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Benefit-Cost Analysis for Transportation Planning and Public Policy: Towards Multimodal Demand Modeling

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Failure to account for multimodal considerations and induced demand in transportation-related benefit cost analyses can lead to biased results.

Benefit-cost analysis (BCA) is widely used in transportation planning and programming. This report examines existing methods of BCA in two areas – retrospective transportation policy analysis and prospective transportation planning – and suggests ways of modifying these methods to account for travel within a multimodal system. A major focus is on presenting recommendations to the California Department of Transportation (Caltrans), although other state DOT agencies will find the results of interest.

Study Methods

The research team conducted two parallel analyses. The first examines BCA for retrospective public policy analysis focused on 23 rail transit systems in the U.S. while the second analyzes prospective BCA used for transportation planning purposes. Each analysis begins with describing the context-specific approach to BCA and some of its limitations along with a discussion of the role of travel demand modeling, an essential component of BCA for transportation. Through an assessment of past investments in rail transit across the U.S., this research provides an example of how simple it can be to account for multimodal travel in BCA, and that doing so can significantly affect the conclusions of the analysis. Following a review of BCA models used by Caltrans for planning purposes, and interviews with professionals at the USDOT, state DOTs, and transportation agencies across the country, the authors identify powerful new approaches for advancing BCA practice at the state level.

Findings

Findings on this study of BCA methods for both retrospective transportation policy analysis and prospective transportation planning point to a number of biases that result from a failure to account for multimodal considerations and induced demand. Despite the fact that Caltrans has supported the development of a detailed set of spreadsheet-based BCA models (e.g. Cal-B/C) as well as the development of one of the most advanced statewide travel demand models (TDMs), the institutionalized process for BCA is unimodal when evaluating highway and road investments. Additionally, induced demand effects are routinely ignored when calculating traffic estimates with and without infrastructure projects. A simple adjustment to average daily traffic entry in the Cal-B/C model, which can be calibrated using congestion data and estimates from the existing literature, might enable a low-cost method of incorporating induced-demand into routine benefit-cost analysis.

Policy Recommendations

This research identifies several likely areas of improvement, falling into two categories: (1) changes to the primary BCA model used by Caltrans (Cal-B/C), and (2) better integration of BCA and travel demand modeling.

Modifications to Cal-B/C

- Add an induced-demand function to the Cal-B/C model;
- Encourage multimodal modeling and providing the support needed to carry it out.

Better integration of BCA and travel demand modeling

- Use the statewide travel demand model (TDM) to ensure demand is best accounted for in the Cal-B/C spreadsheet model;
- Develop a BCA post-processor that can fully utilize the rich multimodal, geographic, and sociodemographic data available from activity-based TDMs.

In addition to modeling suggestions, the report also suggests ways Caltrans may be able to better manage for multimodal system modeling:

- Consider formal and informal structure changes, up to and including mergers between offices and branches, so that intra-agency collaboration is increased.
- Rethink relationships with external partners, including consultants and universities, to leverage outside expertise while ensuring that internal expertise is also adequate to the tasks at hand.

About the Authors

Matthew J. Holian, PhD, is an Associate Professor at San José State University in the Economics Department. He is also a research associate at MTI, and he currently teaches Introduction to Transportation Funding and Finance in the Transportation Management Masters degree program, which is supported by MTI at SJSU. He comple`ted his PhD in Economics in 2008 at Ohio State University, and his recent scholarly work has appeared in publications such as Journal of the Association of Environmental and Resource Economists and Ecological Economics.

To Learn More

For more details about the study, download the full report at ***transweb.sjsu.edu/project/1203.html***

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