Performance Based Transportation Project Assessment

Utilizing Travel Demand Model Data and Dynamic Economic Modeling

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Region 1 Planning Council (R1PC), Rockford Illinois
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Regional Context

- 80 miles NW Chicago, 60 miles from O’Hare Airport, <100 miles to Milwaukee
- Population of 441,000
  1,640+ sq/mi (TDM model)
- U.S. Route 20, Interstate 39/90
- Rockford International Airport
  - 3rd busiest airport in Illinois
  - 29th for cargo in the nation
  - UPS, Amazon
Local Context

- Rockford Metropolitan Agency for Planning (RMAP) is the Metropolitan Planning Organization (MPO), under the recently formed R1PC – Region 1 Planning Council
- Past, economy was based on heavy industrial processes
- Today, health care, manufacturing, tourism, agriculture, freight and cargo transportation.
- Transportation Mgmt. Area, about 700 TAZ’s
Federal and State Recommendations

- During RMAP’s last Transportation Management Area Certification Review from the Federal Highway Administration and Federal Transit Administration a **Recommendation** was provided for our Long Range Transportation Plan. It was recommended to “implement a Benefit-Cost Analysis, or comparable analysis, for aiding in project selection; RMAP should re-evaluate the methodology for rating and selecting major capital investment projects in the LRTP.” (2015)

- **Fixing America’s Surface Transportation Act, (FAST) 2015** (Previously MAP-21)
  - The U.S. DOT should require state DOTs and MPOs to perform economic analysis and incorporate regional priorities as part of state regional transportation improvement plans TIP.
  
  - Performance assessment and reporting should be expanded to include performance areas beyond those currently established. Reporting should be accessible to the community to increase transparency and accountability.
R1PC Regional Travel Demand Model (PTV VISUM)

- 3-County Model (Boone, Winnebago, Ogle), and urbanized portion of Stateline Area Transportation Study (SLATS).
- Traditional 4-Step Model, Trip Generation, Trip Distribution, Mode Choice, and Trip Assignment. Core Network was calibrated using collected AADT data from IDOT.
- Integrated Illinois Department of Employment Security (IDES) employment data into the TDM to accurately allocate employment by TAZ/2-digit NAICS.
  - Suppressed employment data down to the business address allows assignment to the proper TAZ.
  - This data was used to calibrate our REMI software for the base-year.
  - REMI projections used to calculate TDM 2040 transportation projections.
R1PC Regional Travel Demand Model (PTV VISUM)

- Road network comprised of links and nodes that contain attribute information such as number of lanes, capacity, average daily traffic (ADT), functional classification, roadway design speed, etc.
- Traffic Analysis Zones containing socio-economic data, employment, dwelling units, population, traffic generators, & building ratings.
Volume-to-Capacity is a measure that reflects mobility and quality of travel time of a roadway. It compares roadway demand (ADT) with roadway supply (capacity). For example, a V/C of 1.0, or 100% is operating at full capacity, while .5 or 50%, is operating at half capacity.
Volume-to-Capacity projected to year 2040 based on current transportation system with projected increases in population, employment, and Dwelling Units from REMI = a change in VMT, VHT, and Trips, can be positive or negative.
I-90 and E. State Street 2015 Network Congestion
Rockford, Illinois

Volume-to-Capacity Ratio
V/C Percentage
0% - 40%
40% - 50%
50% - 60%
60% - 70%
70% - 86%

77% VC Ratio
I-90 and E. State Street 2040 Network Congestion
Rockford, Illinois

Volume-to-Capacity Ratio
V/C Percentage
0% - 40%
40% - 50%
50% - 60%
60% - 70%
70% - 86%
86% - 96%

93% VC Ratio
Travel Demand Model Integration

Infrastructure projects are entered into the Travel Demand Model with as much detail as possible.

- Functional classification
- Operating speeds
- Number of Lanes
- Intersections, including type
- Future employment data if known, by Traffic Analysis Zone, TAZ
Export changes in VMT, VHT, and Trips which are used to compare against the baseline transportation, economic, and demographic model results.

Data is exported into excel in a format developed by our TDM consultant which allows for a seamless upload into REMI TranSight for analysis.
VISUM and TranSight Integration

TDM Outputs needed as inputs to TranSight

REMI TranSight Calculates...

- VMT
- VHT
- Trips

Commuting Costs

Accessibility Costs

Transportation Costs

Average trip time

Number of truck trips per hour

Overall network speeds
VISUM – REMI Import Procedure
REMI TranSight Economic Summary
REMI TranSight Demographic Summary
REMI TranSight Benefit-Cost-Ratio (BCA)

### Inputs

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### Results

**Benefit-Cost Analysis**

Benefit-Cost Analysis is an economic tool for evaluating possible projects by comparing their total benefits with their total cost over a period of time. The analysis considers only the direct benefits and direct costs associated with a project, according to the FHWA guidelines. A discount rate is used to calculate the total present value of the benefits of a project to society and the total present value of the costs of designing and constructing the project. Benefits may include changes to the environment due to changes in emissions, vehicle operating cost savings, safety benefits, travel time savings, and maintenance costs/savings. A Benefit-Cost Ratio can be calculated using the net present value of the benefits divided by the net present value of the costs which can be used to evaluate a project's economic merit.

- **Total Benefits, Ml PV$:** 6.07
- **Total Costs, Ml PV$:** 0.79
- **Benefit-Cost Ratio:** 7.67
Travel Demand Model & Land-Use Planning

A scenario where a new road is planned to be built will include land-use planning and zoning decisions that will impact new traffic generators such as residential units, businesses, hospitals etc.

- Projected employment entered into the TDM by TAZ for projected impacts due to the transportation system.
- REMI regional analysis of additional jobs generated for project.
Conclusions

• The integration of REMI and the Travel Demand Model has given the region an additional assessment tool to help planners and elected officials make more informed decisions.

• Travel Demand Model integration with TranSight gives planners a better understanding of economic drivers and impacts on transportation facilities.

• Tool to help guide investment for economic development and Regional Competitiveness, especially for funding.

• Scenario planning can help planners and engineers better understand “what-if” scenarios such as new road connections, road closures, increased roadway capacity, or even the construction of new businesses or residential units.

• Quantify return on investment from publicly funded projects.

• Strategic investments in the transportation system are necessary with limited local funding resources to leverage state and federal match.

• Increase government transparency with performance-based project selection.

• Strengthen the MPO and RPC Long-Range Transportation Plan with data-driven recommendations and implementation strategies.
Contact Information

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