

Choice of multimodal travel modes: Does personality matter?

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Contemporary travel behavior analysis, especially discrete choice models that aim to capture human behavior regarding travel mode options focus more on behavioral, attitudinal aspects of the individuals as a means to further explore and explain their choices and behavior. Analyzing and explaining travel behavior towards multimodal options for passengers is a timely topic, considering the current situation in CO₂ emissions globally and the initiatives taking place from various international and national organizations to mitigate the risks and the external cost of transportation. Multimodal travel modes are considered a viable alternative to using private, motorized modes of transport. This paper presents a behavioral analysis and models choices of multimodal transport. It uses personality traits, as latent variables, to further explore the choices of individuals. The research presented is conducted in the context of OPTIMUM, a H2020, EU-funded project that delivers a multimodal, optimal journey planner with tailor-made user recommendations and a credit-based reward system.

A multimodal survey was designed and distributed to cover the following topics: socio-demographics, respondents' commute habits (typical trip purpose, usual transport mode, personal and work constraints), while psychometric questions are asked to identify the respondents' attitudes and perceptions towards transport

modes, environment and general lifestyle. The core of the survey is the last part where the respondents are presented with Stated Preference (SP) scenarios which are used to model the individuals' transport mode decision-making depending on several multimodal attributes (time and cost).

The behavioral model provides certain information about the users, which is helpful for the application to suggest the optimal mode and route to the user. The behavioral model is built on data collected through the web-based OPTIMUM Multimodal survey. This data includes socio-demographic and measured attitudinal data that are used to classify users into different groups with different choices and travel patterns. In addition, Stated Preference experiments are designed where travel time and cost form the attributes to affect the user decision on the multimodal choices. The model, through a Latent Variable modelling framework, models individuals' choices in terms of probabilities for choosing a certain multimodal alternative. The model results are presented and the effect of five different latent variables on the final choice is revealed. The model estimates indicate the statistical significance of the included latent variables, while the values of the estimated coefficients are as expected

A total 1096 Stated Preference answers were collected from May to November 2017. The collected sample was approximately evenly distributed between the gender categories (50.9% of female and 49.1% of male), while the average age of the respondents was 37.2 years old. Our sample mostly gathered people who hold graduate or post-graduate degree (56.2% of total), are full time employed (62.4% of total) and own a car (76.6% of total). In addition, most of the respondents (about 69% of total respondents) chose the trip to work as their typical trip, while leisure and family care trips were indicated as typical trips by 11.3% and 6% of the respondents respectively.

The paper utilizes a hybrid choice model, with latent variables exploring the effect of personality type on the choice of multimodal travel modes. The final version

of the model contains four latent variables, measured by the psychometric questions related to the respondents' personality type and self-assessment questions.