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Intentions to use bike-sharing for holiday cycling: An application of the Theory of Planned Behavior

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HIGHLIGHTS

- First study to explore tourist intentions to use bike-sharing.
- First study to apply the Theory of Planned Behavior to holiday cycling.
- Comparison of the preferences for regular and electric bicycles.
- Tourists are very interested in using bike-sharing frequently and for multiple purposes.
- Holiday cycling involves group decisions, not individual ones.

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ABSTRACT

This study explored the behavioral factors underlying tourist intentions to use urban bike-sharing for cycling while on holiday. The analytical framework relied on the Theory of Planned Behavior relating tourist intentions to favorable attitudes toward cycling, interest in bicycle technology, favorable subjective norms toward cycling, and perceived cycling ease. The case-study focused on the new bike-sharing system in Copenhagen (Denmark) and questioned 655 potential tourists about a hypothetical holiday scenario. Structural equation models revealed: (i) a great interest in using bike-sharing, frequently and for multiple purposes; (ii) a relation between holiday cycling and living in a cycling-friendly country, past cycling experience, and habitual transport mode choice during daily life; (iii) an appeal of electric bicycles to tourists with high interest in bicycle technology, low perceived cycling ease, and weak favorable norms toward cycling; (iv) a relation between frequent and multi-purpose cycling intentions and favorable to stronger attitudes and norms toward cycling, and greater perceived likelihood that the holiday partners would cycle.

1. Introduction

Bicycle tourism took roots in the late 19th century and remained a marginal niche for over a century until the last decade (Lamont, 2009). During the end of the nineties, cycle tourism was estimated to represent around 2-4% of the total holidays. While there are no reliable data regarding the overall volume of the existing cycle tourism market, cycling tourism has been estimated in 2009 to vary between 3% in France and 13% in Denmark (Weston et al., 2012). Nevertheless, current trends in cycling demand and supply indicate a significant market potential for holiday cycling. Unlike cycle holidays where cycling is the main purpose, holiday cycling involves the occasional use of the bicycle as an alternative mode of transportation for exploring a destination (Downward & Lumsdon, 2001; Ritchie, 1998). From the demand perspective, alongside high cycling rates in established cycling countries in Europe (Pucher & Buehler, 2008; Pucher, Dill, & Handy, 2010; Souffriau, Vansteenwegen, Van den Berghe, & Van Oudheusden, 2011), the number of recreational cyclists is rapidly growing in car-oriented countries such as the U.S., Canada, and Australia (Heesch, Sahlqvist, & Garrard, 2012; Moudon et al., 2005). From the supply perspective, alongside the on-going development of national and European scenic cycling routes and networks, holiday cycling is widely accessible because many cities are initiating cycling-friendly policies, bike paths, and bike-sharing schemes (e.g., Pucher et al., 2010). Recent estimates of the market share of bicycle tourism in Europe on the basis of cycle holidays and daily cycling excursions revealed that, although countries with established cycling culture and high cycling rates remain the most appealing, other tourist

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destinations such as Italy, Spain, Hungary and Poland are observing a rapid increase in cycle tourism (Weston et al., 2012).

The interest in cycle tourism is relatively new and the use patterns of bicycle infrastructure for tourism have been scarcely explored (Deenihan, Caulfield, & O'Dwyer, 2013). Most of the existing studies focused on scenic regional, national and European cycling routes and networks. Some studies analyzed the preferences of recreational cyclists for route attributes. Ritchie (1998) showed that cyclists in New Zealand prefer circular scenic routes with high road safety and low traffic congestion. Downward and Lumsdon (2001) found that recreational cyclists in Staffordshire Moorlands seek scenic bike paths that are marked and traffic free, with service and refreshment areas. Chen and Chen (2013) concluded that recreational cyclists in Taiwan prefer bike paths with attractions, refreshment and maintenance areas. Other studies monitored the use patterns of specific bicycle trails. Cope et al. (2003) surveyed a sample of 10% of the cyclists using the U.K. National Cycle Network and found that the percentages for recreation versus utilitarian cycling are respectively 67% and 33%, and that the majority of the users were adults over 30 years old, male, and fully employed. Lumsdon, Downward, and Cope (2004) revealed that the North Sea cycle route in England is used by 8.4% of the cyclists for trips defined as short trips for a particular purpose (i.e., shopping or work), by 25.3% for trips defined as short circular trips that are less than 3 h, by 22.6% for trips defined as short out-and-back recreational trips, and by 10.0% for trips defined as day rides. Deenihan et al. (2013) studied the use of the Great Western Greenway in Ireland by tourists and locals and found pronounced morning and afternoon peaks during weekdays, as well as the use of the trail increasing with the increase in the temperature and decreasing with rainfall. Two studies focused on GIS tools for the development of recreational cycling. Souffriau et al. (2011) suggested a path-finding algorithm to help cyclists plan their route in a web-based bicycle route planner for East Flanders in Belgium. Bíl, Bílová, and Kubeček (2012) suggested a method for a unified GIS database representing the cycle tourism infrastructure in the Czech Republic. The resulting GIS database contributes to improving the management of the network of cycle trails.

The current study is the first to explore the behavioral factors underlying the intentions to use urban bike-sharing for recreational cycling by potential tourists during their holiday, which is highly important because domestic and international tourists form a large demand group for bike-sharing (Buehler, 2011; Zhang, Zhang, Duan, & Bryde, 2014), in particular in major tourist destinations. Addressing the factors underlying the intentions to use bike-sharing systems in cities is important from both the tourism and the transport planning perspectives. From the tourism perspective, bike-sharing systems provide the possibility to use a healthy, enjoyable, and relatively inexpensive door-to-door transport mode at the holiday destination. Cycling carries high physical and mental health benefits, even when considering accident and air pollution risks for cycling in urban areas, and the benefits are higher in cities with segregated bike paths and when choosing routes with low-traffic volumes (de Hartog, Boogaard, Nijland, & Hoek, 2010; Teschke, Reynolds, Ries, Gouge, & Winters, 2012). From the transport planning perspective, considerable tourist influx impose a demand pressure on the city public transport and road infrastructure, and generate negative externalities, in particular where the tourism intensity is high and the transport system is not designed to accommodate such influx (Albalate & Bel, 2010). As bike-sharing can be used as complementary to or substitute of public transport, and as domestic and international tourists are a large demand group for both public transport and bike-sharing systems in major tourist destination (Buehler, 2011; Zhang et al., 2014), bike-sharing systems can be a sustainable solution and contribute to protect scenic, sport, and historical conservation areas (Zhang et al., 2014). Hence, it is important to understand the factors shaping tourist demand for bike-sharing systems in order to help in the design and branding of such systems to tourists.

The number of bike-sharing systems has been growing at an unprecedented pace almost doubling in less than five years to nearly 700 systems (Fishman, Washington, & Haworth, 2014). Bike-sharing systems are operating in iconic cycling cities such as Copenhagen, as well as in major tourist destinations that are not naturally associated with cycling such as London, Barcelona and New York (Fishman et al., 2014; Parkes, Marsden, Shaheen, & Cohen, 2013), and small or medium-size cities such as Santander (Romero, Ibeas, Moura, Benavente, & Alonso, 2012), which are popular vacation destinations. Bike-sharing systems allow users to access bicycles located in bicycle docks around the city on an as-needed basis using a daily, monthly or annual pass (Parkes et al., 2013). While bike-sharing facilities are less important in rural areas for cycle tourists who usually bring their own bike (e.g., Downward & Lumsdon, 2001; Simonsen, Jørgensen, & Robbins, 1998), the market potential of such systems among the general tourist population could be higher. A study conducted on the island of Bornholm in Denmark found that 20% of all the tourists hired a bicycle during their stay (Simonsen et al., 1998). While many bike-sharing systems operate in major tourist destinations, studies on their market penetration focused on demand from local residents (Bordagaray, Ibeas, & dell'Olio, 2012; Fishman, Washington, & Haworth, 2012; Shaheen, Zhang, Martin, & Guzman, 2011), and thus mainly on the system efficiency for utilitarian trips. Studies on bike-sharing use patterns in such destinations do not differentiate between local residents and tourists (e.g., Kaltenbrunner, Meza, Grivolla, Codina, & Banchs, 2010; O'Brien, Cheshire, & Batty, 2014; Ogilvie & Goodman, 2012). The appeal of the new generation of bike-sharing systems for holiday cycling has not been investigated so far, and the current study is the first looking into this research direction.

The case-study focuses on the new generation bike-sharing system in Copenhagen (Denmark). The study aims at (i) evaluating the market potential for tourists given an operational and pricing scheme and uncovering the motivators underlying this potential, and (ii) understanding the attractiveness of the design characteristics for tourists and comprehending the bike rental frequency and purpose. The analytical framework is based on the Theory of Planned Behavior (TPB) linking behavioral intentions to attitudes, subjective norms and perceived behavioral control (Ajzen, 1991). Because at the time of this study the bike-sharing system was only at the pilot stage, the data for the analysis derived from a survey among an international sample of 655 adults requested to state their intentions to use the new bike-sharing system during a hypothetical vacation in Copenhagen. The analysis was conducted by means of structural equation modeling (SEM) because of its suitability to encompass joint decisions and to accommodate latent attitudinal factors alongside observed characteristics.

The remainder of the paper is structured as follows. The next section presents the background of the case-study. The following section presents the behavioral framework and mathematical modeling approach. Then, the context of the bike-sharing system in Copenhagen as the tourist destination and the survey design are described. Last, results are presented and discussed, and conclusions are drawn.

2. Case-study background: bike-sharing in Copenhagen

The new bike-sharing system called 'Bycyklen' is operated by the company 'GoBike' in cooperation with the rail company DSB and the municipalities of Copenhagen and Fredriksberg. This new system replaces the old Bycyklen system that was in operation from