Port Congestion and Drayage Efficiency
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Presentation Outline

• Ports of LA/Long Beach Congestion Crisis
• Congestion and Throughput Density
• Port Metro Vancouver Comparison
• Drayage Efficiency Simulation Modelling
• “Peel-Off” – “Dray-Off” Cost Analysis
• BCO Cooperation to Reduce Drayage Costs
• Long Term Strategies to Cope With Higher Drayage Costs
Ports of LA/Long Beach Congestion Crisis

• Symptom: Long truck turn times at the port terminals (average 89 minutes July 2015).
• Causes:
  • Impact of larger vessels.
  • Bunching of arrivals.
  • Vessel-sharing alliances.
• Has necessitated shift from “wheeled” to “grounded” operations at port terminals.
Congestion and Throughput Density

- “Throughput of 7,000 TEU’s per acre required to handle large vessels” (Larry Nye Moffat & Nichol 2015).
- Current LA/Long Beach throughput: 4500 – 4800 TEU’s per acre.
Port Metro Vancouver

Port Metro Vancouver throughput density exceeded current LA/Long Beach level by 2004.

Port of Vancouver Throughput per Acre 1997 - 2014

- PMV Throughput Per Acre
- LA/LB Average 2013

Centerm/Vanterm Expansion
Deltaport Third Berth
Changes in Terminal

- Reduced free time for import and export containers.
- Elimination of empty container storage on the docks with the exception of empty containers scheduled for evacuation on the next vessel.
- Empty containers subjected to a fee of $100 per TEU per day for any period beyond the free time of 2 days.
- Earliest Reporting Dates (ERD’s) for loaded export containers reduced from 5 days to 4.
- Quotas on acceptance of import containers for each shipping line based on rail capacity agreements; any containers in excess of this must be trucked off immediately or financial penalties may be imposed.
Drayage Impacts

- Drayage strikes in 2005 and 2014.
- Drayage rates increased 65% 2004 to 2015 (plus fuel surcharges).
- Increased truck costs due to appointment system.
- Increased costs to shipping lines for dray-off and storage of empty containers.
- Government regulation of drayage performance and driver remuneration.
- Regulation of terminal turn times with penalties to terminal operators.
Container Efficiency Simulation Modelling

- Efficiency benchmark: Revenue trips per hour.
- Key parameters:
  - Turn times.
  - Trip patterns.
  - Travel times.
Simulation Results

Lower Mainland Container Truck Simulation Results - Change in Loaded Trips Per Hour

- Turn Times -50% All Terminals
- Turn Times -50% On & Off Dock Terminals
- Turn Times -25% All Terminals
- Night Operations (Reduced Travel Times 25%)
- Turn Times - 25% On-Dock Terminals
- Turn Times - 10% All Terminals
- On-Dock Storage
- Night Operations (Reduced Travel Times 10%)
- Reduced Deadhead Trips at Docks
- Double Shift and On-Dock Storage
- Increased Triangulation & Reduced Deadhead Trips

0% 5% 10% 15% 20% 25% 30% 35%
Simulation Financial Impacts

Impact of Efficiency Improvements on Cost Per Trip

- Reduce Turn Times 25%
- Reduce Turn Times 50%
- Extended Operations 2 Hrs.
- Double Shift 16 Hrs.
- Reduce Deadhead Trips On-Dock
- On-Dock Storage

% of Baseline Costs

75% 80% 85% 90% 95% 100%
Ports of LA/LB “Peel-Off” and “Dray-Off” Option

- “Peel-off” Option: containers from pre-approved importers are block-stored at the marine terminal; truckers are given preferential gate access and the containers are “peeled off” from the top and drayed to destination.

- “Dray-Off”- loaded import containers are drayed to a near-dock site, and then return to the terminal with another container. Another truck transports the loaded container to its destination.
“Peel-Off”/“Dray-Off” Cost Model

- Economic-cost model which assumes that the control and ownership of each box from ship to door is all managed by a single agency that minimizes overall costs.
- Model estimates total terminal and drayage costs based on unit capital and operating costs and typical productivity factors at Ports of LA/Long Beach.
“Peel-Off”/“Dray-Off” Cost Model

- Case A: No ‘Peel-Off” or “Dray-Off”.
- Case B: Case A + 1 Bobtail leg.
- Case C: “Peel-Off” & “Dray-Off” (Drop Yard).
- Case D: Drop Yard bypassed on return journey.
“Peel-Off”/“Dray-Off” Cost Model Results

Terminal and Drayage Costs per Container

Cases:
- **Case A**: Import direct to BCO and Empty returned direct
  - Cost: $636.00
- **Case B**: Add on bob-tail to A
  - Cost: $824.00
- **Case C**: Drop Yard for inbound import and outbound empty
  - Cost: $944.00
- **Case D**: Drop Yard for inbound import and direct outbound export
  - Cost: $869.00

Port Congestion and Drayage Efficiency

Davies & Kieran
METRANS I-NUF Oct. 20, 2015
“Peel-Off”/“Dray-Off” Conclusions

• Solutions focusing on only terminal congestion by shifting the problem to another location do not generate systemic solutions.

• The drop yard approach is an effective short-term stopgap measure to buy some time to develop effective system solutions.

• Availability of land for drop yards is major constraint – based on density (300 TEU’s per acre on-dock and 64 TEU’s at Drop Yard) need almost 5 acres off-dock for every port terminal acre.
BCO Case Study

• Study conducted for a group of BCO’s in Vancouver in 2007 to evaluate potential cost reductions from increased cooperation and coordination of container movements.

• Six BCO’s equally balanced between volumes imported and volumes exported in 40 foot containers – total volume 100,000 FEU’s per year.

• Optimal sourcing and allocation of empty marine containers on an average day based on the lowest total cost for handling and transportation of all loads and empties on that day.

• Reduce costs through reductions in non-productive truck trips.
BCO Model

• Linear programming trip assignment model using actual point-to-point demand for loaded movements.
• Empties were assigned to achieve the objective of lowest overall system cost.
• Sensitivity cases were calculated for a typical slow day and a typical busy day.
• Sensitivity analysis to evaluate the impact of the balance between import and export volumes.
Model Results

- Cost savings of up to 30% achievable.
- Sensitivity analysis suggests potential savings of around 20% with LA/LB import/export imbalance.

![Graph showing Sensitivity Analysis - Cost Index - per FEU](image-url)
Model Outcomes

• BCO’s reluctant to commit to collaboration due to:
  – Existing commercial relationships with drayage operators, and proven reliability in potential emerging situations.
  – Lack of flexibility to utilize other options (i.e. breakbulk marine shipments for exports).
Long Term Strategies

- Clustering of import, export and empty container storage facilities.

Current Land Use PMV Richmond Logistics Centre

Almost fully developed on existing footprint
Long Term Strategies

• On-site stacking of loaded and empty containers at import and export warehouses.
Conclusions

• Without proactive management, drayage inefficiency is an inevitable consequence of increasing port throughput density.
• Collaborative approaches are extremely limited in their ability to resolve drayage issues – leadership is required.
• Longer term strategies involve complementary densification of operations at off-dock facilities along with adoption of technologies to enhance berth productivity.