Mode Choice Effects on Bike Sharing Systems

Matthias Kowald, Margarita Gutjar, Kai Röth, Christian Schiller and Till Dannewald
Department of Architecture and Civil Engineering, RheinMain University of Applied Sciences, Wiesbaden (DE)

Background

- Increasing number of bike-sharing systems (BSS)
- Lack of parameters for BSS-related attributes (e.g. price, travel time)
- BSS are not implemented in transport demand models
- No knowledge about the potential of BSS to reduce the use private motorized transport (PMT), e.g. vehicles

Methods

**Data & Sample**

**Stated mode choices**
- Fieldwork: Sep 21 - Feb 22
- Paper-and-pencil questionnaire
- Respondents:
  - 18 years and older
  - BSS-users and non-users
  - owning a driver’s license
  - BSS-users and non-users
  - living in the supply area of the transport association Rhine-Neckar (VRN)
- Incentive: EUR 20

**Fieldwork**

- Recruiting
  - BSS-users: smartphone app
  - BSS-non-users: telephone call
- Collection of (semi-)RP data
  - BSS-users: BSS: last route by BS traced in a CATI, PMT: online routing provider, PT: online schedule
  - BSS-non-users: aggregated figures; BSS: CATI survey, PMT & PT: secondary data (PMT, PT)
- Variation of (semi-)RP data
  - by experimental design
  - Sending questionnaire

**220 respondents 2184 choices**

**Multinomial Logit Model**

Fig. 1. Marginal utility for mode-specific attributes

Fig. 2. Mode-specific marginal utility by demographics

Fig. 3. Mode-specific marginal utility by age

Results

Mode-specific attributes:

- Negative effect for travel time, even stronger for access & egress time for all modes (BS, PMT, and PT)
- Negative effects for costs, while stronger for bike rental prices and PT tickets than for PMT fuel or parking costs
- For BSS, cycleway and asphalt are most preferred
- Higher capacity utilization decreases the utility of PT

With reference to BSS:

- PMT: is more preferred by females, if car available always, in winter, at age 64 and older; less preferred by BS-users, with PT season ticket, for mandatory trips, by people younger than 64
- PT: is more preferred in winter, with PT season ticket, at age 55 & older; less preferred by people younger than 55

Outlook

- Estimating more sophisticated model
- Implementing BSS-parameters into a regional transport demand model

Acknowledgment

This project (KA-No. 1013/21-15) is funded by the state of Hessian and the House of Logistics (HOLM) within the program “Innovations in logistics and mobility” of the Hessian Ministry for Economic Affairs, Energy, Transport and Housing.

Contacts

Matthias Kowald
Tel.: 0049 611 9495 1949
m.kowald@hs-rm.de

Margarita Gutjar
Tel.: 0049 611 9495 1933
margarita.gutjar@hs-rm.de

Publications


https://doi.org/10.3390/app12094391