

Master Thesis Topic

Mode choice modeling to and from Munich Airport: the case study on Urban Air Mobility

Background

Urban Air Mobility (UAM) is a recent concept aiming to improve accessibility to and from traffic hot-spots in and around the metropolitan area of Munich. Prior to the introduction of UAM, a thorough analysis of the demand should be conducted, to quantify the potential of this novel transportation mode as well as its ability to compete with other existing modes of transport.

In the framework of "[AMI-AirShuttle](#)", the Chair of Transportations Systems Engineering (TSE) and its partners are analyzing and evaluating the necessary requirements and solutions for the integration of electric vertical take-off and landing aircraft (eVTOL) into the infrastructure of commercial airports, focusing on the airport of Munich. The partners are aiming for a seamless travel chain in which eVTOL shuttles are involved in, while at the same time catering to user requirements and public acceptance. The goal of this master thesis would be to **explore the transportation mode preferences of travelers** between traffic hotspots in Bavaria (or in the metropolitan area of Munich) and the airport of Munich. The student will possibly be involved in two steps; to **collect and analyze data** and to **develop mode choice models**.

Methodology

To survey the preferences of travelers, multiple factors such as the travel cost, travel time, safety, comfort, number of transfers, waiting time, availability, etc. of eVTOL vehicles and conventional modes of transport are being considered in a survey, which has already been designed by TSE. The prospective student is expected to:

- Disseminate the survey through multiple channels (websites, social media, flyers, etc.) and collect responses
- Analyze the collected data and present interesting insights
- Develop mode choice models

During data analysis and model development, the master student can investigate several research questions and apply innovative methodologies. In particular, the AMI-AirShuttle project aims to explore **new methods in discrete choice modeling** and in **artificial neural networks or decision trees or cluster analysis**, in order to compare the results to established **multinomial logit models**.

Results

This master thesis will result in a mode choice model including conventional modes of transport and urban air mobility to determine the factors that influence the future travel behavior of travelers.

Expected key skills

1. Fluency in English, good communication skills in German will be highly appreciated but are not necessary.
2. Willingness to collect data and work independently over a period of 6 months.
3. Completed the course “Discrete Choice Methods for Transportation Systems Analysis” at TUM or similar.
4. Previous experiences with discrete choice modeling tools such as Biogeme, Apollo R or similar will help.

Preliminary work

Fu, M., Rothfeld, R., & Antoniou, C. (2019). Exploring Preferences for Transportation Modes in an Urban Air Mobility Environment: Munich Case Study. *Transportation Research Record: Journal of the Transportation Research Board*, 2673(10), 427-442

Ploetner, K. O., Al Haddad, C., Antoniou, C., Frank, F., Fu, M., Kabel, S., Llorca, C., Moeckel, R., Moreno, A. T., Pukhova, A., Rothfeld, R., Shamiyeh, M., Straubinger, A., Wagner, H., & Zhang, Q. (2020). Long-term application potential of urban air mobility complementing public transport: An upper Bavaria example. *CEAS Aeronautical Journal*, 11(4), 991–1007.

Al Haddad, C., Chaniotakis, M., Straubinger, A., Plötner, K., & Antoniou, C. (2020). Factors affecting the adoption and use of urban air mobility. *Transportation Research Part A Policy and Practice*, 132, 696-712.

For more information about AMI-AirShuttle, please check:

<https://www.mos.ed.tum.de/en/vvs/research/projects/ami-airshuttle/>

Starting date

In November 2022 or later

How to apply:

Interested applicants should contact Filippou Adamidis (filippou.adamidis@tum.de) and Hao Wu (wu.hao@tum.de) by sending an email including a short explanation (max. 100 words) of why you are interested in this thesis topic and your starting date.