

# ***Estimating Economic Development Benefits for Transportation Investment: The State of the Art***

**Glen Weisbrod  
Economic Development Research Group, Inc.**

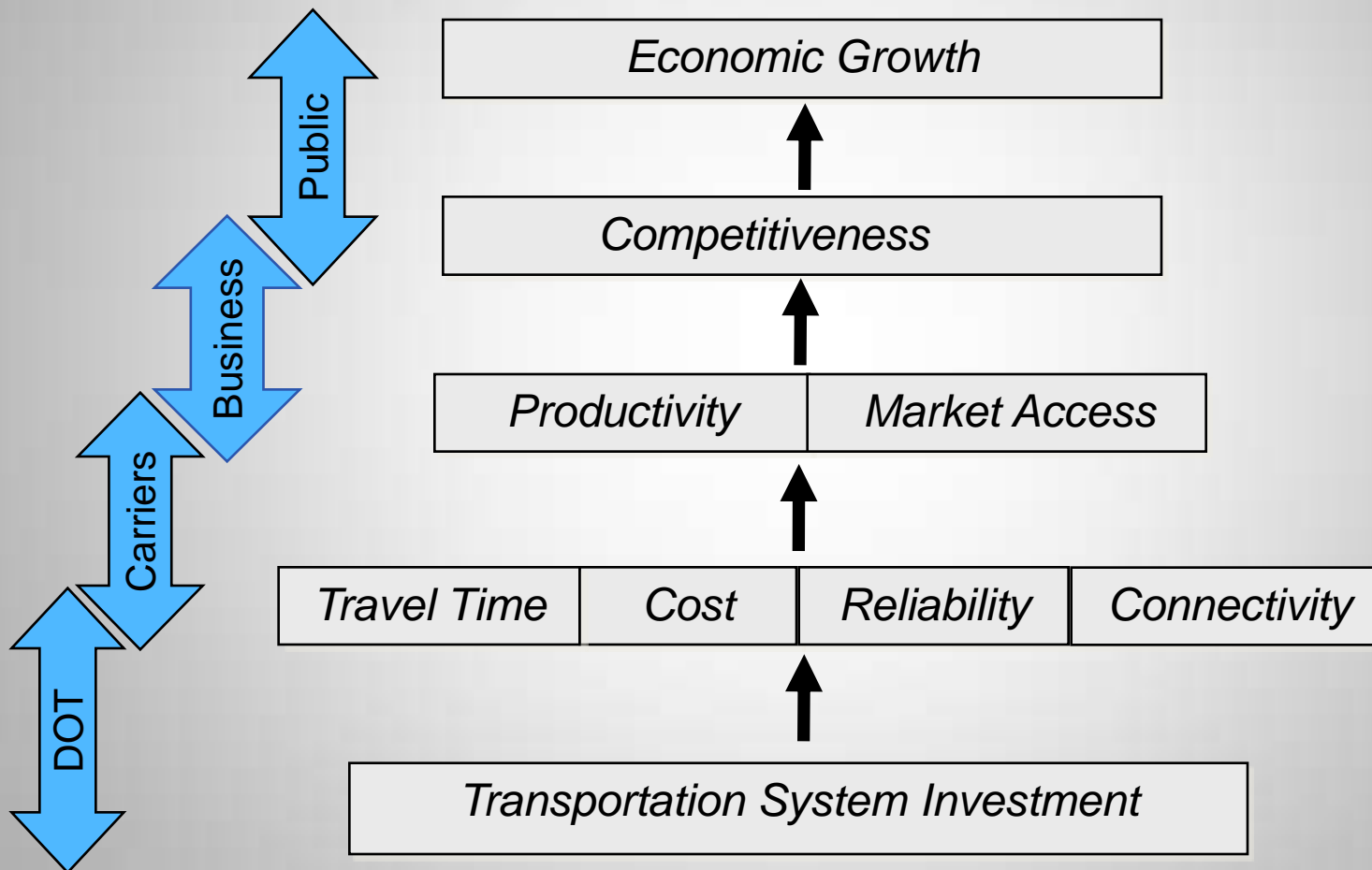
**Ohio Transportation Engineering Conference,  
October 29, 2008**

# Topics

1. The Problem of Economic Models
2. Economic Development Factors
3. Ways to Develop & Use Economic Impact Assessment
4. Modular Approaches to Improve Analysis

# The Problem with Economic Models

# The Real World: Multi-Stage Impacts & Perspectives



# "Black Box" Models

*Economic Growth*

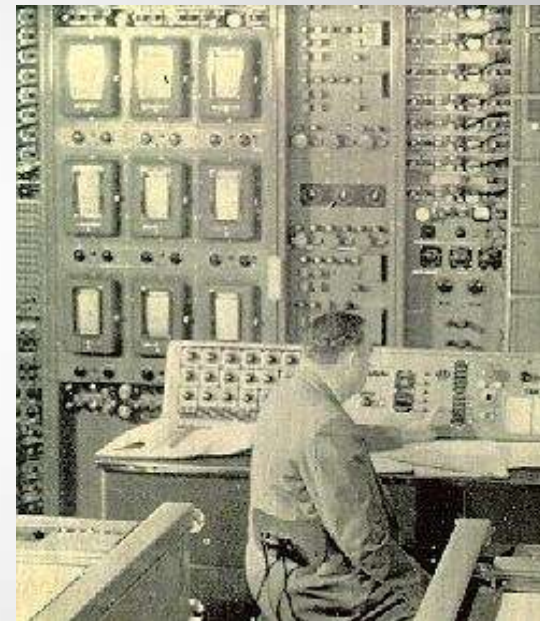
**Missing:**

- Multi-Step Impact Logic
- Multiple Objectives
- Multiple Perspectives
- Multiple Spatial Scales

*Travel Time*

*Travel Cost*

*Transportation System Investment*



# Role of Econ Impact in Decisionmaking

## Funding Decision

How much money should we invest in transportation?

## Programming Decision

How to allocate for preservation, capacity, modal programs?

## Prioritizing Decision

How to rank and select among competing projects?

## Planning Decision

What route alignment and design configuration to select?

## Financing and Fee Decision

How to involve users, private providers, etc.

# Need for Multiple Perspectives

## Stages of Planning and Decision-making

- funding
- programming
- prioritization
- planning

## Different Spatial Levels of Impact

- local
- state
- federal

## Different Impact Groups

- public
- business
- carriers
- government

# **Economic Development Factors**

*that need to be accounted for  
in transportation impact assesment*

# Not All Transportation Investment Has the Same Payoff



Connectivity and setting matters

# Economic Benefits -- from 2 Sources

## Traditional Efficiency Perspective:

*Improving Throughput* –  $\Delta$  Speed, Distance, Delay  
→ Saving Time and Expense for current travelers and existing businesses

## Economic Development Perspective:

*Improving Access /Connectivity* –  $\Delta$  market reach, intermodal interchange → facilitating new job access , new business markets

# Frequently Missed Factors

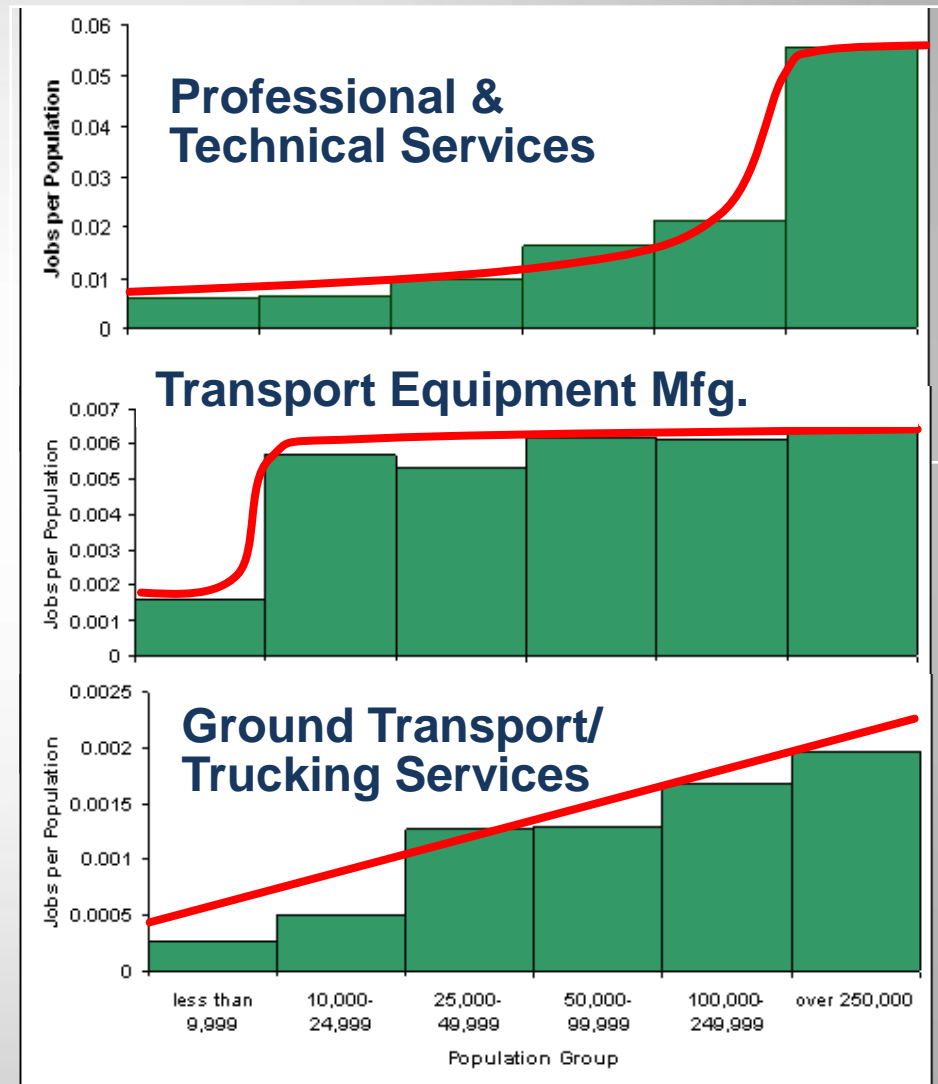
## *Affecting Productivity & Competitiveness*

- **Market Access**
  - Worker markets
  - Supplier markets
  - Customer markets
- **Connectivity & Reliability**
  - Airports, Marine ports, Inter-modal rail terminals,
  - Industrial Parks
  - Visitor Attractions



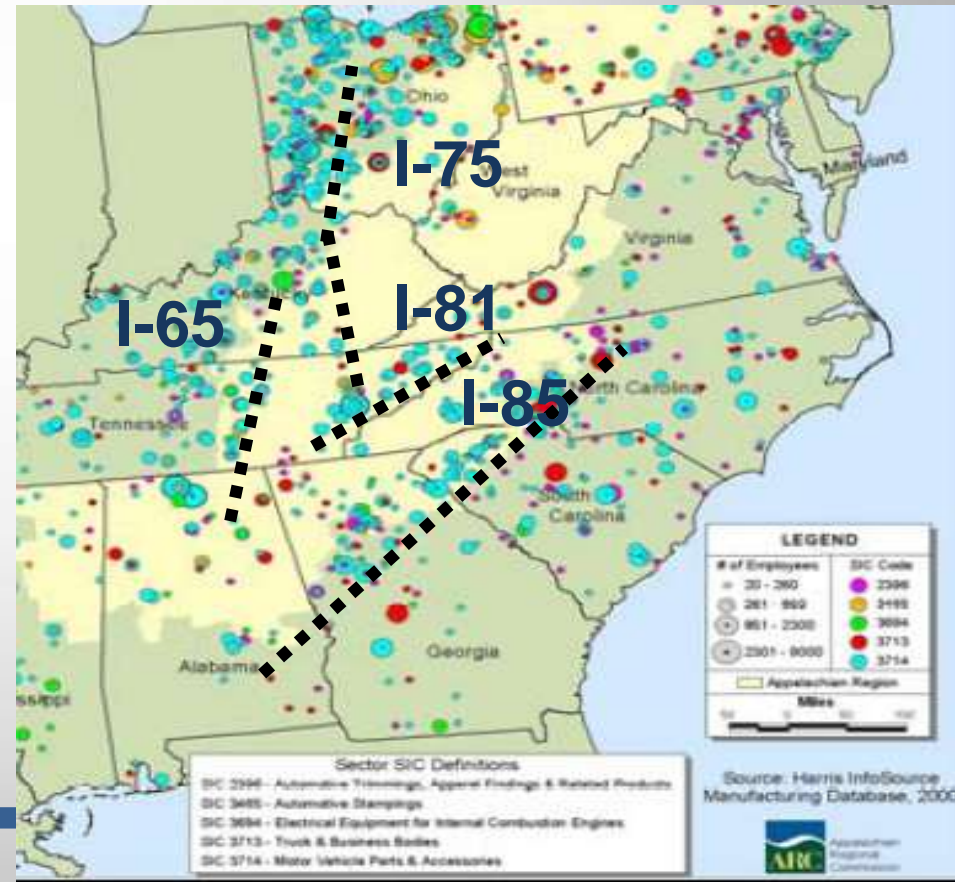
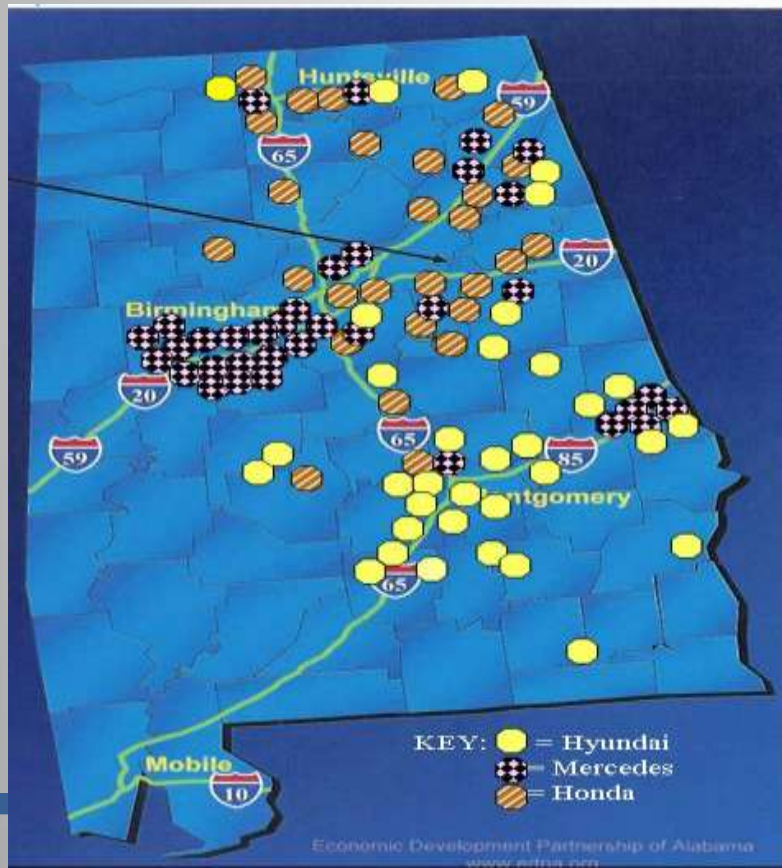
# Market Access: Market Scale

- Travel times change commuting labor market size
- Expanding labor markets enable new forms of economic activity

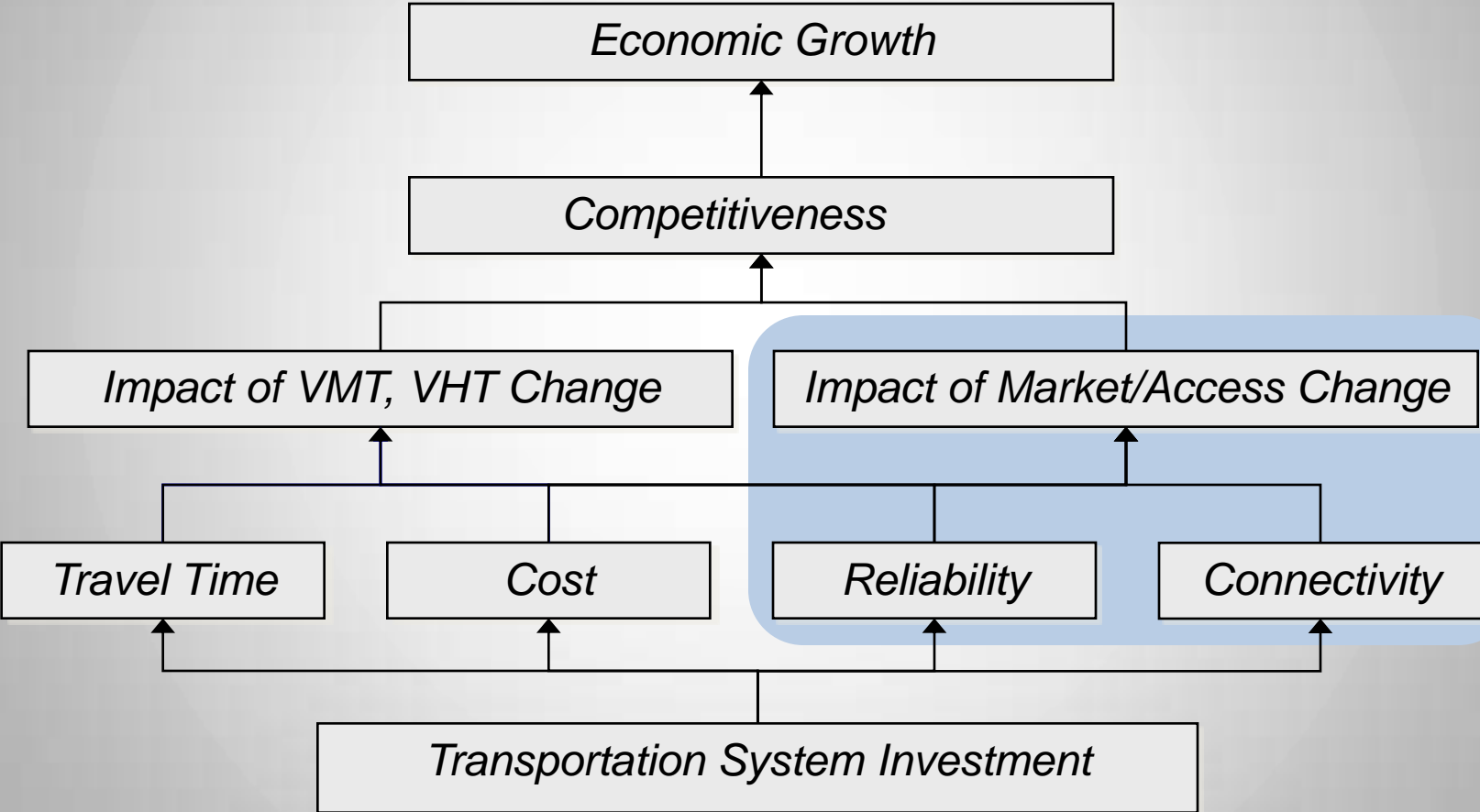


# Delivery Access : Supply Chains

- Travel time & reliability changes affect same-day delivery areas and inter-modal access (rail, air)
- Enabling supply chain corridors



# Analysis Steps



# Ways to Develop and Use Economic Development Impact Assessment

- Direct Designation
- Qualitative Ratings
- Quantitative Performance Measures

# Direct Assessment: Economic Development Routes

**Step 1. Identify routes and facilities that have a large potential for economic impact.**

## Screening Criteria

- Serves hwy or rail corridors and industrial centers
- Serves distribution/warehousing routes and centers
- Connects to airport, marine port or land gateways
- Serves convention, tourism, banking and commerce that brings in visitors, money



# Direct Assessment: Economic Development Routes

**Step 2. Measure the sensitivity of economic activities to those facilities.**

## Sensitivity Criteria

- Vehicle Mix/Purpose – service to freight and visitors
- Origin-Destination – serves flows to outside regions
- Intermodal Connectivity – ground to air/sea gateways
- Economic Connectivity –to industrial, warehouse and export business services



# Direct Assessment: Economic Development Routes

**Step 3. Estimate potential economic benefit from making improvements (or loss if not made).**

## Types of Changes

- Travel Time to intermodal terminals, global gateways
- Predictability (stability) of travel time
- Size of same-day delivery market
- Access restrictions on truck use

*Vancouver, BC Region*  
*Chicago, IL Region*



# Qualitative Rating Systems

## Measurement Methods

- Scorecard
- Multi-dimension scales
- Relative ranking

## Economic Development Factors

- Enhancing Market Access
- Enhancing Intermodal Connectivity
- Enhancing Competitiveness

## Economic Development Outcomes

- Job creation & retention
- Private investment
- Redeveloping distressed areas

# Qualitative Rating: Econ Criteria

Criteria	OH	WI	MN	MO	VA	Scot
<b><i>Transportation Drivers of Economic Impact</i></b>						
Multi-modal & intermodal facilities	X	-	X	X	X	X
Connectivity to key statewide corridors	-	X	-	X	-	X
Supports desired land development clusters	-	X	-	X	-	X
Predictability of travel times	-	-	X	-	-	X
Connectivity or access to global markets	-	-	X	-	-	-
Concentration of trucks for goods movement	-	-	-	-	X	-
Enhances competitiveness of shipping rates	-	-	X	-	-	-
Reduces bottlenecks and size/wt. impediments	-	-	X	X	-	-
Supports economic development initiatives	-	-	-	X	-	-
Supports redevelopment of old industrial areas	X	-	-	-	-	-
Location in economically distressed area	X	-	-	X	X	-
<b><i>Economic Growth Outcomes</i></b>						
Job Creation – supports industry attraction	X	X	-	-	-	X
Job Retention – supports existing industry	X	X	-	-	-	X
Public-private participation in funding	X	-	-	-	-	-

# Quantitative Measurement Systems

## Transportation Performance Changes

- Travel times, cost, reliability, volumes, safety

## Economic Development Factors

- Access, Connectivity, Competitiveness

## Economic Development Outcomes

- Job growth, investment, distress

## Stakeholder Perspectives

- Public, businesses, carriers, commuters, DOTs

# Quantitative Systems Economic Model Factors

- cost of commuting
- cost of freight movement
- Schedule reliability
- breadth of same-day delivery market
- breadth of labor market
- access drive time to airport
- access drive time to marine port
- access drive time to intermodal terminal
- access time to international gateways
- level of service at ports and terminals
- constraints on classes of vehicles

*Impact  
Differs by  
Industry*

*Portland, OR Region  
Chicago, IL Region  
Houston, TX Region  
Massachusetts EOT  
Wisconsin DOT  
Kansas DOT  
Oregon DOT  
Maine DOT*

# Quantitative System: Comparing Projects

Stakeholders	Performance Measures	Existing	No Action	Alt. A	Alt. B
Public	Jobs & Income				
	Safety / Security / QOL				
	Cost of Living				
Business	Delivery Cost & Reliability				
	Market Access & Scale				
	Operating Productivity				
	Profitability / Competitiveness				
Carriers	Driver, Vehicle & Fuel Costs				
	Service Frequency				
	Speed & Reliability				
	Market Share				
Commuters	Travel time & reliability				
	Travel-related cost				
	Travel Safety / Security				
DOT	System Efficiency				
	System Operating Cost & Revenue				
	System Safety				
	Energy, Environment Social Goals				

# Quantitative Systems in Practice:

## Comparing Alternatives - Travel & Access

Travel Performance: commuting, freight delivery, reliability, safety

Savings or Reduction in	Pass Car	Truck Freight	Bus Transit	Rail Freight
Gross VMT	0	0	0	0
Gross VHT	0	0	0	0

Gross VHT w/reliability adj

Travel Access: labor market, delivery, inter-modal terminal access

	Industry	Road Labor Mkt	Road Delivery Mkt	Rail Delivery Mkt
Passenger Trips				
Passenger Miles				
...from mode shift				
...induced				
Freight Tons				
Freight Ton Miles				
...from mode shift				
...induced				
Fatalities				
Personal Injuries				
Property Damage				
Total Value of Travel Imp				
Passenger Cost - Net Total				
Crew Cost - Net Total				
Freight Logistics Cost - Net				
Veh Oper - Net Total				
Toll Cost - Net Total				
Safety Cost - Net Total				
Environmental Costs - Total				
	Crop Production	0.000	0.000	0.000
	Animal Production	0.000	0.000	0.000
	Forestry & Logging	0.000	0.000	0.000
	Wood Products	0.000	0.000	0.000
	Paper Manufacturing	0.000	0.000	0.000
	Printing & Related Support Activities	0.000	0.000	0.000
	Petroleum & Coal Products	0.000	0.000	0.000
	Chemical Manufacturing	0.000	0.000	0.000
	Plastics & Rubber Products	0.000	0.000	0.000
	Nonmetallic Mineral Products	0.000	0.000	0.000
	Primary Metal Manufacturing	0.000	0.000	0.000
	Fabricated Metal Products	0.000	0.000	0.000
	Machinery Manufacturing	0.000	0.000	0.000
	Computer & Electronic Products	0.000	0.000	0.000

# Quantitative Systems in Practice: Comparing Economic Impact and Benefit/Cost

Economic Impact: jobs, income, value added (GRP), shipments

Year	Business Output (\$ mil.)	Value Added (\$ mil.)	Jobs	Wage Income (\$ mil.)
2007	5.535	2.715	55	2.109
2008	5.535	2.715	55	2.109

Benefit/Cost: user, economic, state and societal perspectives

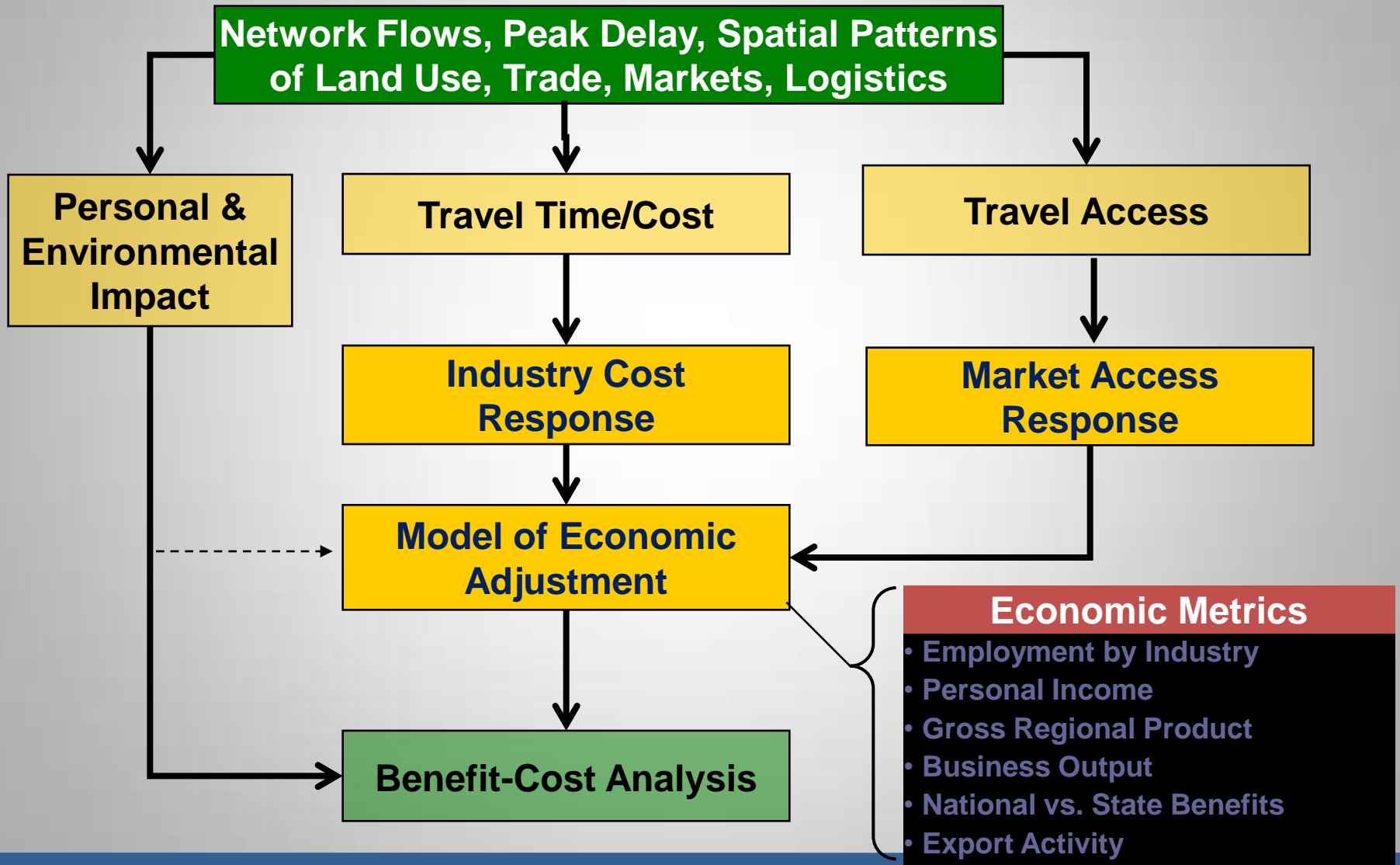
Year	Mode	(A) Traveler Benefits					(B) Shipper Logistics Cost	(C) Other Benefits	
		Vehicle Costs	Time Costs	Non - \$ Value of Time	Safety Cost	Induced Adjustment		Social/ Environ.	Business Productivity
2017	Pass Car/Lt.Truck	-11.2	1373.4	1306.7	-5.3	479.6	0.0	-1.1	0.0
2018	Truck Freight	-6.8	953.7	0.0	-0.3	486.7	1160.8	-1.7	0.0
2019	Bus Transit	0.0	139.2	139.0	0.0	0.0	0.0	0.0	0.0
2020	Rail Freight	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2021	Rail Transit	0.0	173.7	147.3	0.0	0.0	0.0	0.0	0.0
Year	Category	Definition	Present Value of Benefits	Present Value of Costs	Net Present Value (Benefits - Costs)				
2024	Traveler Benefit	A	5176	802	4374				
2025	Full User Benefit	A+B	6337	802	5534				
2026	Total Societal Benefit	A+B+C	6334	802	5532				
	Economic Development Impact	D	1724	802	921				

# Concept: Multi-Modal, Multi-Regional, Spatially-Aware Economic Framework

TREDIS as a “*Modular Framework*” allows for...

- multi-modal – highway, transit, rail, air, water modes
- any travel model (EMME2, TransCad) or sketch planning data
- any economic model (REMI, CRIO-IMPLAN, Global Insight)
- any specialized analysis (land use model, freight model, BEST)
- incorporates economic distress and access factors via business attraction analysis (LEAP) and GIS (ESRI)
- works at zone, municipal, county and state levels
- results for multiple perspectives and spatial scales

# Modular Approach



# Modular Approach in Practice

## Programming: Preservation vs. New Capacity

Michigan DOT and Kansas DOT: applied bridge & pavement management systems with TREDIS framework

## Land Use and Economic Development Impacts

Oregon DOT and California HSR Authority: apply integrated transportation and land use models with TREDIS framework

## Freight Planning

Wisconsin DOT and Massachusetts EOT: applying TransSearch freight data with TREDIS framework

## Business Competitiveness

Vancouver, Portland, Chicago business organizations: applied port, terminal data with TREDIS framework

# The Future – New Technologies

Actual Photo of UFO Landing Zone on the A27 Highway in the Netherlands



# Contact

**Glen Weisbrod**

**Economic Development Research Group, Inc.**

[www.edrgroup.com](http://www.edrgroup.com)

[www.tredis.com](http://www.tredis.com)