

Symposium: The Psychology of Sustainable Mobility

Satisfaction with Different Travel Modes

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Introduction

In order to achieve sustainable mobility, knowledge about how users evaluate different travel modes is essential. Specifically, what attributes of travel modes are evaluated positively, and what attributes are evaluated negatively by different users? These attributes are also important determinants of travel mode choice. Beside the factors investigated in the past, such as travel time and costs, this session shows that psychological variables also have important influence on the single and joint evaluations of travel modes. In particular, affective attributes and outcomes of travel mode choice like satisfaction with travel or loyalty are new topics besides the traditional ones like behavioral intentions associated with new services or mobility strategies in general.

The *first presentation* shows that these “new” attributes used by transport planners (beyond time, cost and reliability) are influencing satisfaction with travel mode. A survey of 123 university students investigated how car users evaluated different attributes when choosing the car or bus for their regular commute to the university. These attributes influenced satisfaction with travel (measured using the Satisfaction with Travel Scale – STS) as well as the feeling component of daily subjective well-being.

The *second presentation* focuses on longer regional and national trips where trains are a relevant sustainable alternative to the private car. Due to major infrastructure

investments in Northern Sweden, a new attractive train connection has been established. Before the opening of this new line a survey was conducted (N=1283) with residents asking for their expectations, beliefs about and formed intentions associated with the train service. A structural equation model was fitted to the data.

In the *third presentation* psychological variables such as the emotional value of a transport mode are measured and incorporated into modal split forecasting models. It was found that the loyalty mechanism sheds light on travelers’ mode choice behavior. Data from 505 passenger survey responses among rail and bus users showed that loyalty towards rail-based transport is stronger than towards bus.

Mobility strategies of families in rural areas with special regard to parental division of work are the focus of the *fourth presentation*. A secondary data analysis of a large nationwide household survey is combined with qualitative interviews of families asking for their current and future mobility strategies.

The session finishes with the *fifth presentation* that reports on a psychometric analysis of the Satisfaction with Travel Scale (STS) that can be used to compare satisfaction with travel for different travel modes. The results of a survey of 996 commuters in three urban areas of Sweden show that the measure is reliable and that the factor structure of the measure is stable across different user groups.

Presentation 1: Perceived Attributes of Bus and Car Influencing Satisfaction with the Work Commute

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Successful car-use reduction depends on individual changes of travel, in particular that car users switch to more environmentally friendly travel modes. Improvements of public transport services are also needed which raises the question of what improvements of public transport services are attractive to car users such that they change their travel. Previous research has disentangled several factors that make public transport attractive such as; access to bus stops, wait time, trip length, frequency of service and seat availability (Hensher et al., 2003). Studies of frequent car users' experienced satisfaction with the use of public transport are virtually non-existent. It still remains to be investigated how car users' perceptions of the car differ from their perceptions of public transport in the context of making a choice of travel mode. Furthermore, mode-specific factors (see e.g. Stradling et al., 2004) also have a significant impact on individuals' mode choice. In the present study we ask what attributes car users take into account when choosing the car over the bus or the reverse for the work commute.

In a survey of 123 undergraduates the effect of different travel modes on satisfaction with travel, mood and subjective well-being were assessed by presenting scenarios with a forced choice of car or bus for a typical commute to and from work. In one of these conditions the participants were requested to choose car instead of bus and in the other to choose bus instead of car for a simulated work commute. Ratings of the travel modes were made on 12 nine-point scales. The Satisfaction with Travel Scale (STS) includes both affective and cognitive components related to daily travel. Affective items were assessed by 6 nine-point scales whereas cognitive items were assessed by 3

nine-point scales (Ettema et al., 2011). Satisfaction with the day was assessed by means of a modification of the Satisfaction with Life Scale (SWLS) (Diener et al., 1985).

In general car was rated higher than bus on satisfaction with travel. Compared to bus, the car is rated to be more fun, provide less exercise, be more flexible, be more secure, be faster, be more comfortable, be less polluting, and provide a better lifestyle match. Ratings of the attributes of fun, lifestyle match, and feeling secure, on which car surpassed bus, accounted for these mode differences in satisfaction with travel. It was also shown that satisfaction with travel partially mediated the effect of travel mode on mood.

The results showed as expected that car was rated different than bus on several other attributes than travel time and cost, including fun, exercise, flexibility, feeling secure, comfortable, polluting, and lifestyle match. It was further shown that car surpassed bus on satisfaction with travel (STS). Furthermore, all attribute ratings except exercise and polluting fully mediated the differences between travel modes on STS. Mood during the day was shown to be affected by travel mode. This effect was partially mediated by STS. In summary, the present research thus shows that not only time and cost are important for satisfaction with travel mode but also factors contributing to travel satisfaction and daily subjective well-being.

References

- Diener, E., Emmons, R. A., Larsen, R. J., and Griffen, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49, 71–75.
- Ettema, D., Gärling, T., Eriksson, L., Friman, M., Olsson, L. E., and Fujii, S. (2011). Satisfaction with travel and subjective well-being: Development and test of a measurement tool. *Transportation Research Part F*.
- Hensher, D. A., Stopher, P., and Bullock, P. (2003). Service quality – developing a service quality index in the provision of commercial bus contracts. *Transportation Research Part A*, 37, 499-517.
- Stradling, S. G., Noble, A., Carreno, M., Jeffrey, G., and Marshall I. (2004). *Eight reasons people don't like buses*. Paper presented at ICTTP 2004.

Presentation 2: Predicting Future Intention to Choose the Train: Attitudinal Influence and Socio-demographic Differences

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Introduction

In the work towards developing a sustainable transportation system one has to look at people's travel behavior and travel intentions. This study focuses on regional and national trips with train.

In this study train services are introduced to a region in which the train has previously not been an alternative. The aim of the study is: (1) to investigate if there is a hierarchical relations between basic values and general environmental beliefs, travel mode attitudes, beliefs about the specific infrastructure investment, and the intention to choose to travel by train in a region in which travel socialization foremost has resulted in car use (Nordlund et al., 2003; Baslington, 2008), and (2) to investigate whether there exists age cohort differences in the included attitudinal factors in such a model (Haustein et al, 2009; Hjorthol et al., 2010).

Method

A mail-back survey was distributed in the spring of 2010 to a sample (20 to 85 years) with a return rate of 36 percent (n = 1283).

Results

The proposed SEM model was supported in that 36% of the variance in expressed intention was explained by the proposed hierarchical stream of influence starting with general values, environmental awareness, and attitudes towards both car and train respectively as travel modes for longer trips,

and finally beliefs about the specific infrastructure investment at hand.

In addition age cohort differences existed. The age cohorts used in this study was the cohort young adults (age 20-29), adults (age 30-49), older adults (age 50-64), and older retirees (age 65-85). The results show that it was the young adults in working age cohort and older retirees' cohort that stood out.

Discussion

Even in the situation in which a new mode of transportation will become available, such as the train services in this study, our values, attitudes and beliefs are of importance when forming an intention to chose this travel mode. The basic values "openness to change", a perceived legitimacy of the infrastructure investment, and positive attitudes towards train, is important for forming positive intentions to use train for longer trips in the future.

The old retirees showed weaker "openness to change" values and intentions to choose train compared to young adults which could be explain by the young adults having been socialized into their travel mode choice in times of a pronounced environmental debate in society and therefore perhaps having more experience with trains.

References

- Baslington, H. (2008). Travel Socialization: A Social Theory of Travel Mode Behavior. *International Journal of Sustainable Transportation*, 2(2), 91-114.
- Haustein, S., Klöckner, C., & Blöbaum, A. (2009). Car use of young adults: The role of travel socialization. *Transportation Research Part F: Traffic Psychology and Behaviour*, 12(2), 168-178. Elsevier Ltd.
- Hjorthol, R. J., Levin, L., & Sirén, A. (2010). Mobility in different generations of older persons. The development of daily travel in different cohorts in Denmark, Norway and Sweden. *Journal of Transport Geography*, 18(5), 624-633. Elsevier Ltd.
- Nordlund, A. M., & Garvill, J. (2003). Effects of values, problem awareness, and personal norm on willingness to reduce personal car use. *Journal of Environmental Psychology*, 23(4), 339-347.

Presentation 3: Evaluating the Emotional Preference for a Transit Mode

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Mode choice models based on classic economic theories use explanatory variables that are mostly related to the level of service of the different modes and the passenger.

Based on a synthesis of the literature on modern consumer behavior marketing research expressing the mechanism of how people choose between products we developed a general model of decision making process that is composed of four interrelated stages. The process begins with three values: A utilitarian value which expresses the functionality of the product for the consumer; a switching value which expresses the technical effort in switching from one product to another, and a hedonic value which expresses the emotional value created in the consumer's feeling after using the product. The last stage is related to the repeated choice of the product – the loyalty. Unlike the classic travel behavior mode choice models which is based on a utility function expressing the utilitarian value only, our approach includes the emotional (hedonic) value as well.

This investigation is of special importance to the discussion on sustainable mobility. In recent years, Bus Rapid Transit (BRT) systems have been proposed and introduced in different urban areas. The BRT concept seeks to use buses to provide a rail-like service including a separate right-of-way. An assumption that underlies the introduction of BRT services is that their attractiveness will be determined mostly by the service attributes, i.e. that a rail-like bus service can attract a similar number of passengers to an equivalent rail service, but at a lower cost. A debate is going on in the practice and academic literature on whether the provision of a transit service by rail has an advantage per se, or as phrased by Axhausen et al (2000), whether or not a 'Rail Bonus' exists.

This research tries to respond to this question by exploring the validity of the loyalty model in choosing among different public transport modes. The research methodology is based on a passenger survey of 505 respondents among rail and bus users that were used as the base for descriptive statistics, factor analysis, structural equation models and mode choice model estimation.

The factor analysis found three factors to be significant: **Loyalty** - describing the level of loyalty, in terms of both attitude and behavior, of a passenger towards their transit mode; **Hedonic commitment** - capturing the emotional value associated with each mode in the consumer's mind; and the **Utilitarian value** – representing travel time, comfort and reliability. The validity of the loyalty model was tested using the SEM technique. A strong link between the hedonic commitment and the loyalty factor was found in all models, as well as a strong link between comfort and hedonic commitment. But while in the rail model the loyalty is affected by the hedonic and utilitarian variables, in the bus model it is affected by the hedonic commitment variable. It therefore appears that, as hypothesized, the loyalty mechanism sheds light on the travelers' mode choice behavior; but while the loyalty towards bus is mainly emotional, and affected by the hedonic commitment variable the loyalty towards rail is stronger, and is affected by both utilitarian (i.e. travel time, reliability and comfort) and hedonic values.

Finally, the estimated mode choice model shows that loyalty and comfort have a significant effect on mode choice, while the hedonic commitment was insignificant. It seems that the effect of hedonic commitment on mode choice is indirect, through the loyalty factor, as also confirmed in the SEM phase.

The study concludes that passengers have a higher level of loyalty, and stronger emotional attitude toward rail travel compared to bus travel, indicating the existence of 'rail bonus'.

Presentation 4: Mobility Patterns of Families in Rural Germany with Special Regard to Parental Division of Work

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What does ‘sustainable mobility’ mean when you have children and live in rural areas? Especially families in rural areas are highly depending on the car to be mobile. These phenomena exist in Germany as well as in other European countries (e. g. Bowden & Moseley, 2006).

Several studies indicate that the division of paid and unpaid, formal and informal work between men and women is crucial for explaining gender differences in mobility behavior (e. g. Turner et al., 2006). Hence, a gender-specific approach is essential for our investigations:

- (1) To what extent does the mobility behavior of parents in rural areas differ from:
a) parents living in urban areas, b) couples in rural areas without children? Are there differences between the eastern and western parts of Germany? Are there gender-specific differences, especially when different models of parental division of work are considered?
- (2) Which kinds of threat appraisals and mobility strategies of parents living in rural areas can be identified? Are there differences between the eastern and western parts of Germany? Are there gender-specific differences, especially when different models of parental division of work are considered?
- (3) What do parents in rural areas think of selected mobility services? How can one characterize their conceivable future options?
- (4) How should future mobility concepts look like, and how should they be communicated, in order to reach families in rural areas?

For (1), we conducted a secondary data analysis of ‘Mobilität in Deutschland 2008’, the latest German study on everyday mobility (n = 25,000 households; Infas & DLR, 2010).

For (2) and (3), we conducted semi-structured problem-centered interviews with mothers and fathers in two rural areas (n = 28 individuals). Half of the interviewees are living in households with a ‘non-traditional’ parental division of work (working hours of father are less than or equal to the mother’s). The interview guide is based on *Protection Motivation Theory* (e. g. Rogers & Prentice-Dunn 1997). The interviews are analyzed with Grounded Theory Methodology.

In our presentation, central results from our secondary data analysis will be presented as well as first-hand findings on parents’ evaluation of selected services such as ‘bus on demand’, ‘mobility voucher’ and ‘mobile supermarkets’.

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References

- Bowden, Chris & Moseley, Malcolm (2006). *The Quality and Accessibility of Services in Rural England: A Survey of the Perspectives of Disadvantaged Residents*. Wolverhampton: ADAS.
- Infas & DLR (Hrsg.) (2010). *Mobilität in Deutschland 2008. Ergebnisbericht. Struktur – Aufkommen – Emissionen – Trends*. Berlin.
- Rogers, Ronald W. & Prentice-Dunn, Steven (1997). *Protection Motivation Theory*. In: Gochman, David S. (Hrsg.): *Handbook of health behavior research*. New York: Plenum Press. S. 113–132.
- Turner, Jeff; Hamilton, Kerry & Spitzner, Meike (2006). *Women and transport study*. European Parliament, Brüssel.

Presentation 5: A psychometric analysis of the Satisfaction with Travel Scale (STS)

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Subjective well-being (SWB) has been proposed as a measure of individuals' benefits of daily travel (Ettema et al., 2010). Measures of SWB provide an alternative method of assessing the value of different travel modes or other aspects of travel services for daily travel. An important question when countries want to increase public transport is whether travel by public transport decreases SWB relative to travel by car.

Ettema et al. (2010) proposes a theoretical framework for the application of SWB to travel behaviour analysis. In line with this Jakobsson Bergstad et al. (2011) used a 5-item measurement scale (Satisfaction with Travel Scale or STS) to measure travel-specific SWB. This existing STS scale worked well to investigate the relationships between general SWB and domain specific well-being in the context of activities and travel. However, since it consists mainly of cognitive items, an improved STS was tested in a survey of undergraduate students who commute to the university (Ettema et al. 2011). The results showed that the STS is a reliable measurement scale that differentiates between changes in travel conditions. The internal consistency (Cronbach's) as an estimate of reliability was shown to be consistently high, exceeding .84 for each construct. The scale was also shown to have convergent validity in that the constructs correlated with each other but still remained separate. STS were affected by travel mode (bus vs. car), travel time, access to bus stops, and the number of activities in the daily agenda.

In addition to evaluating the overall model fit, it is important to determine whether STS is psychometrically equivalent across

relevant subgroups (e.g., public transport users and car users or people living in different geographical regions).

The purpose of the present study was to evaluate the psychometric properties of STS using confirmatory factor analysis, including test of measurement invariance across travel mode and geographical regions. A sample of 951 Swedish residents was obtained from the three largest urban areas of Sweden, Stockholm, Göteborg, and Malmö. The total response rate was 24.2%.

A theoretically supported, one-factor second-order measurement model with three separate constructs was found to have a better fit compared to a one-factor model. On the three first-order factors high loadings were as expected obtained on scales entailing cognitive evaluations (e.g. very low standard - very high standard), a positive versus negative activated mood (e.g. very stressed - very relaxed), and a positive versus negative deactivated mood (e.g. very tired - very alert). The model was invariant for overall STS, STS to work, and STS from work in each of the three urban areas. It was also invariant for users of different travel modes.

References

- Ettema, D., Gärling, T., Olsson, L. E. & Friman, M. (2010). Out-of-Home Activities, Daily Travel, and Subjective Well-Being. *Transportation Research Part A*, 44, 723–732
- Ettema, D., Gärling, T., Eriksson, T., Friman, M., Olsson, E. L. & Fujii, S. (2011). Satisfaction with Travel and Subjective Well-Being: Development and Test of a Measurement Tool. *Transportation Research Part F*.
- Jakobsson Bergstad, C., Gamble, A., Gärling, T., Hagman, O., Polk, M., Ettema, D., Friman, M. & Olsson, L. E. (2010). Subjective Well-Being Related to Satisfaction With Daily Travel. *Transportation*.