Modelling Impacts of Beliefs and Attitudes on Mode Choices: Lessons From a Survey of Luxembourg’s Cross-border Commuters
Philippe Gerber, Marius Thériault, Christophe Enaux, Samuel Carpentier

To cite this version:
Philippe Gerber, Marius Thériault, Christophe Enaux, Samuel Carpentier. Modelling Impacts of Beliefs and Attitudes on Mode Choices: Lessons From a Survey of Luxembourg’s Cross-border Commuters. 11th International Conference on Transport Survey Methods, Sep 2017, Montréal, Canada. halshs-01712646

HAL Id: halshs-01712646
https://halshs.archives-ouvertes.fr/halshs-01712646
Submitted on 19 Feb 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Introduction
This presentation shows an attempt to measure and relate environmental beliefs and concerns and attitudes about the car and the train (as latent constructs) to the self-declared satisfaction in commuting and the perceived utility of transportation modes (latent) for commuting using a survey of Luxembourg’s cross-border commuters. The main objective is to illustrate the use of structural equation models (SEM) as a data-mining tool to unravel the endogenous relationships among measurements, satisfaction and the perceived utility within the theory of planned behaviour (TPB; Ajzen 1991) conceptual framework. Shortcomings of the analytical procedure and suggestions to enhance the integration of beliefs and attitudes are discussed. It identifies ways to improve the measurement of perceptual indicators and needs to identify latent sociopsychological factors and mediators that potentially condition mode choices for commuting on top of usual factors of socio-economic status, lifestyle, accessibility, parking availability/costs, public transit service levels, etc.

The Survey (Mobility, Resources, Satisfaction, Attitudes)
LISER (Luxembourg Institute of Socio-Economic Research) conducted a self-administered 9-page pencil paper mobility survey among commuting border workers. The first phase was about the usual features of a National Transport Survey. The second phase was concentrating on travel satisfaction, and the impact of CfDs, infrastructure, availability and attitudes on mobility choices and environmental concerns. The third phase was concentrating on commuting costs (and attitudes) on the left side and the bus on the right side and satisfaction (see the figure below) included in the survey. The survey was conducted in 2007/2008 to analyze the existing commuting behavior and the satisfaction for car users and public transport users. It included 7,727 respondents among those of the first phase (56% car users).

The map below shows the mode shares of public transit (PT) according to home location inside Luxembourg and work place inside Luxembourg. Because of long commuting distances, almost all trips are oriented, with 86% (bus) and 77% (car). Only PT trips involve a single journey (6%) or two journeys (1%) in the home country, while only 6% of the car journeys involve two journeys. This is due to the independence of the work location. Important to note is that almost 95% of the visitors choose between home countries of cross-border commuters (see the figure below). Because of the attractiveness of PT, the single proportion of PT users going to Luxembourg City from the map below.

Thanks to the improved rating of travel and commuting satisfaction, the number of PT users increased from 21% in 1991, followed by a decrease from 19% in 1997, to 17% in 2007 and has been 9% (40) in 2014.

Satisfaction is needed when dealing with separated “choices” for daily commuting because the impact of attitudes and controls with experience and habits, eventually leading to further conditioning the outcome (de Vries et al. 1991; 2006), while anomic and consequential experience could lead to changes of habits.

Modelling the Perceived Utility
The concept of utility is central to the transportation literature, considering the cost and duration of travel (and value of time) to compare modes. During the last decade, progress was made using multiple choice models and with the socio-psychological content within various functional specifications of logistics regression and SEM. This integration could be used to identify important factors in the specification of the utility assuming their role in the shaping of the utility because attitudes about transport modes are qualitative assessments of perceived compatibility to support travel. The figure below shows a SEM model of perceived utility of PT that integrates attitudes, self-reported satisfaction, travel cost and duration with the mode choice as the outcome (commuting behavior specific for the case of Luxembourg, countries and the location of the work place are used to control for the overall biases of differences in PT service levels).

The analysis procedure leads to identification of measures of latent variables from the survey (ISR/LUX) and to test for the inclusiveness of these attitudinal factors using cross-sectional decision model and SEM for data mining. The model SEM implements the endogenous core of attitudes and variables measured and provides the max likelihood estimation (MLE) for commuting based on the TPB (see the figure above) for robustness against endogeneity in data mining.

Modelling Impacts of Beliefs and Attitudes on Mode Choices Lessons From a Survey of Luxembourg’s Cross-border Commuters

Philippe Gerber*, Marius Thériault*, Christophe Enaux*, Samuel Carpentier-Postel*

a) LISER (Luxembourg); b) CRAO, Université Laval (Canada); c) CNRS, Université Louis-Pasteur (France); d) CNRS, Université d’Aix-Marseille (France)

Discussion and Conclusion
CFA and SEM allowed to develop latent variables to shameful instrument relationships between beliefs, perceptions (self-reported satisfaction and perceived self-efficacy) in order to check the influence of PT is commuting based on the TPB. SEM approach model could be used to a straightforward tool to gain in-depth knowledge of relationships between influencing factors and improve model specification. The final figure illustrates the final outcomes of the data mining: an enhanced SEM (r-squared = 40%) that is far better tuned than the initial TPB model shown above.

Presentation at the ISCTSC 11th International Conference on Transport Survey Methods, September 24-29, 2017, Estérel, Québec, Canada