



Commuting trip satisfaction in Beijing: Exploring the influence of multimodal behavior and modal flexibility



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ABSTRACT

In the past decade, many studies have explored the relationship between travelers' travel mode and their trip satisfaction. Various characteristics of the chosen travel modes have been found to influence trip experiences; however, apart from the chosen modes, travelers' variability in mode use and their ability to vary have not been investigated in the trip satisfaction literature. This current paper presents an analysis of commuting trip satisfaction in Beijing with a particular focus on the influence of commuters' multimodal behavior on multiple workdays and their modal flexibility for each commuting trip. Consistent with previous studies, we find that commuting trips by active modes are the most satisfying, followed by trips by car and public transport. In Beijing, public transport dominates. Urban residents increasingly acquire automobiles, but a strict vehicle policy has been implemented to restrict the use of private cars on workdays. In this comparatively constrained context for transport mode choice, we find a significant portion of commuters showing multimodal behavior. We also find that multimodal commuters tend to feel less satisfied with trips by alternative modes compared with monomodal commuters, which is probably related to their undesirable deviation from habitual transport modes. Furthermore, the relationship between modal flexibility and trip satisfaction is not linear, but U-shaped. Commuters with high flexibility are generally most satisfied because there is a higher possibility for them to choose their mode of transport out of preference. Very inflexible commuters can also reach a relatively high satisfaction level, however, which is probably caused by their lower expectations beforehand and the fact that they did not have an alternative to regret in trip satisfaction assessments.

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1. Introduction

Studying trip satisfaction is valuable for transport policy making. For instance, policies aiming at a shift towards sustainable transport modes will be more effective when travelers are more satisfied with their new travel mode. The relationship between trip satisfaction and transport modes has been examined extensively in recent studies (Abou-Zeid and Ben-Akiva, 2014; Eriksson et al., 2013; Ettema et al., 2013; Olsson et al., 2013; Páez and Whalen, 2010; Turcotte, 2006). Mode-related attributes of cars (e.g., driving conditions), public transport (e.g., reliability of service) and active modes (e.g., crowdedness) have been found to influence trip satisfaction. A common feature of these studies is that they treat trip satisfaction in the context of a single trip made by a single given mode. Hence, they neglect the fact that trip satisfaction may also depend

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on the choice context. This choice context includes the fact that travelers may use various travel modes for a given trip over a longer time period, as well as their perception of alternative modes for that trip. This paper sets out to test the influence of this choice context on trip satisfaction.

The use by travelers of multiple transport modes in a specified period has received much attention in recent studies in Western Europe (Frändberg and Vilhelmsen, 2014; Kuhnimhof et al., 2006; Nobis, 2007) and the U.S. (Block-Schachter, 2009; Buehler and Hamre, 2014) and has been termed “multimodality” (Kuhnimhof et al., 2006; Nobis, 2007). It has been found that multimodal travelers generally have more realistic perceptions of available choices and their attributes than single mode travelers (Diana and Mokhtarian, 2008). Additionally, individuals may compare a trip experience by one travel mode with experiences of other travel modes (Schwartz, 2004; Schwarz and Strack, 1999). Hence, due to different reference levels, multimodal travelers may experience the same trip differently than monomodal travelers; however, the extent to which and direction in which this mechanism works has not yet been determined.

In addition to the actual use of multiple travel modes, modal flexibility (i.e., travelers’ perceived ability to vary transport modes) may also affect travelers’ trip satisfaction because it indicates whether the mode is chosen out of preference or due to a lack of other options. Although the influence of owning a car and living close to public transport facilities on trip satisfaction have been explored (Jakobsson-Bergstad et al., 2011; De Vos et al., 2014; Ettema et al., 2011), these variables cannot be equated with individuals’ perceived ability to switch transport modes for a single trip because the latter is also affected by factors such as individuals’ attitudes, busy daily activity agendas on specific days or the unavailability of household vehicles due to use by the spouse.

Hence, in regard to trip satisfaction, the effects of neither multimodality nor modal flexibility have been investigated. Exploring the influence of using or having multiple mode choices may provide insights into predicting individuals’ satisfaction levels and consequently their behavioral changes when certain transport modes are encouraged or improved in policy making. The current paper will address this gap in the existing literature by investigating urban residents’ commuting trip satisfaction in Beijing in relation to commuters’ multimodal behavior and modal flexibility based on multiday activity and travel diaries.

The remainder of this paper is organized as follows. The next section reviews the literature on modality and trip satisfaction research and raises hypotheses concerning the relationship between them. Section 3 presents the research design for this study, including data collection, measurements of key concepts and methodology. Descriptive analysis results are shown in Section 4. Further, five two-level regression models have been conducted for trips by specific modes, and the model estimation results are also discussed in Section 4. The conclusion and discussion are presented in the final section.

2. Theoretical background and expectations

2.1. Multimodality and modal flexibility

Although the definitions vary across studies (Block-Schachter, 2009), multimodality is generally defined as the use by a traveler of various transport modes rather than a single mode in a certain time period, usually one week (Buehler and Hamre, 2014; Kroesen, 2014; Kuhnimhof et al., 2006; Molin et al., 2016). Monomodality thus means that a traveler did not change his or her transport mode in a given time period. There are also studies incorporating intensity measures (e.g., frequency of using different modes) and thresholds to distinguish the degree of multi- and monomodality (Diana and Mokhtarian, 2009; Kuhnimhof et al., 2012, 2006). Many studies further identify various modality groups based on the combinations of transport modes that travelers use. For example, Buehler and Hamre (2014) distinguished 3 groups in the U.S. ranging from monomodal car users, multimodal car users, and those who only walk, bike, and/or use public transport, while Kroesen (2014) excluded walking trips and identified five mode profiles in the Netherlands including strict bicycle users, strict car users, immobile traveling (i.e., who travel little by car, public transport or bicycle), joint car and bicycle users, and public transport users. In an empirical study in Germany, Nobis (2007) found that mono car users represent the majority of modality groups.

To a certain extent, multimodal behavior indicates the degree to which an individual deliberately chooses a mode (Kroesen, 2014), and a multimodal traveler is more likely to be flexible in his/her mode choice (Vij et al., 2011). Individuals may also engage in multimodal behavior due to constraints, however, such as limitations in car availability or budget reasons. For example, more multimodal car travel among young people in Germany is related to lower car availability and incomes among this group (Kuhnimhof et al., 2006; Nobis, 2007). The possibility to vary one’s travel mode can be investigated with self-reported modal flexibility. In some studies, researchers investigated the self-reported number of modes that respondents consider available/feasible for travel (Lavery et al., 2013), and some asked about the limitations regarding traveling by certain modes at a certain time of a day and the availability of an automobile when desired (Ory and Mokhtarian, 2005). These self-reported indicators of mode availability reflect commuters’ perceptions of feasible options or their perceived ability in travel mode decisions to a certain extent. Mode availability does not equal modal flexibility, however, because individuals’ perceived travel mode options are not only related to the number of available transport modes but also may be affected by personal attitudes towards transport modes, activity agendas on specific days and other constraints such as traffic management measures. In this study, we will investigate modal flexibility based on self-reported perception concerning switching mode choice for each commuting trip.

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