CENTER FOR TRANSPORTATION RESEARCH

PROJECT SUMMARY

Texas Department of Transportation

0-7065: Develop Innovative Financing Mechanisms in a Fast-Changing Texas Transportation Landscape

Background

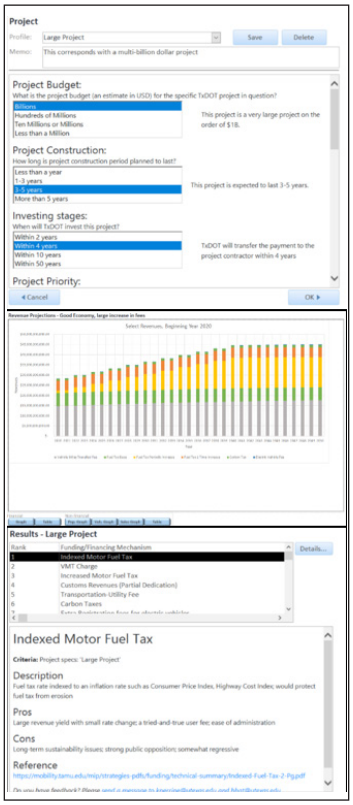
Over time, traditional funding revenues from state and federal gas tax have become insufficient due to the increasing transportation needs of the state's growing population, the decreasing purchasing power due to inflation, and increasing fuel efficiency. Texas Department of Transportation (TxDOT) revenue sources currently include taxes (fuel, sales, oil and gas production, etc.), driver and vehicle fees (registration, inspection, permission, etc.), and tolling. The financing tools available to TxDOT include bond programs and public/private partnership arrangements. However, CTR researchers predict that in 2032, TxDOT will have a budget shortage.

To address funding shortages, this research project determined new methods to develop and implement financing tools that would allow TxDOT to advance transportation projects more quickly. The main research objectives include: 1) developing an inventory of alternative funding and financing mechanisms to meet TxDOT's funding needs, 2) designing a decision-making framework that evaluates the mechanisms under different transportation project contexts, and 3) developing a computer application tool to assist TxDOT and policymakers in making transportation funding decisions.

What the Researchers Did

To achieve the project objectives, in the first task, CTR researchers reviewed the literature and revenue sources catalogs of several departments of transportation (DOTs) across the U.S. and developed a list of suitable financing alternatives, identifying the pros, cons, and details of each mechanism. Then the researchers determined a set of parameters for each financing mechanism to translate the verbal description of its characteristics into quantitative parameters. Each financing mechanism was evaluated based on:

- Revenue stream considerations, including predictability, stability, sustainability, and revenue potential criteria.
- Implementation and administration considerations, including current use status, ease of implementation, ability to enforce, and public acceptance criteria.
- Economic efficiency considerations, including the promotion of an "efficient use" criterion.
- Equity considerations, including user and social equity criteria.



The second task involved developing a mathematical framework to evaluate the appropriateness of financing mechanisms based on specific project criteria. This framework drives the Appropriateness module in the RESPONSE & CHOICE database—an Access-based application developed in this project to support TxDOT's selection of funding mechanisms for specific projects. Using that framework, RESPONSE & CHOICE ranks funding and financing mechanisms based on characteristics of a hypothetical project as provided through a series of questions. The mecha-

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nism that produces the rankings is facilitated through an algorithm called the Analytic Hierarchy Process (AHP). The researchers designed two questionnaires and an expert panel survey to elicit subject matter expert experience to calibrate the AHP decision matrices. In addition to exploring the appropriateness of mechanisms, a revenue projection framework was designed to test the outcomes of different financing plans and policies over varying analysis periods.

What They Found

A thorough review of best practices revealed that departments of transportation do not usually have systematic decision-making rules to select revenue sources and develop financing plans for a transportation project. Financing mechanisms are not always customized to project characteristics and goals. One notable outlier in this regard is the Indiana DOT's Excel-based revenue cost model, which provides thorough projections of various funding mechanisms and allows testing of different policies and future scenarios.

In investigating potential future revenue sources, the researchers found that several DOTs point to vehicle miles traveled and electric/hybrid vehicle fees as the most promising (out of the reviewed financing mechanisms).

Finally, the CTR research team concluded that a certain amount of subjectivity inevitably accompanies the selection of a financing mechanism to meet transportation infrastructure needs; DOTs sometimes are challenged to determine the most appropriate funding option. Appropriateness is a dynamic concept that is sensitive to an agency's preferences and the prevailing political and economic environment. Therefore, any application designed to support selection of a financing mechanism must be based on thorough and periodic interviews with subject matter experts to fine-tune the decision matrices. Many mechanisms are available, and accurately matching a mechanism to a specific scenario is challenging. However, establishing the project characteristics greatly helps to reveal the relative importance of the considered decision criteria.

What This Means

Political viability and public acceptance are some of the most influential criteria affecting the applicability of financing mechanisms. Consequently, the outcomes of this project are designed to provide an effective tool to better communicate to policymakers and the public the benefits of various funding/financing mechanisms. In particular, the RESPONSE & CHOICE database assists TxDOT in identifying mechanisms that may be well suited for a specific project, and produces cash flow diagrams and revenue projections for different proposed rates or fees. TxDOT personnel can also employ this tool for testing different policies "on the fly." The ability to test different scenarios based on the status of the state's economy or population, as well as the flexibility to predict mechanisms in the future based on current and expected trends in the economy/market, provides TxDOT with an agile framework to efficiently compare funding and financing plans and generate defensible choices.

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