

Developing a Comprehensive Mode Choice Model to Capture the Preferences for Mass Rapid Transit in Dhaka

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Dhaka, the capital city of Bangladesh and the home of 15 million people, is subjected to acute traffic congestion on a regular basis resulting in lost productivity, fuel wastage, commuter frustration and environmental degradation. The city is perhaps the only megacity with no well organized public transport system and one of the very few ones without Mass Rapid Transit (MRT). In Strategic Transport Plan for Dhaka (STP, 2005) recommendations have been made to launch new MRT systems like Bus Rapid Transit (BRT) and Metro in order to strengthen the public transport system of the city. Planning of these new systems warrants comprehensive mode choice models that can help in quantifying the relative importance of attributes, determining the Value of Time (VOT) for cost-benefit analysis, predicting ridership, etc. The existing models however do not account for the deficiencies of existing data like missing choice sets, measurement errors in the level of service (LOS) data, lack of information regarding the new modes etc. and can lead to incorrect travel demand predictions.

This has prompted the current research where Stated Preference (SP) data has been collected to capture the preference for proposed new alternatives (MRT), methodologies have been developed to address the other limitations of the existing data and a comprehensive mode choice model has been developed combining Revealed Preference (RP) and SP data.

In the SP survey conducted in the research, respondents have been presented with choice scenarios that included BRT and Metro alongside their current modes. Different levels of three attributes (travel time, travel cost and waiting time or frequency) were used to describe the new alternatives. The attributes and associated levels were selected as the most important attributes as perceived by the respondents on the basis of the findings of an initial survey.

To address the unobserved choice sets of the respondents in the available RP data a choice set generation model has been developed using SP data. The estimated parameters of the developed model have been used to predict the choice sets of the respondents in the RP data probabilistically. Regression analysis has been done to address the measurement errors of the travel time derived from network analysis

Discrete choice models have been developed using the corrected RP data and the collected SP data and the coefficients of the utility parameters have been estimated using a maximum likelihood approach. The observed taste heterogeneity of the respondents have been taken into account by the introduction of socio-economic variables like income, age, gender, occupation, employment, etc into the model and market segmentation tests have also been performed. The VOT values from the combined model are more plausible compared to the values obtained from previous choice models as well as the disjoint RP and SP models. Further, the methodologies proposed in the current research can be useful tool for transport related analysis in other developing countries facing similar data issues.

Key words: Mass Rapid Transit, Mode Choice

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