MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

RESEARCH SUMMARY

EVALUATING THE EFFECT OF COMPLETE STREETS ON MODE CHOICE, A CASE STUDY IN THE BALTIMORE WASHINGTON AREA

OCTOBER, 2021

WHAT WAS THE NEED?

The Complete Streets (CS) concept has increasingly been adopted by urban and transportation planning agencies to strengthen the balance between safety and mobility of all roadway users by developing context sensitive solutions that support pedestrian, bicycle, ADA and transit accessibility. The benefits and success of CS projects depend on future demand for alternative modes to automobiles and on the development of compact, residential/commercial, multi-modal urban neighborhoods. However, existing capabilities in the modeling tool-box of the MDOT SHA are not sensitive to changes in built environment and do not capture shifts in demand for modes such as walking and cycling in response to road infrastructure projects (such as Complete Streets).

WHAT WAS THE GOAL?

The goal of this project is to enhance regional travel demand modeling capability of MDOT SHA by developing data-driven mode choice models that incorporate bicycling and walking so that impacts of CS projects and plans can be forecasted.

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WHAT DID THE RESEARCH TEAM DO?

A Stated Choice Experiment (SCE) in which respondents are asked to evaluate different alternatives characterized by attributes related to trips made in a CS context is completed. The data was used to estimate discrete choice models to explain the preferences for cycling and walking modes in a CS context. Considering the implementation of the model in MSTM, we estimated a series of models for each combination of purpose and income bracket. We calculated both direct and cross elasticities from the coefficients obtained. We utilized elasticities to update motorized share input in MSTM. The Level of Traffic Stress (LTS) was approximately estimated. We developed an Excel spreadsheet tool to update the motorized share table by incorporating the computed elasticities of the LTS variable. We then tested elasticity estimate results and the Excel spread-sheet tool on two hypothetical scenarios.

WHAT WAS THE OUTCOME?

This project collected data and developed a method and tool to update the percentage of motorized trips input to the MSTM as an external module, for analysis at regional level. It is ready for use. The scenario results demonstrated that the methods and tools we developed are successfully reflecting the potential impacts of CS within a statewide transportation model, i.e., MSTM, albeit requiring further refinement and validation. Thus, future work should include the validation of the models and tools we developed. Based on our analysis of MSTM, and discussions with MDOT SHA TFAD team, the method can be used to update non-motorized share input to MSTM 1.5 Level 1 and make the model sensitive to non-motorized modes.

HOW WILL SHA USE THE RESULTS?

The goal of this project was to enhance regional travel demand modeling capability of MDOT SHA by developing data-driven mode choice models that incorporate bicycling, walking, transit and multi-modal connections among these modes so that impacts of Complete Street projects and plans can be forecasted in the future. The project successfully estimated modal shares on Complete Streets based on different Levels of Traffic Stress for Bike and Walk alternatives based on behavioral data exclusively collected for this project. This is a fundamental step in understanding travel behavior on Complete Streets which will need further data collection, model estimation, validation and application to real case studies.

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