Exploring structural and psychological determinants of travel mode choice

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Abstract
This paper overall objective is to contribute to a better understanding of travel mode choice by applying structural equation modeling (SEM), followed by a discussion of implications for policy measures aimed at promoting alternatives to car use namely by increasing public transport usage. Also from the empirical results, managerial implications for the transit operators are addressed.

Nowadays most people are highly dependent on car travel (Anable, 2005). But, the car is far more than just a means of transport (Steg, 2005). Other motives than just its instrumental functions seem to play an important role, such as feelings of sensation, power, freedom, status and superiority (Steg, 2005). Moreover, the perceived benefits of cars depend on the lifestyle and social-spatial relations engaged by the user (Hiscock et al., 2002).

Policies which aim at increasing public transport usage should promote its image, but at the same time, public transport systems need to become more market-oriented and competitive. This requires an improvement in service quality, which can only be achieved by a clear understanding of travel behavior and consumer needs and expectations. Therefore, it becomes essential to evaluate the level of service in order to identify the potential strengths and weaknesses of public systems. This can provide clues to public transport management in the process of evaluating alternative service improvements aimed at enhancing user satisfaction and increasing market share.

It is not expected that all car users, in general, will change from driving a car to using public transport exclusively by improving the public transport system (Jensen, 1999), but service quality is perceived as an important determinant of users' travel demand (Prioni and Hensher, 2000). Moreover transit behavior is influenced by attitudes towards using public transport and beliefs about whether or not transit can fulfill one's transport needs (Thogersen, 2006). This implies that traveler attitudes and preferences are an important component of travel behavior (Kuppam et al., 1999; Golob, 2003; Parkany et al., 2004). In order to reduce car dependence it is necessary to promote several measures, such as modifying the opportunities for travel by improving the availability of alternative modes; modifying the inclinations and preferences towards travel by alternative modes; and modifying the lifestyle patterns that generate obligations to travel from current origins to present destinations (Stradling, 2003). At the same time policies that involve an improvement in the transit service should be implemented. Furthermore, it is necessary to promote measures to reduce the attractiveness of car use (Görling and Schuitema, 2007).

Evidence suggests that policies should be designed towards specific target groups (Anable, 2005; Jensen, 1999; Steg, 2005). Marketing campaigns should target individuals that are most motivated to experience public transport (Thogersen, 2006). This suggests the need for segmentation taking into account travel attitudes and behaviors. Recent studies have revealed the importance of individuals’ attitudes to the acceptance of transport demand policies (Beale and Bonsall, 2007; Thorpe et al., 2000). Furthermore, the negative beliefs of individuals with no desire to use a bus are very difficult to overcome (Beale and Bonsall, 2007).

The data analyzed in this study were collected during the fall of 2005 from a telephone survey of
approximately 3,000 individuals residing in the Porto region, in Portugal. Greater Porto is the second largest metropolitan area of Portugal, with about 1.5 million people. This urban area around Porto city includes fourteen municipalities in northern Portugal. In a 10-year period, from 1991 to 2001, car journeys to work or school increased from 31% to 52%, and public transport usage declined from 42% to 28% (INE, 2003).

The questionnaire was developed based on a previous qualitative study and by a literature review (Beir?o and Cabral, 2007). The survey included attitude questions concerning aspects related to time spent on traveling, attachment to the car, feelings towards public transport, travel stress, cost and environmental concerns. Also questions regarding general information about the respondent travel behavior (focusing on the most regular trip), ratings on overall satisfaction with the transport used on regular trips, evaluations of transit service quality and socioeconomic characteristics.

A two step process is used in the exploration of the factorial structure of the attitude variables. First an exploratory factor analysis (EFA) is used as an initial strategy to provide insight into the interrelationships among the attitudinal variables and the underlying structure of the data. Confirmatory factor analysis (CFA) is then used to evaluate the model derived from EFA. This process resulted in eight factors.

Those factors were used as the basis for cluster analysis which uncovered six groups - Transit Enthusiasts, Anxious Status Seekers, Car-less Riders, Green Cruisers, Frugal Travelers, and Obstinate Drivers - with distinct attitudes, preferences and behaviors and different levels of propensity to use alternatives to the car.

Next a structural equation modeling approach is going to be used to develop and estimate a simultaneous model relating traveler attitudes, travel behavior, socio-demographics characteristics, perceived transit service quality and satisfaction. Differences among different modes of transport (car, transit and walking) are also going to be explored.

The literature review suggests that policies aiming at promoting alternatives to car should be designed towards specific target groups. Furthermore each market segment extracted by cluster analysis shows unique characteristics and attitudes toward travel behaviors. So we are pretend to use the model previously developed by SEM to investigate differences between the clusters.

References:


