Overview of National and International Freight Transport Planning Practices for Mega Regions

2013 Freight in Mega Regions Workshop
Transportation Research Board Annual Meeting

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Introduction

- What is a mega region?
- What is the planning problem?
- What is the freight planning problem?
- Freight in regional transportation planning
- Comparative case study of freight planning practice in mega regions
- Observations and conclusions
What is a mega region?

- Old concept with new label?
  - Emergence of extensive agglomerations of population and employment in US evident from 1960s
  - Terms: megalopolis, polycentric regions
  - How to define and characterize the growth of multiple population centers in close proximity with one another

- Characteristics:
  - Merging or blurring of commute sheds
  - Economic linkages – person, goods, information flows
  - Multiple activity centers
  - Hierarchic spatial organization
  - Fuzzy and shifting boundaries
The Randstad
Randstad commute flows
So is anything new?

- **Magnitude and scale?**
  - Many regions of more than 10 million population around the world
  - In US, largest in range of 25 million
  - Spatial extent – sprawled regions

- **Intensity of interactions?**
  - More cross-commuting, trade, information flows?

- **Another aspect of our growing transportation problems?**
  - Urban congestion
  - Bottlenecks and corridor congestion
  - Freight system capacity constraints, especially trade nodes
What is the planning problem?

- Spatial mismatch of governing institutions
  - Mega regions include many cities, counties, sometimes states
  - Spatial boundaries
    - Don’t respect political boundaries
    - Shift with growth
- Authority at what level of government?
  - Only federal encompasses entire mega regions on east coast
  - But federal government is shrinking its portfolio
  - States have varying capacity to take on role of mega region planner
More general planning problems
- Weakness of regional planning organizations
- Devolution of government responsibilities to locals
- Fragmentation of planning and infrastructure decision-making
  - Follow the money

Outcomes
- Collaborative, bottoms-up planning
- Single purpose authorities
- Ad hoc arrangements and responses
What is the freight planning problem?

- **Freight flows**
  - Driven by supply and demand
    - Consumer and business demand; production and distribution costs
  - Supply and demand beyond control of local, state governments
    - Fuel prices, port fees, global labor market and prices, consumer preferences
  - Extremely price sensitive and hence highly flexible
    - Example – shifts in distribution systems in response to fuel prices
    - Example -- “Re-shoring” in response to higher fuel and labor prices
Freight planning problems, con’t

- Freight knows no boundaries
  - Freight flows, local or regional, are part of global dynamics
  - Local efforts to control freight flows will not succeed

- Federal authority
  - Local, state actions limited by interstate commerce protection
  - International trade policy

- Planning implications
  - Freight is private, and so is the data
  - Flexibility and role of exogenous factors = difficult forecasting problem
Freight in regional transport planning

- Recent addition to regional planning
  - Regional planning dominated by passenger transport
  - Why?
    - Historical roots of regional planning in highway planning
    - Freight constitutes small share of all highway traffic
    - Freight as interstate commerce and hence federal responsibility
  - Still limited to regions that are major nodes in interstate, international trade networks
    - Los Angeles, New York, Chicago, Atlanta
Regional transport planning, con’t

- **Lack of data**
  - Most publicly available freight flow data are highly aggregate
    - CFS is not complete at county level
  - Detailed sector level flow data are proprietary and pricey – beyond the budget of typical university research projects
  - CFS and other government data collection suffering from budget cuts
  - Proprietary data difficult to obtain
    - Shipping is highly competitive industry
Freight forecasting

- Lack of appropriate models
  - Goods are not people
    - Flows driven more by supply, demand, price
    - Greater share of long distance trips, through trips
    - Different temporal patterns
  - Approaches
    - Add freight ex-post to equilibrated passenger demand network assignment, typically via fixed factors
    - Extend conventional passenger demand model to incorporate freight
    - Adapt logistics-based freight optimization models to regional level
    - Generate flows from economic supply and demand models (regional input/output models), integrate with passenger demand
- No widely accepted, standardized approach yet
Freight planning practice

Comparative Case Study
Los Angeles region Alameda Corridor East
Seattle FAST Program
Trade node regions

- Metro areas that serve as major nodes in the global economy
  - Control centers
    - London, New York, Tokyo
  - Intermodal centers
    - Los Angeles, Shanghai, Rotterdam

- Concentration of physical flows
  - 10 US gateways account for 44% of all US based international trade
  - 5 container ports account for 70% of all US container trade
Local impacts of global trade

- Congestion
  - Trade related flows + local/last mile flows
  - Heavy freight flows on road, rail systems
- Scale economies and concentration
  - Ports, airports, warehouse/distribution clusters
  - Concentrated, localized impacts
- Air pollution
  - Ocean vessels, airplanes, trucks, trains
- Noise, livability, environmental justice
Challenges

- Who benefits vs who pays
  - Negative impacts local, efficiency benefits global
  - Local economic benefits vs environmental costs
- Complexity of global supply chain
  - Many interdependent actors
  - Flexibility
Governance considerations

- Decentralized, fragmented governance systems
- Multiple authorities at multiple levels
- Consequences
  - Many stakeholders, perspectives, veto power
  - Cost and benefit considerations at reduced geographic scale
  - Politicization of decision-making
Outcomes

- Growing reliance on consensus-based, deliberative processes
- Engagement with industry
- Voluntary agreements
- Industry as environmental innovators
Comparative Case Study
West Coast container volumes

The graph shows the container volumes from various ports from 1999 to 2010. The ports include Prince Rupert, Vancouver (BC), Sea/Tac/Ev, Portland (OR), Oak/SF, LA/LB, San Diego, Manzanillo, and Lazaro Cardenas.

The volumes are measured in TEUs (Twenty-Foot Equivalent Units). The graph indicates a general increase in container volumes over the years, with some fluctuations.
The two regions

<table>
<thead>
<tr>
<th></th>
<th>Los Angeles Region</th>
<th>Seattle Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>US rank size</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Population</td>
<td>18.2 million</td>
<td>3.7 million</td>
</tr>
<tr>
<td>Employment</td>
<td>8.3 million</td>
<td>1.7 million</td>
</tr>
<tr>
<td>Local gov’t units</td>
<td>5 counties, 189 cities</td>
<td>4 counties, 73 cities</td>
</tr>
<tr>
<td>Size</td>
<td>38,000 sq mi</td>
<td>6,300 sq mi</td>
</tr>
<tr>
<td>Port volumes 2010</td>
<td>14.2 TEU</td>
<td>3.8 TEU</td>
</tr>
</tbody>
</table>
The problem

- How to reduce congestion on the highway system while facilitating port activity
- Problem of at-grade rail crossings
  - Rising port volumes = more rail traffic = more conflicts with road traffic at at-grade crossings
- Grade separations
  - Costly solution – bridges or trenches
  - Who should pay?
FAST Process

- Leadership of PSRC, Governor’s office
- Multiple organizations, overlapping membership
- Comprehensive representation, participation of stakeholders
- Collaboration over several years
- Consensus-based development
  - Phase 1: 12 grade separations, 3 truck access projects, $470M
  - Non-binding MOU
  - Each project individually funded and managed
Outcomes

- 2003, 2005
  - State fuel and weight taxes to fund transport infrastructure
- 2006
  - Expand to 25 projects, $868M
- 2009
  - 14 projects completed or under construction, 2 suspended
AC East trade corridor
ACE Process

- Initial leadership of MPO, ports, then devolves to COGs and counties
- Independent local public agencies
- Mostly elected public officials
- Collaboration and consensus within local units, not across local units

Results
- Four county plans, $4.5B, mostly unfunded, related but not coordinated
# Case study comparison

<table>
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<tr>
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<th>Los Angeles</th>
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<tr>
<td><strong>Scope</strong></td>
<td>25 projects, $868 M</td>
<td>172 projects, $4.6B</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Increase safety, reduce road congestion, improve port access</td>
<td>Increase safety, reduce road congestion, reduce vehicle emissions</td>
</tr>
<tr>
<td><strong>Development process</strong></td>
<td>Decentralized and consensus based; MPO leadership, broad public and private participation</td>
<td>Decentralized and consensus based at county level; no clear leadership; mostly public sector participation</td>
</tr>
<tr>
<td><strong>Plan</strong></td>
<td>Formalized by MOU</td>
<td>Formalized in LA county; unfunded portion of transport plans in other counties</td>
</tr>
</tbody>
</table>
## Case study comparison, con’t

<table>
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<tr>
<th>Governance structure</th>
<th>Seattle</th>
<th>Los Angeles</th>
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<tbody>
<tr>
<td>FAST special purpose authority; broad representation in Board membership</td>
<td></td>
<td>ACE-LA special purpose authority under sub-regional MPO; 1 county MPO; 1 county transportation commission; 1 county transport authority</td>
</tr>
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<th>Funding sources</th>
<th>Seattle</th>
<th>Los Angeles</th>
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<tr>
<td>Federal earmarks, fed formula funds, various state funds (fuel taxes), local city and county, private</td>
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<td>Federal earmarks, various state funds (bonds), local city and county, private</td>
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Observations from case studies

- **Similarities:**
  - Mitigate impacts on local communities
  - Extensive bottoms-up, collaborative process
  - Funding from many sources

- **Differences:**
  - Scale
  - Extent of regional/state common interests
  - Level and breadth of consensus, participation
  - One project vs 4 related projects
  - Progress, funding availability
Conclusions from case studies

- Relatively greater success of FAST
  - Smaller, more homogeneous region
  - Shared goals re port growth, impact mitigation
  - Less serious environmental problems
  - Leadership of PSRC
  - Industry/state/local partnerships
  - “Ownership” of the problem
    - Willingness to increase fuel taxes
Observations from case studies

- Inter-governmental collaboration
  - Vertical and horizontal
  - Authority, funding
- Leadership, program champions
- Public/private collaboration
  - Voluntary agreements, mutual objectives
- Community engagement
  - Risks and rewards
Current state of freight planning practice

- Unique response to specific problem
- Bottoms-up, collaborative process
- Multiple stakeholders, public and private
- Special purpose entities
- Emphasis on infrastructure
  - Complex finance and funding arrangements
- Mixed record of success
Thank You

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