Car sharing adoption intention in urban areas: What are the key sociodemographic drivers?

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ABSTRACT

In recent years, car sharing has become an international transportation trend and has shown the potential to change the way people use cars. Sociodemographic variables are the key drivers of mobility patterns and travel modes and may determine the diffusion of car sharing services in the urban population. The present paper considers the impact of sociodemographic variables on car sharing behavior and explores individual choice between car clubs and peer-to-peer car sharing services. We carry out an international survey and analyze a representative sample of 2733 car owners in four major metropolitan areas: London, Madrid, Paris, and Tokyo. The empirical analysis identifies key drivers of car sharing behavior and choice. The findings yield practical insights for business practitioners and transportation planners.

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1. Introduction

In recent years, car sharing has become a key transportation trend, especially in metropolitan areas where car sharing services have been growing at an impressive rate. For example, the number of car sharing users in the world has increased from 0.35 million in 2006 to 4.94 million in 2014 (Frost and Sullivan, 2014). De Luca and Di Pace (2015) underlined the importance of this new transportation trend, which allows access to cars through sharing systems. Many researchers and practitioners have stressed the great potential of these new services in terms of business opportunities and as a sustainable solution for transportation needs (Steininger et al., 1996; Cervero et al., 2007; Shaheen and Cohen, 2007a, 2007b, 2008; Firnkorn and Muller, 2011, 2012). According to Navigant Research[1] (2016), global car sharing services revenue will grow from $1.1billion in 2015 to $6.5billion in 2024.

Most car sharing services have been developed in high-density metropolitan areas, allowing users to accomplish several transportation goals and avoid congestion, parking and pollution problems (De Luca and Di Pace, 2015). These services also permit users to benefit from a car's flexibility without supporting all of its costs (Huwer, 2004). However, despite the increased number of users, car sharing services are currently battling to achieve profitability (De Luca and Di Pace, 2015, p.60). As profitability is derived from the fixed cost of service, the estimated revenues of these companies are directly inferred from user behavior. Profitability requires not only a large number of subscribers, but also subscribers willing to frequently use the service to pay off the fixed charges.

Currently, not much is known about the adoption intention and choice of car sharing services by individual users (e.g., De Luca and Di Pace, 2015). More specifically, market segmentation based on sociodemographic variables such as age, education or household size may be used to detect the profiles that are the most likely to use car sharing services (Millard-Ball et al., 2005). This is especially relevant as many sociodemographic variables affect mobility patterns and travel modes. It has been suggested that demographic factors are now the main determinants of travel demand (Metz, 2012). Consequently, knowing the key demographic, behavioral and geographic drivers may help to increase the diffusion of car sharing services (Millard-Ball et al., 2005). The current research is intended to address this gap in the literature by empirically investigating the socio-demographic drivers of car sharing (henceforth CS).

To that end, we consider the adoption intention of CS services including both car club (henceforth CC) and peer-to-peer services (carpooling and ridesharing services). Peer-to-peer services (henceforth P2P) mean sharing privately owned vehicles for a particular trip (Ballus-Armet et al., 2014). P2P chauffeur/taxi services on demand like those provided by Uber or Lyft, are not included in the P2P services and thus are not considered here. The rise of P2P systems followed the diffusion of smart-phone technology and social networking websites. For example, the French car ride sharing platform BlaBlaCar zoomed ahead with a $200 m investment in September 2015 valuing it at €1.4bn (Financial Times, 2015). This start-up connects 20 million participants across 19 countries in three continents (BlaBlaCar, 2015). Kim (2015, p.251) suggests a prosperous future for carsharing according to indicators such as the total membership and the number of vehicles in carsharing fleets (see also Shaheen, 2012).

Several desirable effects of CS have been noted in the transportation literature, including reduced car ownership rates in urban areas, reduced vehicle mileage and lower greenhouse gas emission levels (Shaheen et al., 2008). Furthermore, parking limitations and congestion in high density areas play an important role in choosing a CS solution (Correia and Viegas, 2011).

These effects strengthen the phenomenon of 'peak car use' observed in the world's developed cities by the Brookings Institution in 2009 (Newman and Kenworthy, 2011). This peak car use phenomenon suggests that we may now be witnessing the demise of automobile dependence in cities. According to the emerging new car sharing platforms, this 'peak car use' considerably reinforces the potential of car sharing services in urban and high density areas.

This paper focuses on the sociodemographic drivers of CS behavior. We survey residents of four large metropolitan areas in four different countries to obtain a large international urban sample. The emphasis on the urban population is warranted because most CS services target urban customers (Bert et al., 2016, p.7).

The present study is intended to augment the existing literature on CS services. Firstly, our multinational study considers European and Asian markets, while existing studies on car sharing systems focus exclusively on North America. Secondly, we study individual preferences for CS systems and in doing so we expand the scope to all car owners as their use of CS services could have a substantial economic, social, and environmental impact. It should be noted that prior studies focus exclusively on existing CS users. We include both car club and P2P systems and explain individual choice behavior using micro-econometric analysis in a sample of 2733 individuals from London, Madrid, Paris and Tokyo.

The paper is organized as follows. Section 2 summarizes the relevant literature. The methodological framework, the survey and some descriptive data are presented in Section 3. Section 4 reports the estimation results. These are discussed in Section 5. The last section concludes the paper and identifies opportunities for future research.

2. Literature review

Existing studies have been mainly concerned with the feasibility of CS services in North America and their potential impact on overall car ownership and vehicle usage (De Luca and Di Pace, 2015). As noted above, researchers have also investigated the behavior of members of CS services. The research literature has failed to consider preferences for CS in the general driver population and identify factors that make nonusers more prone to adopt CC or P2P services (Schaefers, 2013).

In previous research, existing CS users appeared to be younger and more educated (Burkhardt and Millard-Ball, 2006; Efthymiou et al., 2013). Shaheen and Schwartz (2004) found that CS users were often students and belonged to low income households. Le Vine et al. (2014) summarized the socio-economic profiles of CS users as urban, well-educated, moderate/upper income, younger adults that live alone or in small households without children.

Few recent studies have addressed the demographic factors explaining the propensity to join a CS system. Efthymiou et al. (2013) showed that intention to join a CS scheme was associated with household income and household size. Using a sample of licensed drivers in the Lisbon metropolitan area, Correia and Viegas (2011) confirmed that younger people with a lower income were more willing to carpool (Tischer and Dobson, 1979; Gensch, 1981; Teal, 1987). Zheng et al. (2009) showed that willingness to participate in a university community CS system was associated with the respondent's status at the university (i.e., student, professor or administrative staff).

Very few studies in the research literature have so far examined P2P services. Unlike CC services, P2P services match privately owned vehicles to other users on demand. As mentioned above, P2P success is largely attributed to internet applications; however, P2P platforms need to build trust (Ballus-Armet et al., 2014). The recent rise of P2P is partly due to solutions provided by online P2P platforms. For example, they have built online assessment systems or created an online community. Ballus-Armet et al. (2014) underlined the low awareness of those new services in the San Francisco and Oakland areas and stressed the need for further research on the demographics of P2P users.