



## 0-6759: Developing a Business Process and Logical Model to Support a Tour-Based Travel Demand Model Design for TxDOT

### Background

The Texas Department of Transportation (TxDOT) created a standardized trip-based modeling approach for travel demand modeling called the Texas Package Suite of Travel Demand Models (referred to as the Texas Package) to oversee the travel demand model development and implementation for most of the urban areas in Texas. TxDOT's existing trip-based modeling approach for travel demand forecasting is adequate to examine most large-scale, regionally significant, highway capacity-added projects and to provide output usable for the air quality analysis required for areas designated as non-attainment and maintenance areas.

However, this approach requires substantial post-processing and/or is unable to provide output for decision makers on other types of transportation improvement projects being explored. The Texas Package does not currently include the advanced-practice behavioral analysis techniques to examine some specific policy- and behavioral-response questions. This research considers a business case for a tour-based travel demand model system using formal documentation from TxDOT's Technological Services Division (TSD).

### What the Researchers Did

The researchers conducted a case study to:

- Identify the practical benefits and advantages of implementing a tour-based modeling framework.

- Evaluate the feasibility of the steps required to implement a tour-based modeling process in Texas.

The researchers outlined various design options for implementing behavioral-based analysis techniques, considering the TxDOT modeling context, data availability, and organizational constraints. This evaluation was based on the TxDOT-funded Report 0-6210-2, *Tour-Based Model Development for TxDOT: Evaluation and Transition Steps*. In this document, the short-term recommendation is called "Design Option #1," a tour-based model system that incorporates advanced-practice technical procedures with no recognition of interactions among tours (that is, a simple tour-based model system).

The researchers developed a business process model and a logical data model. The *business process model* developed graphically validates the assertion that Design Option #1 is achievable with data sources readily available to TxDOT and metropolitan planning organizations (MPOs).

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#### Project Completed:

8-31-2013

The land use, transportation network, and system performance data require no or very little additional processing beyond that already occurring under the trip-based approach. The travel survey data do require additional processing to form tours from trips recorded in the travel diary. The business process model also demonstrates how main components of the tour-based model can be directly interfaced as an additional module option within the Texas Package.

The *logical data model* includes all data sources required for input into the tour-based and trip-based model components and provides the foundation for further system development. The logical data model can be exported to a physical data model based on TxDOT's requirements for further database development. To comply with TxDOT data architecture standards, the logical data model includes a data dictionary, which describes the entities and attributes contained within the logical data model.

### What They Found

To minimize changes to data collection and inputs, the tour-based approach is only applicable to the procedures to calibrate and apply the model. Under the current implementation, no changes would be necessary to either data collection efforts (counts and surveys) or model inputs development (demographics and networks). From an organizational perspective, efforts that improve planning decision making are supported by the federal transportation funding reauthorization. The estimated cost of developing and

implementing a tour-based model can reach \$1 million; however, the benefits for the community in terms of more accurate policy evaluation—and fund allocation—can surpass this figure very quickly. From a communications perspective, the technical professional audience is assumed to be the same as it is now: TxDOT and MPO staff, on-call academic support staff from in-state research institutions, and consultant contractors.

### What This Means

Tour-based modeling meets state-level contextual considerations. In particular, the development and implementation of a tour-based modeling approach in Texas fulfills the statutory requirements and aligns with the state's strategic plan. The greatest impacts are anticipated on the human side and not on the technical side as staff adjust to a new modeling approach over the current, familiar Texas Package. The impact to technology resources, specifically to TxDOT TSD, is considered minimal. Finally, business outcomes are realistic and achievable, presented with goals for outcome evaluation. The highest risks are likely to be funding availability and perceived value by decision makers and stakeholders.

This business case also documents the existing process flow, the proposed flow, the business process model, and the logical data model, providing an opportunity to assess technical issues and data input considerations. This project supports the TxDOT decision-making process for the transition to a tour-based model and facilitates future model implementation.

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Keyword: Research