Development of a Freight Transportation Network Optimization Strategy – An Overview

August 19, 2015
**Vision:** To effectively identify and prioritize investment opportunities for an optimized freight transportation network to lower transportation costs and promote business growth in Iowa.

- Iowa DOT can optimize statewide freight transportation network to reduce transportation costs
  - Traditional approaches focus more on capacity planning
  - Traditional methods don’t quantify cost saving opportunities in a multimodal network

- This project uses a demand-based supply chain network design and optimization approach to Iowa DOT planning
Supply Chain Network and Optimization

- ~80% of the landed costs are locked in with the supply chain network
Optimization Analysis

- **Quantitative Analysis**
  - Cost, lead time requirement, capacity, etc.
  - Economic viability
  - Improved network resilience

- **Qualitative Analysis**
  - Strategic alignment
  - Increasing network capacity and resiliency
  - Tax incentive / funding availability
  - Job creation and local buy-in
  - Service levels / transportation time
  - Road mile reduction
  - Project implementation risks

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Business Architecture Overview

- Supply Chain Cost
- Domestic Freight Flow
- Import / Export
- County-Level Socio-Economic

Cleanse, Consistency Check, Analyze, Disaggregate, Verify and Aggregate Data

Design Alternatives

Network Design & Optimization Data Model

Computer Simulation
What-if Scenario Analysis

Network Design & Optimization Tool

Constraints, Design Alternatives & Simulation Results

Preliminary Evaluation

Design Evaluation

Recommendation: Optimization Strategy & Business Case

Qualitative Measurements

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Benefits of Multi-Modal Freight Optimization

- Determine the highest value multi modal infrastructure public and private investments that are measured by:
  - lowering the cost of transportation
  - Increases transportation responsiveness and predictability
  - Incent business expansion
- Identify commercial freight road networks that are irrelevant
- Reduce road freight truck traffic
- Improve transportation network resiliency
Cross Dock Overview
Case Study 1 - Cross-Dock Opportunity Analysis

- Evaluated total cost saving opportunities in four regions
- Region 1 has the highest cost saving, but Regions 2 & 3 are more viable options because of existing access to interstate highways
- Selected Region 2 as the primary site candidate with the concept to co-locate cross-dock and intermodal facilities in a logistics park

<table>
<thead>
<tr>
<th>Location</th>
<th>Total Annual Saving Opportunity</th>
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</thead>
<tbody>
<tr>
<td>Region 1</td>
<td>$909 Million</td>
</tr>
<tr>
<td>Region 2</td>
<td>$883 Million</td>
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<tr>
<td>Region 3</td>
<td>$908 Million</td>
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<tr>
<td>Region 4</td>
<td>$713 Million</td>
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</tbody>
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Benefits:
- Leverage freight consolidation to reduce transportation costs
- Reduce long distance truck traffic and improve environmental sustainability
Case Study 2 - Intermodal Facility
Opportunity Size – Focusing on High Volume Origin-Destination Pairs

The total market opportunity for high volume Origin-Destination pairs: $289 million net annual savings

<table>
<thead>
<tr>
<th>Item</th>
<th>Opportunity</th>
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</thead>
<tbody>
<tr>
<td>Annual Gross Transportation Saving</td>
<td>$412 Million</td>
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<tr>
<td>Empty Container Reposition Cost</td>
<td>($123 Million)</td>
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<tr>
<td>Total Outbound Container Number</td>
<td>247,000</td>
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<tr>
<td>Total Inbound Container Number</td>
<td>42,000</td>
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<tr>
<td>Total Container Shortage</td>
<td>205,000</td>
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<tr>
<td>Annual Net Saving</td>
<td>$289 Million</td>
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<tr>
<td>Annual Lift Number</td>
<td>494,000</td>
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</table>
Case Study 2 – IM Facility Network Impact

- **Optimization Benefits:**
  - Leverage rail network to reduce transportation costs
  - Reduce truck traffic and improve environmental sustainability
Questions

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