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Household travel survey of intermodal trips – Approach, challenges and comparison

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Abstract

The increasing use of new mobility services like car and bicycle sharing, information and communication technology results in changing use patterns. Multimodal as well as intermodal use of transport modes is increasing in importance. Multi-agent travel demand models are able to describe intermodal trips for supporting transport policy in evaluating planned measures. Such models require comprehensive information on individual (intermodal) travel behaviour. Our work describes the design of a household travel survey focusing on intermodal trips. Additionally, it discusses challenges that emerge in comparing results to traditional household travel surveys, which mainly focus on main mode.

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1. Introduction

Travel behaviour is changing due to several reasons such as the decreasing use of cars, the reduced car availability especially of young adults or the increasing importance of mobility services. These trends have been observed by different studies (e.g. Institute for Mobility Research, 2013) and household travel surveys (e.g. Zumkeller et al., 2008). Looking at young adults in particular, the question arises about whether they adapt their travel behaviour due to circumstances such as becoming parents. It is clear that environmental consciousness leads

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to more sustainable travel behaviour. Car use is decreasing in metropolitan areas with efficient public transport facilities, car sharing supply and well-developed bicycle infrastructure. Additionally, travel behaviour of people living in metropolitan areas is becoming more and more flexible since mobility sharing options like car-2-go, drive-now or call-a-bike became available.

People have increasing multimodal travel behaviour (Institute for Mobility Research, 2013; Kuhnimhof et al., 2010). They use different modes for their trips over a longer period, such as one week, and may adapt the mode of transport depending on the specific situation. Not only is multimodal travel behaviour increasing, but also intermodal travel behaviour, which refers to the use of more than one mode within one O-D-trip. The project “I-eMM” (Intermodal electric Mobility Management) deals with this intermodal travel behaviour in the Rhine-Neckar region. The planning area covers the city of Mannheim which is metropolitan and three small communities around Mannheim (partly rural cities in the catchment area of Mannheim with and without railway connection). Within the project we aimed to develop electric vehicle concepts such as pedelecs, scooters or small electric cars which are operated in combination with public transport in order to improve access to and egress from public transport. The research focuses on the effects and acceptance of these concepts regarding influences on travel behaviour as well as the integration of these concepts in the operating procedure of public transport companies. Electric driven vehicle concepts should make it easier to reach public transport stations or bus stops and therefore increase the use of public transport. For this reason the project I-eMM surveys intermodal trips in the planning area in order to develop a model which is able to evaluate effects of electric vehicle concepts for defining a sustainable supply and intelligent and intermodal mobility. To develop and evaluate intermodal supply concepts focusing on the improvement of the connection to public transport systems on the last mile, we needed comprehensive information about people’s travel behaviour. Therefore we developed a web-based survey which collects information on intermodal trips.

This paper describes the design of the developed questionnaire and the challenges. We also show the main findings of the survey in comparison with existing surveys in order to assess the quality of the results from our survey. The main research question is: “Are there differences between the modal split based on trips and on stages?”

The paper is structured as follows. Section 2 reviews literature on existing intermodal surveys. The approach of surveying intermodal trips and their challenges is described in section 3 and section 4 presents the results of the survey analyses.

2. Literature and research question

Since our work focuses on the development, the challenges and the analysis of a household travel survey which collects data on intermodal trips, our literature focuses on the analysis of existing intermodal travel surveys and the estimation of intermodal travel behaviour.

In most existing national household surveys intermodal behaviour is treated incidentally. Thus, there is less literature to find. However, there are several countries, such as Great Britain or Denmark, which included intermodal trips in their national household surveys. Further, the Swiss National Travel Survey (Bundesamt für Statistik Schweiz, 2012) surveyed intermodal trips in a very comprehensive way. Stages were recorded with a completely novel route-recording method. A stage consists of a portion of a trip completed with the same transport mode (including walking). Anyone riding a bicycle to the railway station, then taking the train and finally walking from the destination station to the workplace thus completes three stages but only one trip. The survey records all of the stages completed by the respondent. The respondents take part in a computer-assisted telephone interview (CATI) where they answer questions about these stages covering choice of transport mode, start and end points, distance travelled, and self-reported times of departure and arrival (Ohnmacht and Kowald, 2014).

Pan et al. (2010) examined the potential to improve travel efficiency by increasing the use of bicycles as a transfer mode for rail transit riders in a case study of Shanghai. To understand what influences people’s choice on access and egress trips to rail stations, a survey of rail transit riders on three rail stations was conducted. The analysis of this survey data revealed that walking had the largest mode share for access (51%) and egress (81%) trips followed by bus (29% for access and 13% for egress trips). The bicycle share was low (11% for access and 1% for egress trips), partly due to regulations by government which do not allow the carriage of bicycles in transit and the inconvenience and difficulty of carrying a bicycle on an overcrowded train.

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