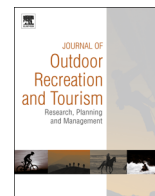Contents lists available at ScienceDirect

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Combining attitude theory and segmentation analysis to understand travel mode choice at a national park

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ABSTRACT

Transportation management is one of the most salient challenges facing managers of national parks and public lands. In order to determine strategies to increase voluntary use of alternative transportation modes, this study explores the factors that influence travel mode choice in recreation settings. We combine the theory of planned behavior and segmentation analysis to determine distinct segments of national park visitors in regard to their beliefs about transportation. Using cluster analysis, we identify three distinct segments of visitors to a popular national park in Colorado, USA. The segments are statistically similar in regards to sociodemographic variables, yet significantly different in terms of attitudes, subjective norms, perceived behavioral control and intentions to use shuttles. This study demonstrates the utility of combining segmentation analysis and attitude theory to inform messaging for travel information sources, such as intelligent transportation system (ITS) technologies. Combining attitude theory and segmentation analysis allows researchers and managers to identify specific types of visitor groups for targeted marketing campaigns in the context of nature tourism.

MANAGEMENT IMPLICATIONS

This research can help managers design alternative transportation systems to alleviate congestion caused by private automobiles. Our research found that:

- Alternative transportation must be frequent, dependable, and provide ample space to attract loyal users.
- Direct routes between parking and popular attractions as well as special opportunities such as pick-up/drop-off for one-way treks may increase alternative transportation use.
- Promotional materials and messaging should focus on the ability of alternatives to enhance sightseeing opportunities, reduce stress caused by driving, and simplify parking.
- When incentives fail to increase voluntary alternative transportation use, mandatory systems may be necessary at the most popular visitor attractions.

1. Introduction

Transportation management is one of the most salient challenges facing managers of America's national parks, wildlife refuges, national forests, and other public lands (Dilsaver & Wyckoff, 1999; Louter, 2006; White, 2007). In the past, as visitation increased and traffic congestion worsened, managers expanded transportation infrastructure to accommodate more private automobiles (Dilsaver & Wyckoff, 1999). Consequences of the automobile-dominated transportation culture within America's public lands include congestion and crowding at popular park attractions, air and noise pollution, erosion caused by parking outside of designated areas, and threats to the safety of visitors and wildlife alike (Hallo & Manning, 2009; Sims, Hodges, Fly, & Stephens, 2005; Youngs, White, & Wodrich, 2008).

In an effort to alleviate transportation issues, several public lands have implemented alternative transportation systems (ATS). Indeed, with the establishment of the Alternative Transportation Program in

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1998, the National Park Service (NPS) committed to invest in ATS rather than new roads. ATS may include any mode of travel other than the private automobile, such as buses, trains, trams, ferries and hiking and biking trails (White, 2007). ATS integrate traditional travel modes (e.g., hiking and biking trails) and alternative travel modes (e.g., trains, trams, buses, etc.) into comprehensive transportation systems to offer visitors the experiences and access they expect on public lands, without the need for a private vehicle (White, 2007). ATS typically offer transportation to and within public lands to reduce automobile use in both the recreation area and the gateway community. The NPS now has 147 alternative transportation systems in 72 park units throughout the United States (National Park Service, 2014).

Some parks, such as Denali and Zion National Parks, have implemented mandatory shuttle systems at the most popular recreation areas. Several early studies revealed greater public support for mandatory systems than anticipated (Harrison, 1975; Sims et al., 2005). Yet demand for reduced traffic congestion and public support for mandatory systems is not always sufficient to result in adoption of mandatory ATS (Sims et al., 2005). In general, visitors prefer incentives, such as free voluntary shuttles, to disincentives, like restricted automobile access (Anable, 2005; Holly, Hallo, Baldwin, & Mainella, 2010). Owing to the strong influence of public opinion in park management, the majority of ATS on U.S. public lands are optional. It is therefore all the more important that visitors are aware of ATS and that the services provided by these systems are comparable to those of private automobiles. Visitors desire frequent, uncrowded service to popular visitor attractions (Holly et al., 2010) and are more willing to use ATS that are spatially and temporally flexible (White, 2007). Furthermore, visitors are more willing to use alternative travel modes that are family friendly and provide adequate space for gear (White, 2007).

Many researchers and managers have looked to intelligent transportation systems (ITS) as tools to decrease the negative impacts of automobiles and increase the use of alternatives. ITS employ information technologies to provide pertinent travel information to visitors. Managers can combine various ITS technologies to meet specific needs and preferences. For example, route guidance systems are used to keep shuttles on schedule, highway advisory radio provides visitors with shuttle information and traffic and weather conditions, and electronic message signs are placed along approach roads to display short messages informing motorists of parking conditions and alternate travel options. Other ITS technologies include: global positioning systems; electronic signs that display real-time arrival and departure of shuttles; websites and social media that provide trip-planning information; and Smartphone applications that offer general recreation and real-time travel information (Daigle & Zimmerman, 2004a; Sheldon, 1997). ITS technologies are currently in use at Acadia, Arches, Grand Canyon, and Sequoia and Kings Canyon National Parks, among others (Daigle & Zimmerman, 2004a, 2004b; Dilworth & Shafer, 2004; Lawson, Manning, Valliere, & Wang, 2003; Strong, Eidswick, & Turner, 2007). Studies of these systems discuss some of the benefits and weaknesses of ITS as tools for travel management. In general, ITS provide visitors with access to travel information and help them avoid parking and traffic congestion. However, ITS are not a panacea. If managed improperly, ITS can exacerbate crowding by directing visitors to alternative travel modes that service only the most popular visitor attractions (Daigle & Zimmerman, 2004a, 2004b). The best systems combine ATS and ITS to provide visitors with the right information and access to distribute visitation spatially and temporally throughout a recreation area. Furthermore, information technologies differ in their applicability to different park settings and environments. For example, highway advisory radio (HAR), while effective in some urban areas, transmits poorly in rural and especially mountainous areas (Dilworth & Shafer, 2004).

This paper presents the results of a survey that applied the theory of planned behavior to better understand the motivations behind travel mode choice at Rocky Mountain National Park in Colorado, USA. According to Holly et al. (2010, p. 75), "As park planners and managers shift toward enhanced public transportation systems, it is increasingly important to gather visitors' input to help maximize the incentives and minimize the disincentives for use of this increasingly relevant and needed mode of travel." By understanding the factors that influence travel mode choice, we can determine who is likely to use alternative transportation and how to motivate them to do so. This knowledge can help managers maximize the value of ITS technologies as well as other travel information tools such as websites and Smartphone applications.

2. Conceptual framework

2.1. Mode choice and the theory of planned behavior

The theory of planned behavior (TPB) (Ajzen, 1991; Fishbein & Ajzen, 2010) is one of the most commonly used theories for exploring the factors that influence travel mode choice. According to the TPB, human behavior (so long as it is under an individuals' volitional control) is guided by reason. Three kinds of beliefs influence human reasoning. First, individuals hold beliefs about the positive and negative outcomes associated with performing a behavior. These beliefs are referred to as *behavior beliefs* and are assumed to influence attitudes toward a given behavior. Second, individuals form *normative beliefs*, which are beliefs about whether important people and groups in their life will approve or disapprove of their performing the behavior in question, and whether those important people/groups would perform the behavior themselves. Normative beliefs produce *subjective norms*, which are the perceived social pressures to perform or not perform a behavior. Finally, individuals form *control beliefs* about the internal and external factors that will aid or inhibit them from performing a behavior, resulting in *perceived behavioral control*, or the perceived ease or difficulty of performing a behavior. Once formed, attitude, subjective norm, and perceived behavioral control (PBC) influence an individual's *intention* to perform a behavior. The more favorable an individual's attitude, subjective norm, and PBC regarding a given behavior, the stronger their intention to perform that behavior. Intention is therefore the immediate antecedent of behavior. Given a strong degree of actual control, intention is a strong predictor of behavior. According to the TPB, it is possible to influence intention (and thereby behavior) by introducing a structural intervention to affect attitude, subjective norm, and/or PBC regarding a given behavior (Fishbein & Ajzen, 2010).

2.2. Segmentation analysis

Segmentation, or the act of defining meaningful sub-groups of individuals, is widely used in consumer studies to identify homogenous groups in order to tailor specific marketing campaigns and policies (Wedel & Kamakura, 2000). For a given behavior, individuals are grouped into specific segments using sociodemographic characteristics or by using multivariate statistical analysis to categorize unique clusters based on psychological factors (Anable, 2005). While ample literature exists on the psychological determinants of travel mode choice, few transportation studies have combined segmentation and attitude-theory.

Early studies almost exclusively used sociodemographic variables to assign segmentation, but over the last two decades researchers have demonstrated the value of segmenting based on attitudes (Hunecke, Haustein, Bohler, & Grischkat, 2010; Jensen, 1999; Pas & Huber, 1992; Redmond, 2000). In a survey of potential rail travelers in the United States, Pas and Huber (1992) identified five distinct groups based on attitudes toward various transportation services. Jensen (1999) used qualitative interviews to determine segments and their