

Guest Editorial

RECENT ADVANCES IN TRAVEL CHOICE BEHAVIOR MODELING

HONG K. LO¹ AND WILLIAM H.K. LAM²

This special issue “Travel Choice Behavior Modeling” is organized based on selected papers presented at the International Association of Travel Behavior Research (IATBR) in Kyoto, Japan, 2006. Great strides have been made recently in travel choice behavior modeling (Bovy and Fiorenzo-Catalano, 2007; Beale and Bonsall, 2007; Chorus et al., 2007; Han et al., 2007; Kim et al., 2007; Tsirimpa et al., 2007). New approaches have been developed to augment and improve existing ones or to seek new modeling paradigms (Bonsall, 2004; Senbil and Kitamura, 2004; Jou et al., 2008; Arentze and Timmermans, 2007). It is timely to take inventory of what we have so far and provide a preview of what lies ahead. Travel involves choices of destination, departure time, mode, and route. Typically, travelers face a large set of alternatives, often with imperfect information about them. How to generate reasonable alternatives and therefore avoid burdening the modeling effort with unnecessary ones; how to develop and include new explanatory variables beyond the traditional socio-economic ones, such as the influence of travel information, marketing, etc; how to take advantages of revealed preference (RP) and stated preference (SP) surveys to improve the accuracy of travel choice models; and how to consider correlated choices in the presence of taste heterogeneity, etc are just some examples of recent advancements. This special issue is aimed to cover some recent methodological advances in travel choice behavior modeling. Five papers are collected in this special issue, as summarized below.

Defining the choice sets appropriately is important for analyzing choice behavior, estimating parameters of choice models, or predicting choice probabilities. This, however, is not a simple task. The paper by Van Nes, Hoogendoorn-Lanser and Koppelman investigates the relationship between the type of choice set and the purpose of the analysis, for estimation or prediction. The authors differentiate choice sets as being “objective” (generated) or “subjective” (observed). The study concludes that for estimation purposes, observed subjective choice sets are preferable; on the other hand, generated objective choice sets appear to be most suitable for prediction purposes.

The paper by Sakano and Benjamin incorporates both RP and SP data in the structural equations model to analyze activity-based travel behavior. The model is then applied to examine the relationship between activities and mode choice for the Puget Sound Regional Council in Seattle, USA. The study finds that the attitude toward comfort of travel, car requirement for job, and travel time are significant predictors for the mode choice decision. The authors conclude that the RP-SP model can help improve the fit of the model over the RP-alone model and that the model developed can be extended to the analysis of more complex decision-making processes involving more detailed information on modes, activities, and times.

Despite substantial recent efforts in improving route choice models, few of them are integrated into traffic assignment studies. The paper by Bekhor, Toledo, and Prashker

¹ Department of Civil Engineering, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong SAR, P.R. China. Guest editor (E-mail: cehklo@ust.hk).

² Department of Civil and Structural Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong SAR, P.R. China. Guest editor (E-mail: cehklam@polyu.edu.hk).

discusses the implementation of some selected route choice models in path-based stochastic user equilibrium algorithms. The paper analyzes the effects of the size of the choice set and selected choice models on solution convergence and run-time, and the resultant flow pattern. The results indicate that for large networks, generation of a large number of alternative routes is necessary for solution convergence and stability. Furthermore, convergence improves substantially if the generated routes are sufficiently disjointed.

The paper by Tam, Lam and Lo investigates the ground transport choices to the airport for departing air passengers. The authors contend that departing air passengers would allow for some extra time, in addition to the predicted travel time to the airport, or a “safety margin”, in order to increase the probability of arriving at the airport on time. With the use of revealed preference survey data collected at the Hong Kong International Airport (HKIA), the effects of this safety margin on ground access mode choices are quantified by a multinomial logit-type mode choice model. The model results indicate that business travelers place a significantly higher value on both travel time and safety margin for their ground access to the HKIA. The findings provide valuable information for ground transport operators to improve their services planning.

Among travel choices, the more common ones involve mode choice, departure time choice and route choice. The paper by Bajwa, Bekhor, Kuwahara, and Chung focuses on the mode and departure time choice processes and studies different specifications for combined mode and departure time choice models. The paper compares different explanatory variables and different model structures to capture the correlation among alternatives and taste variations among the commuters. The results indicate that accounting for random taste heterogeneity and inter-alternative correlation improves the model performance.

The papers published in this special issue are by no means exhaustive. However, we trust that they do provide timely reviews of recent methodological advances in travel choice behavior modeling. It is our hope that this Special Issue will inspire and stimulate new research initiatives and efforts in this still evolving field.

REFERENCES

- Arentze, T. and Timmermans, H. (2007) Parametric action decision trees: incorporating continuous attribute variables into rule-based models of discrete choice. *Transportation Research Part B*, 41, 772-783.
- Beale, J.R. and Bonsall, P.W. (2007) Marketing in the bus industry: a psychological interpretation of some attitudinal and behavioural outcomes. *Transportation Research Part F*, 10, 271-287.
- Bonsall, P. (2004) Traveller behavior: decision-making in an unpredictable world. *ITS Journal*, 8, 45-60.
- Bovy, P.H.L. and Fiorenzo-Catalano, S. (2007) Stochastic route choice set generation: behavioral and probabilistic foundations. *Transportmetrica*, 3, 173-189.
- Chorus, C.G., Arentze, T.A., Timmermans, H.J., Molin, E.J. and Van Wee, B. (2007) Travelers' need for information in traffic and transit: results from a web survey. *Journal of Intelligent Transportation Systems*, 11, 57-67.
- Han, Q., Dellaert, B., van Raaij, F. and Timmermans, H. (2007) Modelling strategic behaviour in anticipation of congestion. *Transportmetrica*, 3, 119-138.

- Jou, R.C., Lam, S.H., Kuo, C.W. and Chen, C.C. (2008) The asymmetric effects of service quality on passengers' choice of carriers for international air travel. *Journal of Advanced Transportation*, 42, 179-208.
- Kim, S., Ulfarsson, G.F. and Hennessy, J.T. (2007) Analysis of light rail rider travel behavior: impacts of individual, built environment, and crime characteristics on transit access. *Transportation Research Part A*, 41, 511-522.
- Senbil, M. and Kitamura, R. (2004) Reference points in commuter departure time choice: a prospect theoretic test of alternative decision frames. *ITS Journal*, 8, 19-31.
- Tsirimpa, A., Polydoropoulou, A. and Antoniou, C. (2007) Development of a mixed multi-nomial logit model to capture the impact of information systems on travelers' switching behavior. *Journal of Intelligent Transportation Systems*, 11, 79-89.