Research Project: SP209B4N
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RESEARCH SUMMARY

DEVELOPMENT OF A FRAMEWORK FOR TRANSIT-ORIENTED DEVELOPMENT (TOD)

Problem

Transit-oriented development is a type of development that encourages public transit and a transit-friendly urban environment. In general TOD provides an environment where residents live within walking distance of one or more major transit stations and other amenities such as places to shop thanks to mixed and higher density land use patterns. In theory they can significantly reduce the need to drive, increase multimodal mobility, reduce air pollution and greenhouse gas emissions, and reduce long-term highway infrastructure needs.

When planning, designing, and assessing TODs, their impact on travel behavior, mobility and sustainability should be considered and incorporated into the decision-making process. However, there currently are no guidelines on how to successfully develop TODs or standard tools for TOD evaluation in Maryland.

Objective

The objective of this project was to perform a comprehensive analysis of TODs in the Washington D.C. and Baltimore metropolitan areas, and to investigate if they reduce automobile travel and encourage transit as well as walking and bicycling. A better understanding of these issues will lead to improved guidance and tools for decision makers.

Description

The research team developed statistical models to analyze the relationship between TOD, land use development patterns, and travel behavior, including the amount of driving or vehicle miles traveled (VMT), trip generation, trip lengths, and mode choice (at household and trip levels), in the Washington D.C. and Baltimore metropolitan areas based on observed data. These models employ different statistical methods, including comparative analysis, hypothesis testing, multiple regression, fixed and random effect methods and environmental impact analysis.

In order to estimate the models, a number of data sources were used including the most recent Household Travel Survey data, land-use data with geocoded population and employment information at the Transportation Analysis Zone (TAZ) level, geocoded rail and bus transit station data, Census block and TAZ shapefiles, and the Maryland Statewide Transportation Model (MSTM). The research team also developed several innovative data processing, geo-coding, merging, and enhancement tools to combine the aforementioned datasets for this research project.

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Results

The findings from two in-depth case studies and statistical models covering the whole study area are consistent, and show that TOD land-use planning is associated with an overall lower level of household VMT, increased transit ridership, and reduced traffic congestion and environmental impacts. The VMT model shows that after controlling for several land-use factors, living in TOD areas results in an additional 20 percent reduction in VMT in the Washington D.C. metropolitan area and an additional 21 percent reduction in Baltimore.

These VMT reduction percentages appear to be high, which may be because the models were estimated without controlling for possible self-selection effects. The self-selection effect is a highly debated issue in land use and transportation-related research areas. Reduction in auto ownership and VMT and increased transit ridership in TOD areas could be in part because those who are in favor of non-motorized travel choose to move to TOD areas where they can easily access transit. However, it is yet to be determined how large the effect of self-selection is and what methods can be used to measure this effect. In this analysis, the research team did not capture the self-selection effect due to data limitations. However, socio-demographic variables were included in the models to partially address this issue.

In summary, the research team believes that programs and policies that are effective at reducing VMT, encouraging transit use, and consequently reducing congestion and pollution in urban areas such as TOD, should be strengthened. Future research may examine issues such as appropriate parking supply in TODs, built-environment factors that make certain TODs more successful than others, and implementation of the TOD analysis framework developed in this research project.

With an improved understanding on the relative effectiveness of different policy tools in improving transit ridership and reducing congestion and emissions, policy and decision makers will be able to allocate resources more appropriately and efficiently toward the ultimate goal of making urban areas more sustainable, livable, and economically viable for all residents and businesses. As a result of this study, SHA will also be able to incorporate the effect of TOD on a transportation system into the trip generation, distribution and model choice steps of the Maryland Statewide Transportation Model.

Report Information

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Link to Full Report: http://www.roads.maryland.gov/OPR_Research/MD-13-SP209B4N-Development-of-a-Framework-for-Transit-Oriented-Development_Report.pdf