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Making the way to the university environmentally sustainable: A segmentation approach

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ABSTRACT

This paper introduces approaches for public transportation companies and transport policy to induce a shift towards environmentally-friendly modes of transport. The results are based on survey data from 241 collaborating academic institutions and more than 28,000 respondents in Germany, Austria and the German-speaking part of Switzerland. By drawing on an attitude-based segmentation approach, target groups and related personal characteristics are identified in order to suggest customized strategies for greening the way to and from university. The paper has implications for the development of new or the improvement of existing dedicated services and derives strategies to address selected customer groups more directly. Such approaches are assumed to have a substantial effect and to be more efficient and effective than vague soft-policy measures.

Introduction

Within the transportation sector, passenger transportation accounts for 34% of CO_2 emissions in the EU-27 (UITP, 2009). Of those, only 10% arise from public transportation while 90% can be related to the use of motorized individual transportation (UITP, 2009). Moreover, transportation has further negative impacts such as air pollution, noise, accidents, damage to infrastructure and other sources of (social) costs and further negative external effects (Santos et al., 2010a,b; Verhoef, 1994). In order to improve the situation, a shift in transportation volumes towards environmentally- and socially-friendly modes is desirable, as it is clearly impossible to avoid transportation altogether.

Unfortunately, efforts to accomplish a shift towards environmentally friendly transportation modes have not been very effective so far. In passenger transportation, even if confronted with higher costs and other (both legal and de facto) restrictions, many people still have a clear preference for travelling by car. In 2010, the modal split for passenger transportation in the EU-27 showed that 82.5% of all pkm were attributed to passenger cars (European Commission, 2012).

Despite this tendency, a modal shift is in the interest of the general public, and travel demand management measures therefore need to be taken. In order to implement such policies, individual attitudes and preferences of customers should be taken into account (Bamberg et al., 1999; Susilo et al., 2012). It has already been shown that lowering the price of public transportation and even offering services free of charge only have a limited impact (De Witte et al., 2008). In fact, the mode and service choice is more strongly influenced by the quality–price ratio and the users' perception of the service, which is reflected in their attitudes and preferences. As a result, both the transportation companies as well as authorities issuing tenders for public services should also focus on quality factors and potential passengers' perception of these. In order to promote

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public transportation, using a segmentation approach to directly address individual target groups is fruitful (Haustein and Hunecke, 2013). But also walking and cycling represent fully-fledged alternatives to the use of a car (Maibach et al., 2009), as they are equally or even more desirable than public transportation due to the opportunity for physical activity (Ogilvie et al., 2004, 2007; Underwood and Handy, 2012). Moreover, public transportation – particularly in urban areas – is sometimes subject to limited capacity (Santos et al., 2010c), and walking and cycling should therefore also be promoted.

Usual approaches to cluster and address passengers have been oriented at socio-demographic factors and/or actual travel patterns (Gronau and Kagermeier, 2007; Hensher and Reyes, 2000; Lanzendorf, 2002; Li et al., 2012; Lin et al., 2009; Wei and Kao, 2010). However, to improve its market share, a market-oriented company should redesign its products focusing on customer requirements and individual attitudes and change its promotion strategies accordingly. Instead of simply maintaining the situation in its current form, such an approach also seems to be constructive in public transportation. Consequently, transportation services should take the attitudes and requirements of (potential) passengers more into account and simultaneously influence these with effective marketing. The way to best address people individually is segmenting them according to attitudes and perceptions (Haustein and Hunecke, 2013). Based on these considerations and previous findings, this paper aims to segment passengers by clustering them along their attitudes towards various transportation modes and their perceptions of these using the example of members of academic institutions.

The paper is organized as follows. First, relevant literature on sustainability in the transportation sector and policy approaches as well as determinants of passengers' mode choice is reviewed. Next, the central role of marketing strategies in improving perceptions and attitudes towards alternative modes is elaborated (see 'Theoretical framework' section). In 'Methods and Statistical Measures' section, the methodological approach of the empirical study and then the results are presented in 'Results' section. Finally, findings are discussed and recommendations are given to increase sustainability in passenger transportation by encouraging a shift towards environmentally-friendly transportation modes (see 'Discussion' section).

Theoretical framework

Sustainability – the use of resources in a way which does not compromise the needs of future generations (United Nations, 1987) – is an established concept within the domain of transportation (Nijkamp, 1994). A substantial amount of greenhouse gas emissions and other unfavorable impacts like noise, congestion and accidents are caused by (motorized) transportation. However, it needs to be respected that transportation and mobility sustain our quality of life and economic prosperity, and are sources of individual and public well-being (Mullen, 2012).

There is a considerable body of literature regarding the efficacy of different approaches to improve sustainability in the domain of transportation (Graham-Rowe et al., 2011). Generally, effectiveness depends on contextual factors and both coercive ('hard') measures like taxes, tolls or bans on driving and non-coercive ('soft' or 'smart') measures like campaigns to raise the environmental awareness are useful in order to induce a behavioral shift. The most effective changes, however, seem to be brought about by a package or combination of measures (Eriksson et al., 2010; May, 2013) or an integrated policy (in a very broad sense) (Buehler and Pucher, 2012). Otherwise, positive effects can easily be jeopardized by frictions and problems arising from a lack of coordination (Santos et al., 2010c).

If a sustainable mobility agenda is to become a reality, the implementation of innovative schemes is of the utmost importance. It is also vital to gain public confidence and acceptability in order to support these measures through involvement and action on the part of the general public (Dargay, 2008). Acceptability is higher if the measures include clear incentives for behavioral change (Bamberg et al., 1999) and if the aim is clearly communicated and seen as fair, useful and effective (Kim et al., 2013; Schuitema et al., 2010).

In general, non-coercive measures are more likely to be accepted than harder measures such as limiting car use or making it more expensive (Gärling and Schuitema, 2007; Jakobsson et al., 2000; Rienstra et al., 1999). Individualized marketing has to be taken into account as it plays a fundamental role in conveying information to customers, which in turn raises awareness of all the travel alternatives available to and suitable for them, the related costs and benefits and the consequences for society and the environment (Banister, 2008).

In a market economy, consumers have a free choice – which includes the freedom to make trips and to decide how to make them. In many cases, they have a set of alternatives including using different kinds of motorized transportation (car, bus, tram, underground, metro-rail, motorcycle, moped, motor-scooter, pedelec, etc.) and non-motorized transportation (bicycle, scooter, walking); trip chaining, trip-pooling, car-pooling; and staying at home or replacing making trips by using telecommunication, among many other options (Gärling et al., 2002). A variety of determinants has been identified as being responsible for actual travel choice. These include the attributes of the transportation system itself (transportation infrastructure access, cost of car and public transportation, quality of public transportation), spatial factors (home location, accessibility to jobs/education, shopping, services and leisure activities) and personal characteristics (age, gender, personal and household income, household composition, life stages, employment status, preferences and attitudes) (Dargay, 2008). Choice, however, can also be constrained in terms of availability at a certain place or for a certain route, service times and frequencies, costs, and individual mobility (persons with reduced mobility, people not holding a driver's license). People forced to take a certain alternative are therefore regularly referred to as 'captives' (Krizek and El-Geneidy, 2007).