

UTA research could help transportation agencies determine best toll price

December 4 2015



Sia Ardekani, professor of civil engineering at The University of Texas at Arlington. Credit: UT Arlington

The use of managed lanes could help traffic move more efficiently on North Texas highways if researchers at The University of Texas at

Arlington can determine a toll price that will encourage use without increasing congestion.

Managed lanes are toll lanes that are built parallel to free lanes, such as the North Tarrant Expressway along parts of Interstate 820 and State Highway 121 and 183, in Fort Worth.

Civil engineering Professor Siamak Ardekani and his doctoral student, Maryam Zabihi, are working with the North Central Texas Council of Governments through a \$40,000 project to determine the sensitivity of drivers to toll prices that would ensure that managed lanes are used efficiently and that traffic consistently travels at speeds of at least 50 mph, which is the benchmark set by NCTCOG.

The concept behind managed lanes is to facilitate more efficient use of available roadway capacity by balancing the demand for a roadway with its available capacity at any given time, NCTCOG Senior Program Manager Dan Lamers said.

Mahmut Yasar, a UTA associate professor of economics, will assist with economic analysis of the data.

"Using discrete choice or probability models to estimate the determinants of demand for managed lanes and obtain an optimal pricing scheme would be useful," Yasar said. "In particular, a dynamic pricing, where the users are charged depending on the price each is willing to pay for the managed lanes under current conditions, would lead to more efficient use of North Texas highways."

The issue is how much to charge drivers so that during peak periods, speed remains an attractive reason to use those lanes, Zabihi explained.

"If the charge is too little, too many drivers will use the toll lanes and

congestion will slow traffic. If the charge is too high, drivers will refuse to use the lanes and they will be underutilized and will not ease congestion."

Zabihi is using survey data provided by the Texas Department of Transportation that asked people how much they would be willing to pay based on different traffic scenarios.

In addition to this baseline data, the North Texas Tollway Authority is providing video data of traffic volumes at different times of day - peak, mid-peak, off-peak, weekends - that will provide data points for how many people use managed lanes. These data points will then indicate people's behavior in real conditions in contrast to the hypothetical situations in the survey.

From there, Zabihi will be able to make recommendations about what toll charges should be.

Another facet of this research is to make the toll prices dynamic so that drivers can be enticed to use managed lanes in response to changing conditions, like an accident that is slowing the free lanes.

"We have a lot of sensors monitoring traffic so as incidents occur, the price of the managed lanes can change. For instance, the toll could increase to maintain the 50 mph speed in the managed lanes, or it could decrease if congestion is causing slowdowns in the free lanes," Ardekani said. "This kind of verification has not been done anywhere in the country. A lot of this depends on drivers' sensitivity to price. This region is very different from New York, California or even Houston. Our research will provide good results here, but we hope it will be used as a guide elsewhere as well."

Lamers said that there is little data existing as to the observed behavior

of travelers regarding the elasticity of cost and travel demand.

"UTA's research effort will help NCTCOG understand the travelers' behavior allowing us to develop better roadway corridor planning models, " Lamers said.

This work is indicative of the type of research at UTA that can have an immediate, positive impact on our world, College of Engineering Dean Khosrow Behbehani said.

"Whether we like it or not, most of us use highways regularly and traffic is always a concern. If Dr. Ardekani and Ms. Zabihi can find ways to keep it moving smoothly and increase the efficient use of our roads, the benefits could be enormous," Behbehani said. "More efficient flow of vehicles on the road means a more efficient use of energy that is used for this purpose, leading to a more sustainable system of transportation. The innovation of this approach shows that our faculty are indeed leaders from a world-class institution."

Provided by University of Texas at Arlington

Citation: UTA research could help transportation agencies determine best toll price (2015, December 4) retrieved 17 July 2024 from <https://phys.org/news/2015-12-uta-agencies-toll-price.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.