Performance Based Transportation Project Assessment

Utilizing Travel Demand Model Data and Dynamic Economic Modeling



Colin Belle, Metropolitan Planner Region 1 Planning Council (R1PC), Rockford Illinois March 28th, 2018



COLLABORATIVE PLANNING FOR NORTHERN ILLINOIS

Regional Context

- 80 miles NW Chicago, 60 miles from O'Hare Airport, <100miles 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.



- 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.



- 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





I-90 and E. State Street 2040 Network Congestion Rockford, Illinois





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 Data for REMI Integration

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





VISUM – REMI Import Procedure





REMI TranSight Economic Summary





REMI TranSight Demographic Summary

	Forecast Tools Results Tools	Regional Simula	ion 1 con	npared to S	Standard	Regional	Control -	Differenc	e - REMIT	ranSight	v4.1	? 🖻 .	. 🗆 🔀	
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Population	Regional Simulation 1 Difference compared to Standard Regional Control			Total	population b	y single year	age cohort.						^ ~	
White-NonHispanic	Region Winnebago County, IL													
	Category	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
Hispanic	All Races	Individuals	+10.344	+18.073	+24.164	+29.028	+33.102	+36.443	+39.196	+41.646	+43.892	+45.909	+47.673	
Four Age Groups	White-NonHispanic	Individuals	+7.601	+13.216	+17.593	+21.051	+23.918	+26.249	+28.152	+29.836	+31.372	+32.746	+33.943	
5 Year Age Cohorts	Other-NonHispanic	Individuals	+0.432	+2.059	+2.768	+3.339	+3.820	+1.648	+1 797	+4.825	+2.067	+2.318	+2.301	
🕨 🧀 1 Year Age Cohorts	Hispanic	Individuals	+1.140	+2.030	+2.759	+3.364	+3.889	+4.332	+4.708	+5.049	+5.367	+5.656	+5.911	
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49 policy variable(s) active.	Not Saved			Winn	ebago, B	oone, and	Ogle Cou	nty (TS-\	VB) - 3 Re	egion 70 S	ector Mod	lel 📼 🗄	i 🗳	



REMI TranSight Benefit-Cost-Ratio (BCA)

21	Transight : Benefit-Cost Analysis 💶 🗖												
Inputs 2019 Fixed National \$ (M)										R	egion /innebago Coi	unty, IL	
	Cost	Benefit	Cost / Benefit	Variables	Detail	2016	2017	2018	2019	2020	2021	2022	2023
		\checkmark	Emissions	Non-Pecuniary (Amenity) Aspects	Total	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
		\checkmark	Travel Time Savings	Non-Pecuniary (Amenity) Aspects	Total	0.494	0.494	0.494	0.494	0.494	0.494	0.494	0.494
		\checkmark	Safety Benefits	Non-Pecuniary (Amenity) Aspects	Total	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
			Vehicle Operating Cost Savings	Consumer Spending	Motor vehicle fuels, lubricants,	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025
		\checkmark	Vehicle Operating Cost Savings	Consumer Spending	Motor vehicle maintenance and	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
		\checkmark	Travel Time Savings	Benefit Cost Analysis	Travel Time Savings	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
			Custom	N/A	(New Design and Construction	0.000	0.000	0.000	0.846	0.000	0.000	0.000	0.000
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Custom Benefits/Costs [Edit...

Results

Parameters							
Discount Rate	7% ∢>						
Analysis Period	21 < >						
Evaluation Year	2019 🕑						
Evaluation from 2019 to 2039							
Total Benefits, Mil PV\$	6.07						
Emissions Benefits, Mil PV\$	0.02						
Safety Benefits, Mil PV\$	0.36						
Vehicle Operating Cost Savings, Mil PV\$	0.34						
Maintenance Costs, Mil PV\$	0.00						
Travel Time Savings, Mil PV\$	5.35						
Other Benefits, Mil PV\$	0.00						
Total Costs, Mil PV\$	0.79						
Design & Construction Costs, Mil PV\$	0.79						
Land Acquisition Costs, Mil PV\$	0.00						
Custom Costs, Mil PV\$	0.00						
Benefit-Cost Ratio	7.67						

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. This analysis considers only the direct benefits and direct costs associated with a project, according to the FWHA 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.



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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.



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