

TED 2006

LITTLE ROCK



CONFERENCE ON TRANSPORTATION
& ECONOMIC DEVELOPMENT

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Integrating Supply Chain Benefits Into the Economic Impact Analysis of Freight Investments

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Agenda

- **Our Objective**
- **The Importance of Supply Chain Benefits**
- **Benefits from Lower Transport Cost**
- **Benefits from Fewer Bottlenecks**
- **Service Level and Pricing Benefits**
- **Initial Application and Results**
- **Conclusions**

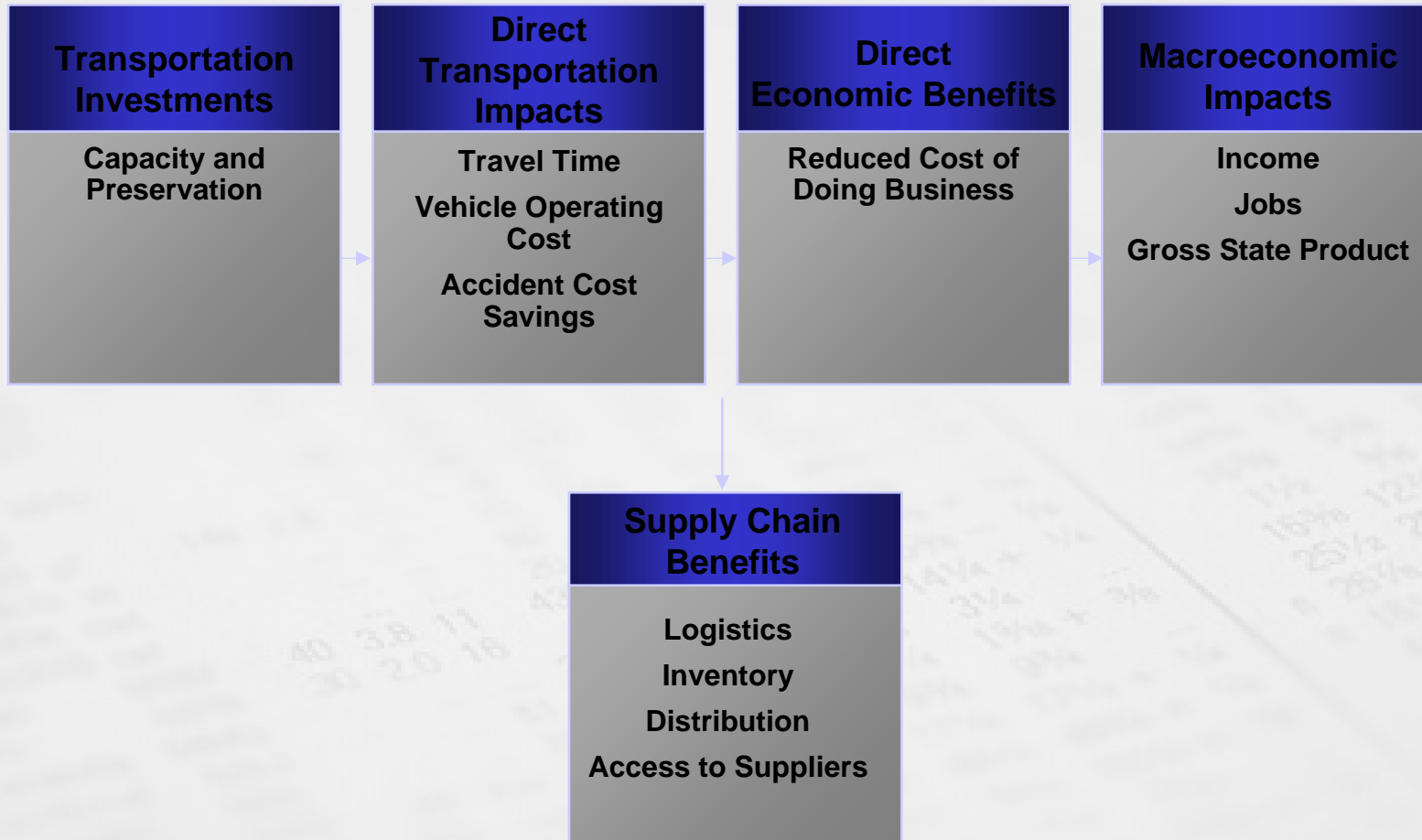
Our Objective

USDOT Study

- **Develop analytical framework to estimate the economic benefits of large-scale freight investments**
- **Alameda Corridor, CREATE in Chicago, etc seeking Federal funding for freight-oriented projects**
- **Benefits of improved freight movement are more dispersed than metro areas – requires national scope**
 - Baltimore rail bottleneck impacts entire eastern US
- **Estimate second-order supply chain and logistics effects**

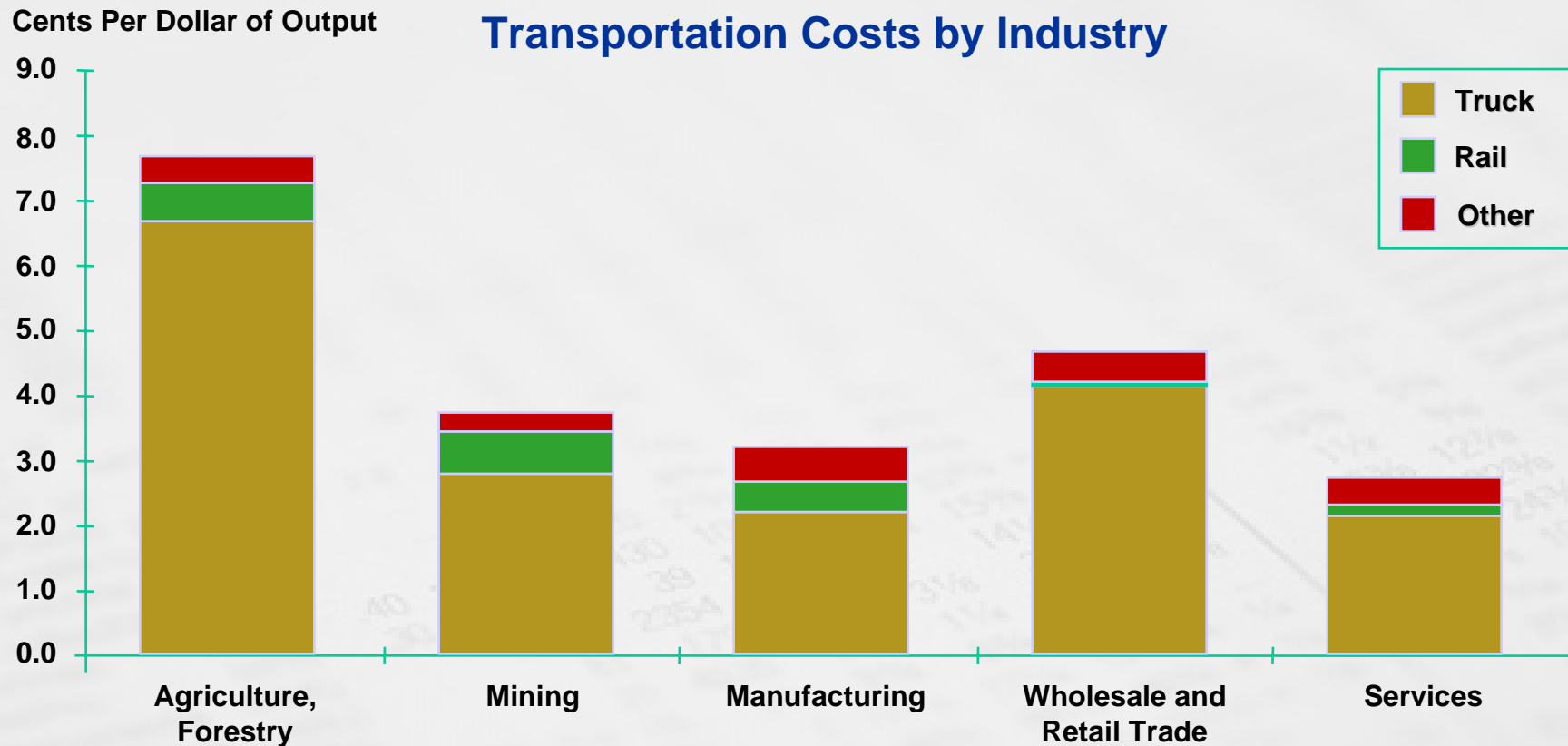
Traditional Approach

Transportation Economic Impact Analysis Framework



Impact of Travel Performance

- Commodity flows, industry analysis

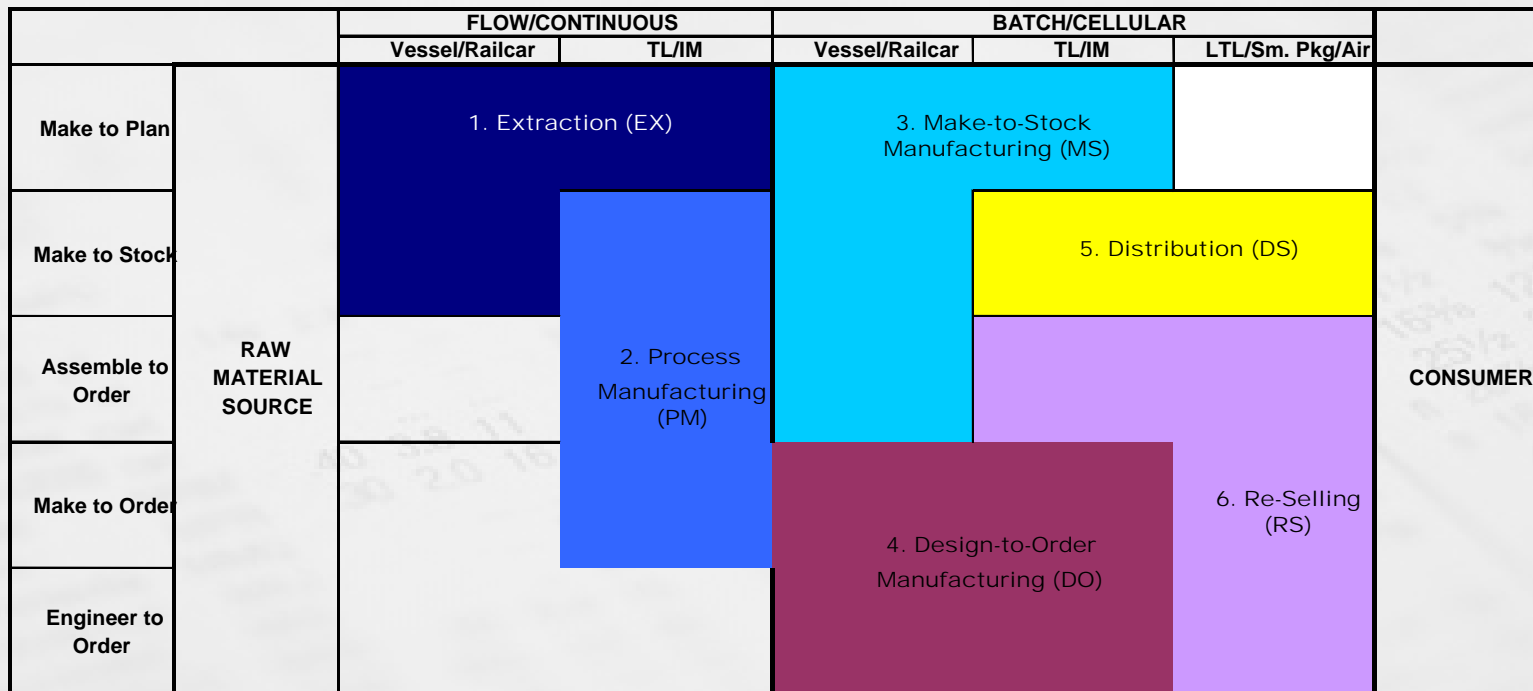


Importance of Supply Chain Benefits

Evolution of the supply chain concept

- Physical distribution (NCPDM): 1963
- Logistics (CLM)
- Supply Chain Management (CSCMP)

Boston Logistics Group's Supply Chain Types™



Major supply chain movements

- **Strategic sourcing**

- Purchasing
- Procurement
- Strategic sourcing

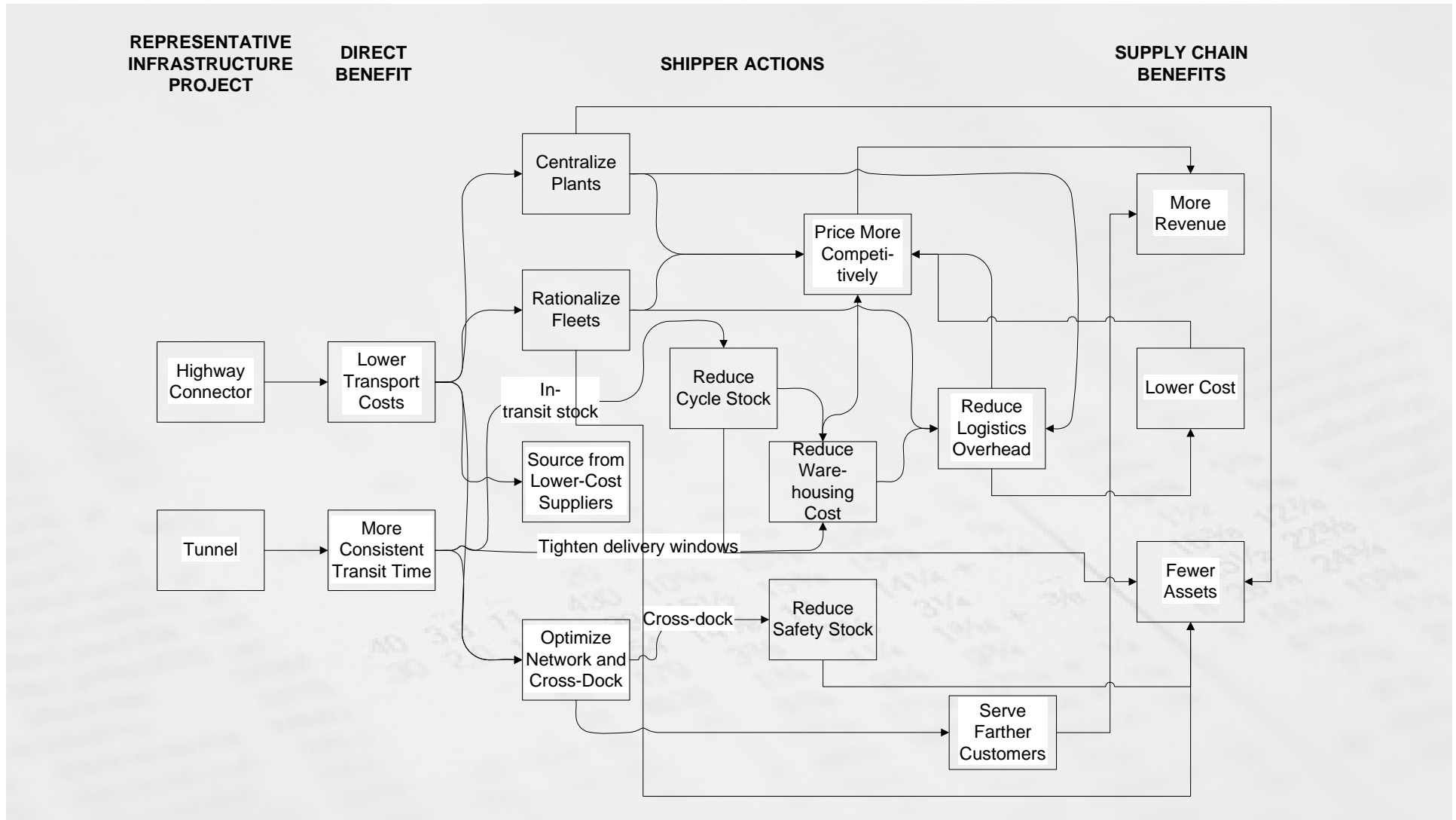
- **Lean**

- Minimization of the amount of all the resources (including time) used in the various activities of the extended enterprise

- **Visibility**

- Ability to manage material at any point in the process from the beginning to the end of the supply chain

Supply chain benefits of transport projects

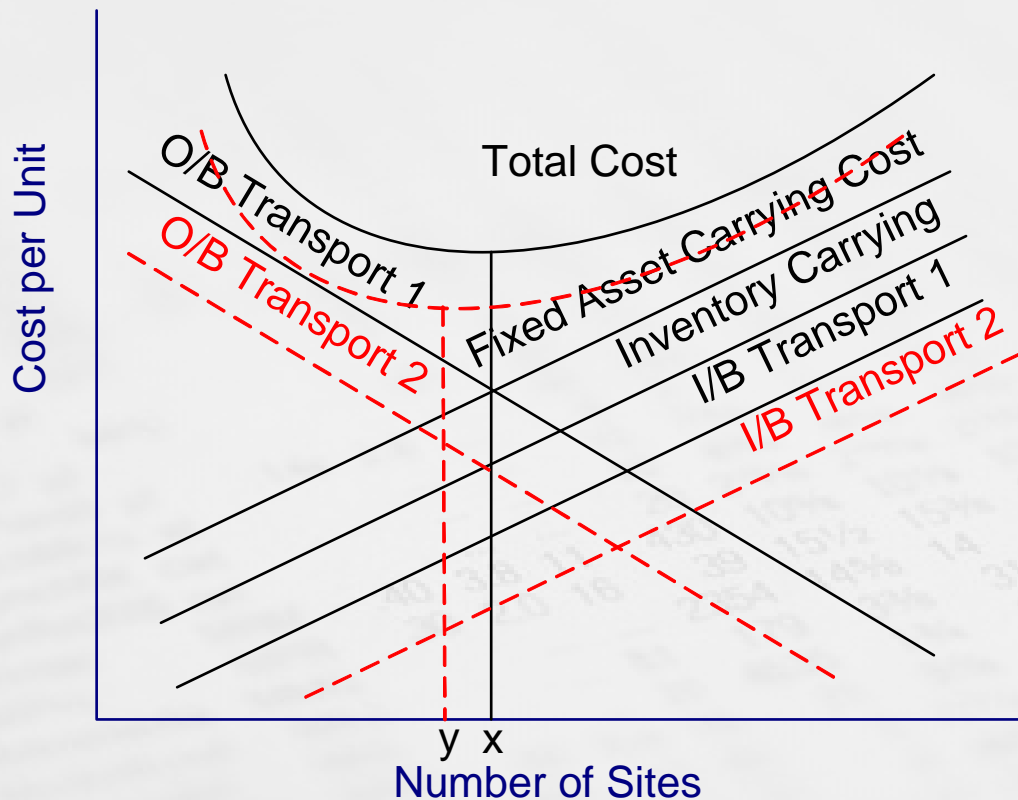


Benefits from Lower Transport Cost

Operating fewer plants, increasing ROA

EFFECT

Site Location Cost Drivers



BENEFIT

10% decrease in transport costs



Supply Chain Benefits
0.2% of operating cost
4.1% of transport costs

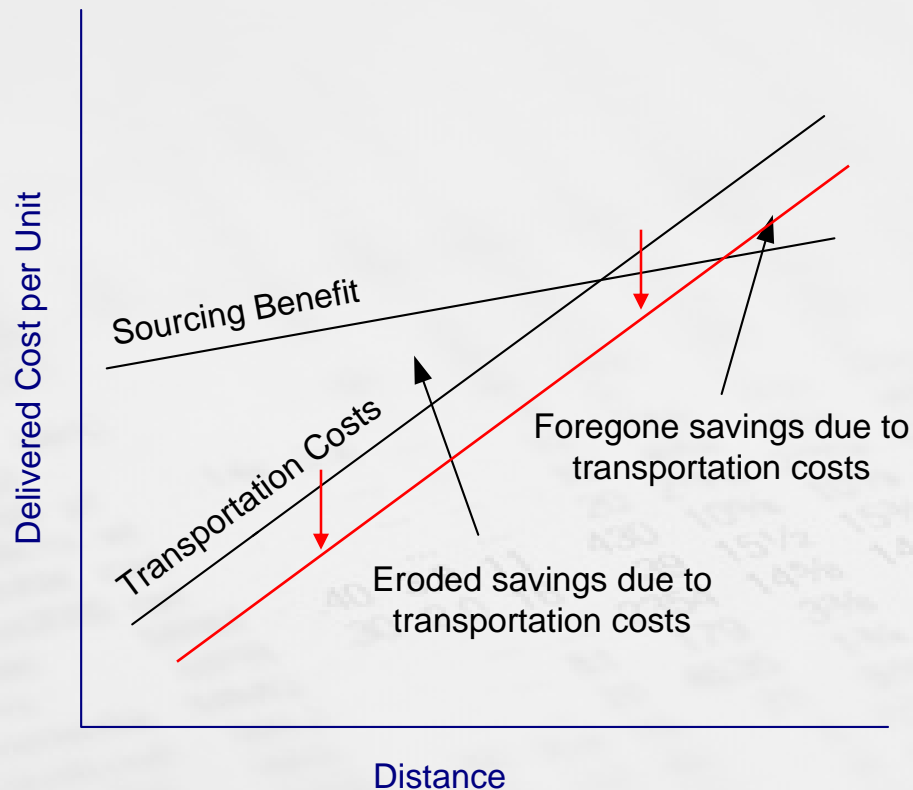


SC Type	Impact
EX	1.54
PM	0.93
MS	0.84
DO	0.73
DS	1.39
RS	0.56

Lower transport costs increase accessibility

EFFECT

Strategic Sourcing Savings vs. Transportation Costs



BENEFIT

10% decrease in transport costs



Supply Chain Benefits
0.1% of operating cost
1.5% of transport costs

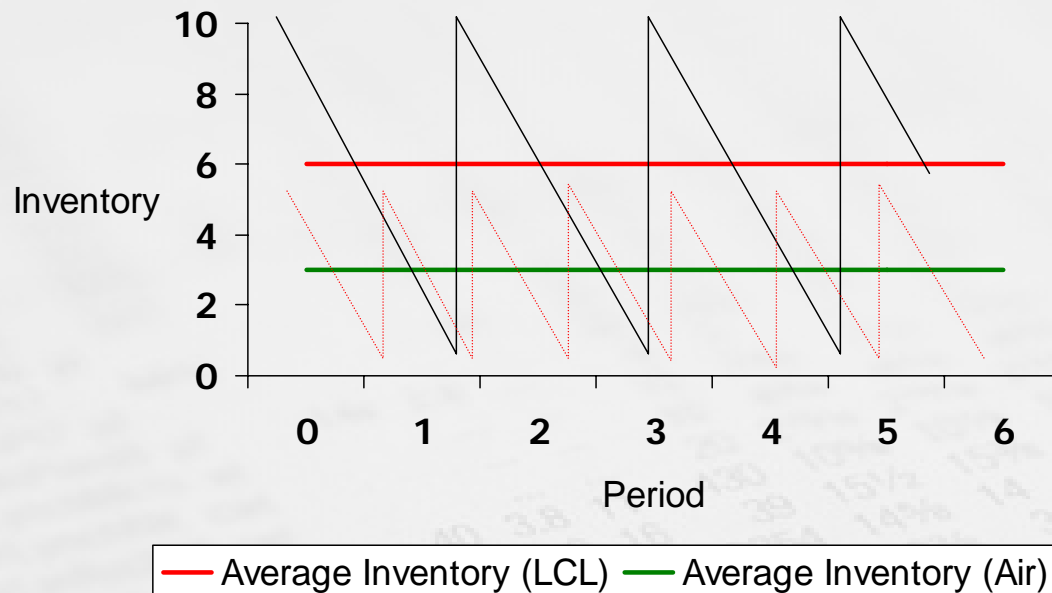


SC Type	Impact
EX	0.76
PM	0.86
MS	0.93
DO	0.93
DS	1.06
RS	1.46

Reducing inventory due to more frequent deliveries

EFFECT

**Inventory Requirements by
Inbound Mode and Order Quantity**



BENEFIT

10% decrease in
transport costs



Supply Chain Benefits
0.1% of operating cost
1.2% of transport costs



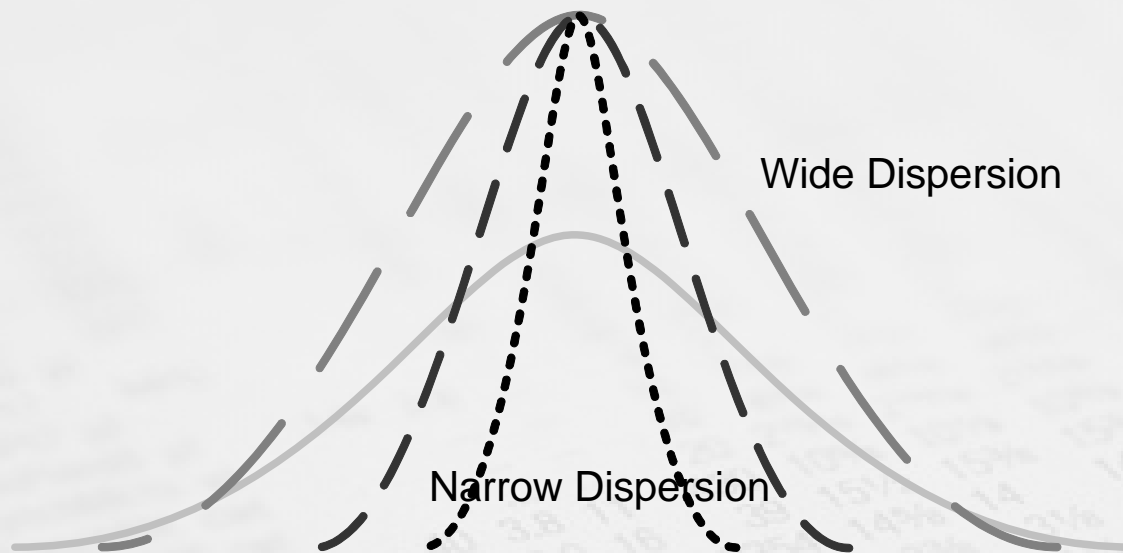
SC Type	Impact
EX	0.82
PM	0.95
MS	1.11
DO	1.09
DS	1.03
RS	1.00

Benefits from Fewer Bottlenecks

Increasing Inbound Reliability, Reducing Inventory

EFFECT

**Transit Time Variability
Compression, Same Mode**



BENEFIT

10% more transport reliability
(capacity increase)



Supply Chain Benefits
0.1% of operating cost
1.1% of transport costs



SC Type	Impact
EX	0.82
PM	0.95
MS	1.11
DO	1.09
DS	1.03
RS	1.00

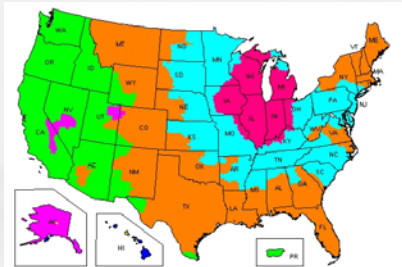
Rationalized Fleet and Warehouse Assets

- Reduced congestion



- Fewer spare vehicles
- Less warehouse space
- More miles/day

Truck Delivery Zones by Number of Days, from Chicago



Higher ROA

BENEFIT

10% more transport reliability
(capacity increase)



Supply Chain Benefits
0.01% of operating cost
0.3% of transport costs

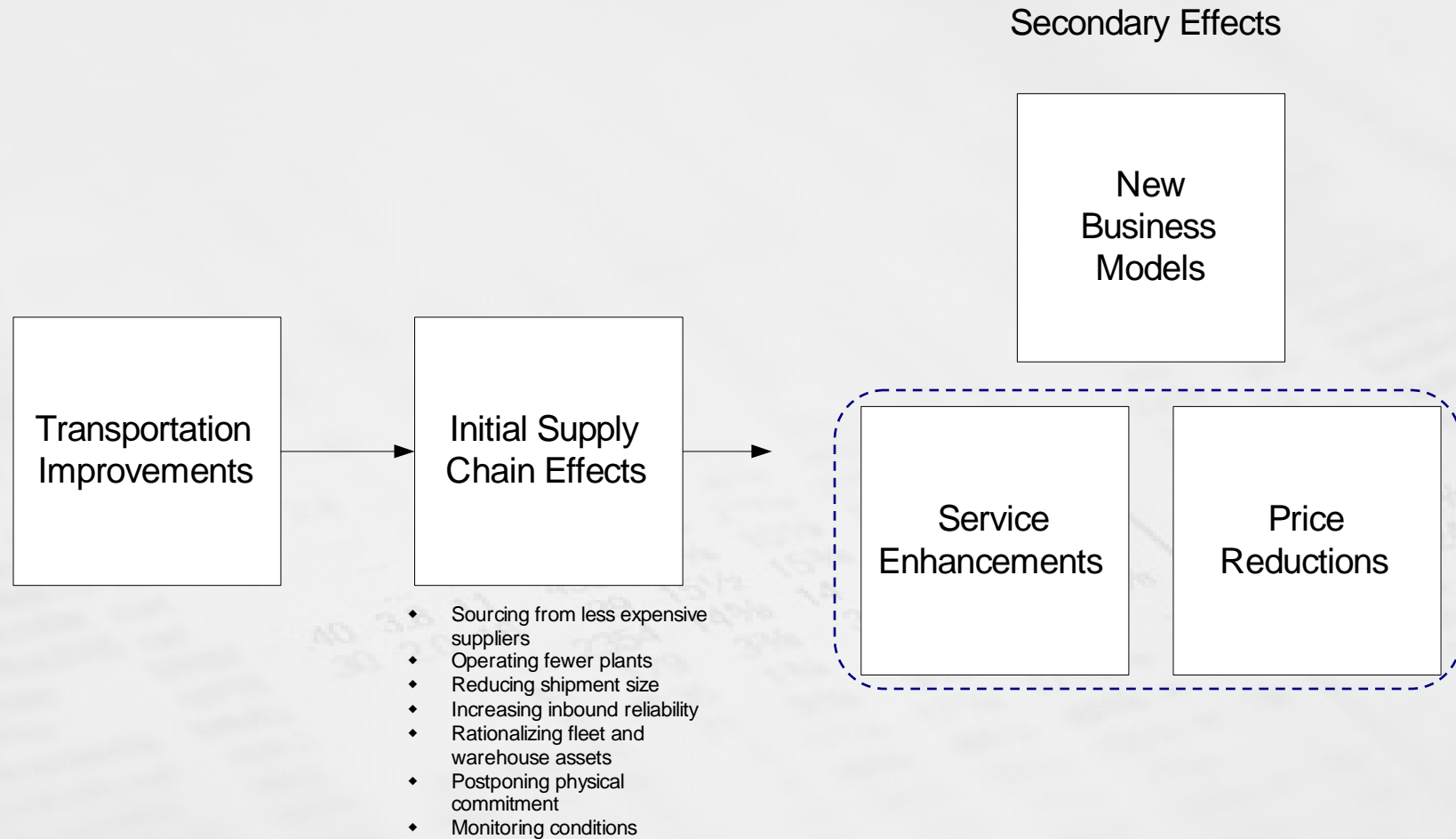


SC Type	Impact
EX	2.7
PM	0.7
MS	0.5
DO	0.5
DS	0.6
RS	1.0

Service Level and Pricing Benefits

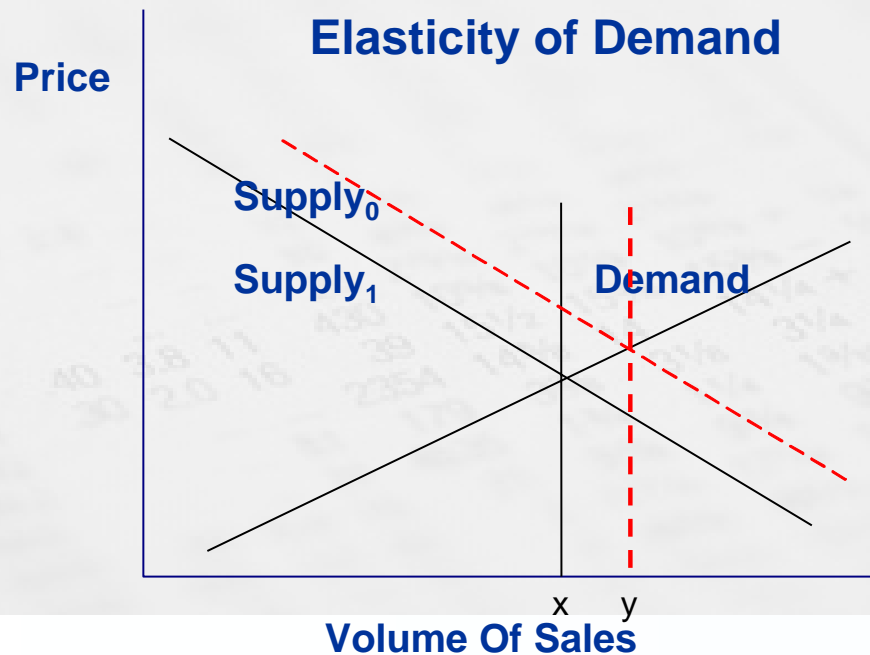
Secondary benefits

Creation of Secondary Benefits



Increased service/cost ratio, enhancing revenue

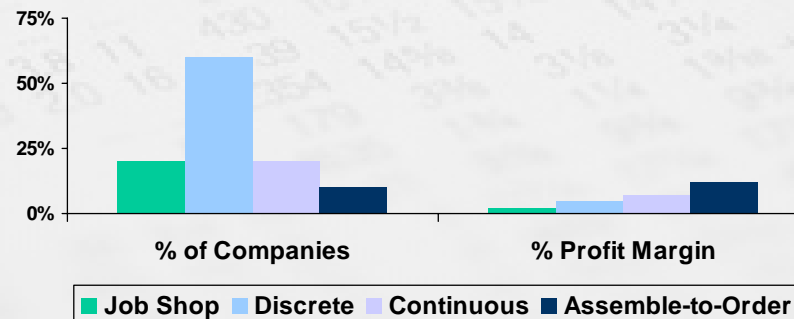
- Same service level (shorter order-to-delivery leadtimes) for a lower price
- Higher service levels for the same price (higher revenue)
- Higher service levels for a higher price (higher margin)



Creating on-demand supply chains

- **Postponing physical commitment**
 - Postponing order fulfillment
 - Dynamic pricing
 - In-transit visibility
- **Monitoring conditions**
 - Damage
 - Loss
 - Theft
- **More sales revenue**
 - Flexibility can command a premium price
- **Higher margins**
 - Dynamic pricing can clear slow-moving inventory before it becomes obsolete
- **Less in-transit loss**
 - Loss & damage (L&D) claims

Illustrative Profitability by Type of Manufacturing Operation



Initial Application and Results

Quantifying benefits by Supply Chain Type™

- **Obtain the number of companies in each Supply Chain Type™ that will be affected by the project**
 - Supply Chain Types™: SIC code relationship
 - White Goods 100% Make-to-Stock Manufacturing
 - Oil & Gas 50% Extraction, 50% Continuous Flow Manufacturing
 - Steel Products: 50% Continuous Flow, 30% Make-to-Stock Manufacturing, 20% Make-to-Order Manufacturing
- **Quantify the percent impact to each set of companies of a 10% transportation improvement:**
 - Greater supply network reach
 - Reduction in plant assets
 - Less inventory resulting from smaller shipment sizes
 - Less warehousing costs from more consistent transit times
 - Reduction of fleet assets

Baltimore Implementation

- Applying the Supply Chain Benefit Methodology

Baltimore Rail Bypass Case Study Analysis

	Maryland	National	Supply Chain
Existing Rail	\$270	\$270	\$270
Shipper Costs	\$1,052	\$1,656	\$1,656
Amtrak	\$176	\$626	\$626
Highway Benefits	\$565	\$874	\$874
Supply Chain Benefits	---	---	\$1,544
Total Benefits	\$2,063	\$3,425	\$4,969
Total Costs	\$3,046	\$3,046	\$3,046
B/C Ratio	0.7	1.1	1.6

Source: Baltimore Rail Studies by PB Consult for Maryland DOT and Cambridge Systematics

Conclusions

Conclusions

- **Transportation infrastructure investments generate significant supply chain benefits.**
- **Direct transportation cost benefits could be off by order of magnitude without considering supply chain benefits**
- **Additional price reduction and service enhancement benefits could be substantial**

Recommendations

- **Further research is recommended to improve completeness and accuracy of the methodology.**
- **Increase completeness**
 - Develop a method to determine the **revenue impact** of the demand
 - Develop a method to determine the **profit impact** of increases in service level made possible through transportation improvements.
- **Improve accuracy**
 - Extend and refine mapping of Supply Chain Types™ to NAICS industry definitions
 - Consider how this varies by region