Effects on final cash flow should be the basis for all decisions.
Costs & revenues over time

- Preparations
- Acquisitions
- Regular expenses
- Major expense
Net present value (NPV)

- NPV produces a single value that is economically equivalent to a sequence of values spread out over time.
- Can be used to compare differing patterns of costs, revenues, profit, etc. over time.

For example:

\[
NPV = \frac{CF_1}{(1 + d)} + \frac{CF_2}{(1 + d)^2} + \frac{CF_3}{(1 + d)^3} + \ldots + \frac{CF_n}{(1 + d)^n}
\]

where

CF = Final cash flow in a given year

d = company’s discount rate
Comparing alternatives by cash flows and NPV

<table>
<thead>
<tr>
<th>SSS SYSTEM ALTERNATIVES</th>
<th>NPV</th>
<th>ANNUAL FINAL CASH FLOW</th>
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<tbody>
<tr>
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<td>‘05</td>
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<tr>
<td>Route Set 1</td>
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<tr>
<td>TB + small barges, 8 kt</td>
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<td>TB + large barge, 12 kt</td>
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<tr>
<td>1 large ship, 14 kt</td>
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<tr>
<td>2 medium ships, 20 kt</td>
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<tr>
<td>5 small ships, 25 kt</td>
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<tr>
<td>Route Set 2</td>
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<tr>
<td>TB + small barges, 8 kt</td>
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Other factors & risks
(which may increase costs or require a higher rate of return)

- Competitive conditions
- Health of the economy
- Regional trends
- Inflation/deflation expectations
- Availability & cost of financing
- Cost trends of labor, fuel, major items
- Tax & subsidy changes
- Environmental requirements & issues
- Political environment, regulation
The system and its environment

- Corporation
  - Distribution division
    - Marine department
      - Ship
        - Machinery system
          - Propulsion system
            - Engine
              - Fuel pump

Think of each level as the customer for the level below.

The customer decides what is needed and how good it must be.

Ensure compatibility with all elements of the environment

Optimize at Corporation level

Trade off marine vs. rail vs. highway vs. air

Set requirements, MOEs, constraints

Design or specify ship

Governments
Laws, rules, regulations
Labor unions
Competitors
Suppliers
Logistic system
Customers
Ports, channels
Roads, rail, air
Natural environment
Society
Vessel capabilities & qualities

- Cargo capacity
- Speed
- Turn-around time
  - Docking time
  - Cargo handling rate
- Availability/reliability
- Cargo safety against:
  - Handling/stowing damage
  - Damage in transit
  - Loss in transit
- Supportability/maintainability
- Security
- Adaptability/changeability
- Environmental compatibility

\{ vs. number of vessels
Concept of operations

• How a freight service concept would operate in achieving its purposes
• Integral part of a system concept’s definition
• Constrained by
  – Speed & range
  – Reliability
  – Port/terminal hours
  – Labor rules
  – Waterway regulations
  – Environment
  – Congestion
  – etc.
Simulation of operations

• Model & simulate
  – SSS system elements
  – Connecting modes and systems
  – Patterns of operation--all elements
  – Freight arrivals & departures at nodes
  – Financial parameters & variables

• Study
  – Combinations of elements to find the best
  – Sensitivity to variations

• Tool for later operations, changes, planning
Relationship of SSS & conventional services wrt ports, terminals, landside facilities

- Should SSS services share ports and terminals/facilities with conventional shipping services -- or have separate ones?
  - Share same ports, terminals, landside facilities
  - Different terminals & facilities within same ports
  - Different ports and terminals/facilities

- Driving factors
  - Suitability of facilities, equipment, services
  - Inherent or potential conflicts or synergies
  - Compatibility of requirements & procedures

- Pros for sharing
  - 
  - 
  - 

- Cons against sharing
  - 
  - 
  - 
Overview of costs

• Development & Start-Up
  – Planning
  – Studies
  – Authorizations, licenses, leases
  – Vessel selection
  – Finding/obtaining funds

• Acquisition
  – Vessels
  – Terminals, stowage yards
  – Support facilities
  – Cargo handling equipment
  – Connecting infrastructure
  – Land vehicles & support
  – Office space
  – Personnel
  – Marketing & advertising

• Operation & Support
  – Management/administrative staff
  – Crews and support personnel
  – Training and crew certification
  – Terminal and facilities operations
  – Security
  – Maintenance
  – Marketing & advertising
  – Insurance
  – Loan & lease payments
  – Depreciation & amortization
  – Vessel fuel & lubricants
  – Vessel servicing, maintenance, repair
  – Vessel inspections
  – Working capital & contingency fund
  – Port & terminal charges
  – Permits, licenses, fees
  – Property & income taxes
  – Working capital
Costs of acquiring vessels

- Determinants
  - Type
  - Size
  - Performance
  - Quality
  - Existing vs. new vessel
  - New vessel: existing, tailored, or new design
  - Construction market competitive conditions

- Acquisition approach
  - Buy
  - Lease
  - Charter

- Financing
  - Loans
  - Guarantees

And who does it:
- Private company
- Public-private partnership?
Costs of acquiring terminals & landside facilities

• Determinants
  – Types of facilities & equipment to service vessels and move cargo
  – Staging and stowage area required
  – Terminal accesses and gates
  – Security
  – Daily working hours
  – Productivity of facilities/equipment & labor
  – Numbers and arrival patterns of vessels
  – Numbers of containers/trailers on vessels
  – Market conditions

• Acquisition approach
  – Buy
  – Lease

• Financing
  – Loans
  – Guarantees
  – Concessions on taxes, fees, etc.

And who does it:
  -- Private company
  -- Government entity
  -- Public-private partnership
Cost: Total system, total life cycle

• Capture all costs attributable to a system
  – Throughout the company
  – Both monetary and non-monetary
  – Impacts on environment and others
  – Ensures lower costs in one area not offset by higher costs elsewhere

• Capture those costs throughout the life cycle
  – Development, acquisition, operation & support
  – Ensures lower initial costs aren’t countered by higher costs later
Evolving shipper requirements over time

- **Evolving conditions**
  - Economy, product/service demands, issues
  - Commercial relationships, competition
  - Transportation technologies
  - Social/environmental constraints
- **Sudden changes in demands or in ability to meet them**
  - Disasters affecting supplies or transportation
  - New laws, regulations, political pressures
  - War, crisis, embargoes
- **Obsolescence of existing systems**
  - Changes in relative capabilities among competitors
  - Availability of more-cost-effective means for meeting requirements
- **Wear-out of existing systems prompts reassessment**
- **Changing owners & managements, and their objectives**
## An SSS business plan

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<thead>
<tr>
<th>Executive Summary</th>
<th>Financial Projections</th>
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<tr>
<td>The Project</td>
<td>Projected economic environments</td>
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<tr>
<td>Purposes/objectives of service</td>
<td>Revenue generation</td>
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<tr>
<td>Freight to be carried</td>
<td>Expenses</td>
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<tr>
<td>Vessel descriptions</td>
<td>Conservative, moderate and best cases</td>
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<tr>
<td>Expected and potential customers</td>
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<td>Routes and ports</td>
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<tr>
<td>The Market</td>
<td>Management Team</td>
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<tr>
<td>History of the market</td>
<td>Experience</td>
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<td>Current and projected trade volume</td>
<td>Ownership structure</td>
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<td>Competition</td>
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<td>Product and service differentiation</td>
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<tr>
<td>Competition</td>
<td>Capital Requirements</td>
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<tr>
<td>Other marine competitors</td>
<td>Amounts and timing of capital required</td>
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<tr>
<td>Competition from other modes</td>
<td>Capital from owners and other sources</td>
</tr>
<tr>
<td>Overview of Operations</td>
<td>Long term borrowing</td>
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<tr>
<td>Vessel features, capabilities, operations</td>
<td>Short term financing</td>
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<tr>
<td>Terminals and cargo handling</td>
<td>Financing by builders and suppliers</td>
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<tr>
<td>Sources, volume and timing of freight</td>
<td>Tax and other concessions</td>
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<td>Service patterns and frequency</td>
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<td>Transit timelines</td>
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<td>Connecting land transportation</td>
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<td>Freight rates</td>
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<td>Environmental reqm’ts and compliance</td>
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<td>Project Risks and Mitigation</td>
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<td>Risks and potential consequences</td>
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<td>Management’s plans for mitigation</td>
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<td>Success Factors for the Project</td>
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<td>Management experience</td>
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<td>Competitive advantages</td>
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<td>Strong financial model</td>
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<td>Conclusions</td>
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