Speaking Transportation Economics

Chandler Duncan

Economic Development Research Group, Inc.
www.edrgroup.com
Transportation Effects on Economic Growth
Connections that drive economic and land development

1) Access to Markets
2) Access to Workforce
3) Access to Supply Chain
4) Inter-City Linkages
5) Feeder Systems
Transportation’s Role in the Economy

- **Production (of Goods & Services)**
- **Distribution**
- **Sellers (of Goods & Services)**
- **Final Demand (households)**

**Transportation Conditions**

**Location & Size of Economic Activity**

- **Labor (Workers)**
- **Capital Goods (Materials & Equipment)**

Transportation's role in the economy involves the movement of goods and services, influenced by factors such as labor, capital goods, production, distribution, sellers, and final demand, all contingent on transportation conditions and the location and size of economic activity.
What’s A Benefit?

- Benefits are always **absolute** gains to the economy that can be measured in **real dollars**.
- They arise in three ways:
  - **SAVING MONEY** to Households and Businesses
  - Increasing **PRODUCTIVITY** of Businesses
  - Attracting, Creating or Expanding **NEW ECONOMIC ACTIVITY**
Money-Saving Benefits

- **Vehicle Operating Costs**
  - Same Activity, Less Mileage on Vehicles or
  - Same Mileage, but better travel conditions

- **Travel Time**
  - Same Activity, Fewer Hours Spent Traveling
Money-Saving Benefits

- Reliability
  - Greater Certainty about Arrival Times
- Safety
  - Fewer Crashes and Fatalities
- Environmental
  - Less Emissions, Public Health, Wildlife and other Benefits
Productivity Benefits

- **Market Access**
  - More buyers, suppliers and workers to use from

- **Site Efficiency**
  - Business can produce more with the same resources because of site-specific features
Enlarging the Scale of Market Access

- Transportation determines effective market size & density

- Market size enables “returns to scale” through access to broader & more specialized labor, supplier and customer bases.

- These “agglomeration benefits” increase productivity and thus economic competitiveness and growth
Contingent Development Benefits

- New Business Attracted (or Created)
  - Must be “net-new” to the state or region
  - Only count “value-added”
  - Do not count “transfers”
How Does It All Fit Together?

Transportation Infrastructure

Economic Development

Land Development

Technology & Demographic Change
What’s an Impact

- Impacts show what the economy *does with* its benefit
- Over 10 years, a firm saves $100,000 in reliability time and invests it in a new machine, the firm can then:
  - Make and Sell $225,000 worth of additional goods
  - Retain $20,000 in additional profits
  - Employ 2 new workers
  - Pay $130,000 in wages
Benefits and Impacts

- Economic BENEFIT = $100,000

- Economic IMPACTS:
  - $225,000 Business Output (Goods Sold)
  - $20,000 Business Profits
  - 2.3 Jobs
  - $130,000 in Wage Income
  - Tax Revenue, etc. etc.
Sources of Impacts

- Transportation Efficiency
  - Using the benefit from transportation system performance (savings)
- Market Access
  - Using the benefit from increased productivity
Sources of Impacts

- Contingent Development
  - Often not a benefit, but derived from new business attracted (not simply relocated)
- Construction
  - The multiplier effects of capital and operational outlays
- Adverse Tax/Tolling Impacts
  - Multiplier effects of taxing/tolling or other revenue mechanisms
What are Multiplier Effects?

- Apply Only to Impacts (never benefits)
- Induced Effects
  - Money is “re-spent” in the economy
- Indirect Effects
  - Market is made for supporting inputs to production
What about Intangibles?

- **Beauty, Wildlife, other strategic outcomes?**
  - Never occur in transactions
  - Often distributive in nature
  - Often long-term vs. short-term
  - Best **NOT** to be monetized
# Multi-Criteria Analysis

<table>
<thead>
<tr>
<th>Measure</th>
<th>Score</th>
<th>Weight</th>
<th>Weighted Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Environment</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Mobility</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Livability</td>
<td>3</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Future Generations</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td></td>
<td></td>
<td><strong>37</strong></td>
</tr>
</tbody>
</table>
Why Multi-Criteria Analysis?

- Avoids indefensible dollar values
- Avoids distraction of public debate
  - Focuses debate on performance areas and not on “what’s a bird’s life worth”
- Recognizes time-value of money and importance of long-term benefits.
Engaging the Discussion

- What kind of outcomes are the most important?
- Who experiences these effects and how?
  - What might the benefits and impacts be?
Triple Bottom Line

- Developed for multi-national corporations to demonstrate corporate social responsibility

- Shifts business focus from “firm-focused” to “societally focused”
  - Environmental Benefits
  - Social Benefits
  - Economic Benefits
Triple Bottom Line

- Often most important outcomes are not on the “Triple Bottom Line”
  - Distributive effects
  - Non-Monetizable effects
  - Strategic Objectives (Modal Diversity, Target Industry, Historic Preservation)

- When investment is public, all benefits may be both “economic” and “societal”
Motivation for Road Projects

US Survey: % of Projects by Stated Motivation
# Case Example: Economic Factors in Appraisal

<table>
<thead>
<tr>
<th>Rating Criteria</th>
<th>CBA</th>
<th>MCA</th>
<th>Rating</th>
<th>Appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USDOT</td>
<td>OH</td>
<td>WI</td>
<td>MO</td>
</tr>
<tr>
<td><strong>Traveller Benefit and Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency: Travel time, cost, level of service</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Safety (accident rate)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Pollution emissions/air quality/greenhouse gas</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Transportation Drivers of Business Productivity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermodal facilities, access &amp; interchange</td>
<td>(x)</td>
<td>X</td>
<td>(a)</td>
<td>X</td>
</tr>
<tr>
<td>Reduce localized congestion bottlenecks</td>
<td>(x)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Connectivity to key corridors or global gateways</td>
<td>(x)</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Labour market access</td>
<td>(x)</td>
<td>-</td>
<td>(a)</td>
<td>-</td>
</tr>
<tr>
<td>Reliability of travel times</td>
<td>(x)</td>
<td>-</td>
<td>(a)</td>
<td>-</td>
</tr>
<tr>
<td>Truck freight route, supply chain impact</td>
<td>(x)</td>
<td>X</td>
<td>(a)</td>
<td>X</td>
</tr>
<tr>
<td><strong>Localized Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location: regeneration of distressed area</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Land use: supports cluster or in-fill development</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Econ Policy: support target industry growth</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Local public support</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Leveraging private investment</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Macroeconomic Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Jobs(support job growth/reduce unemployment)</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Gross Regional Product or Value Added</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- X = factor explicitly included as an element of the rating system;
- (x) = factor implicitly allowed via calculation of additional productivity benefit in CBA
- (a) = factor implicitly included as a component of the macroeconomic productivity calculation
- (b) = factor included in travel efficiency benefit shown above
- " - " = factor not formally recognized as a separate element of the rating system, but may still be considered through other elements of the project appraisal and selection process.
Takeaways (Triple Bottom Line)

- Can be one helpful way of reporting benefits
- A good approach looks at additional factors beyond the TBL
- A good traditional BCA will include all TBL elements (and more) regardless of whether TBL is reported.
- Should not be a rigid structure
Policy and Planning Considerations

- Strengthen intercity / international routes and facilities (road, rail, air), with feeder services.

- Strengthen local commuting & delivery routes (road, rail) to facilitate scale economies.

- Be aware of unforeseen implications concerning wider economic and land development

- Recognize emerging business clusters, requiring non-radial travel. Allow for densification, and agglomeration economies.

- Move to performance metrics and goals for improving access & connectivity (enabling productivity).

- Recognize changing industry and demographic patterns
Performance & Impact Measurement

User Benefits  ➔  Transport System  ➔  Economic Effects

Traditional Traveler Benefit
- Travel time
- Travel cost
- Safety

Wider Transport Benefits
- Accessibility
- Connectivity
- Mobility
- Reliability

Wider Economic Benefits
- Productivity from market access
- Supply chain efficiency

Local Effects
- Economic Competitiveness
- Business Location

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Economic Methods Available

- Cost-Benefit Analysis
  - (including TBL)
- Economic Impact Analysis
- Multi-Criteria Analysis
- Market Studies
- Trade Studies
- Financial and Fiscal Studies
Transportation Business Processes

• Feasibility Analysis
  ▪ BCA
  ▪ Economic Impact Analysis (possibly)

• Corridor Studies
  ▪ B/C Analysis
  ▪ Multi-Criteria
  ▪ Economic Impact (Including Fiscal)
  ▪ Market Studies
Transportation Business Processes

- Environmental Documents (NEPA)
  - BCA
  - Economic Impact Analysis (possibly)

- Policy Evaluation Studies
  - B/C Analysis
  - Multi-Criteria
  - Economic Impact (Including Fiscal)
  - Market Studies
Transportation Business Processes

- Long-Range Planning (Performance Based)
  - Service Packages
  - B/C Analysis
  - Multi-Criteria
  - Economic Impact (Including Fiscal)

- Prioritization and Programming (STIP/TIP)
  - BCA
  - Multi-Criteria
Transportation Business Processes

- Long-Range Planning (Performance Based)
  - Service Packages
  - B/C Analysis
  - Multi-Criteria
  - Economic Impact (Including Fiscal)

- Prioritization and Programming (STIP/TIP)
  - BCA
  - Multi-Criteria
Key Concepts

- There is a large “menu” of economic methods available
- Most will utilize concepts of economic benefit, economic impact and normative weights
- There are free and paid software tools and techniques available
  - Search Terms: Transportation BCA, Transportation Economic Impact, Sustainable Return on Investment
Key Concepts

• No “Silver Bullets” – Key is knowing when to use which approach

• Be leery of over-dependence on dollars as the measure of all possible values

• When in doubt ask what the original rationale for the project was – identify beneficiaries

• Ultimately people, and not numbers or tools make decisions.
Thank You

Chandler Duncan, AICP
Economic Development Research Group
155 Federal St. Boston, MA 02110

cduncan@edrgroup.com
(617) 338-6775 x 203