Dynamic analysis of holiday travel behaviour with integrated multimodal travel information usage: A life-oriented approach

Bobin Wang *, Chunfu Shao, Xun Ji

MOE Key Laboratory for Urban Transportation Complex Systems Theory and Technology, Beijing Jiaotong University, Beijing 100044, China

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ABSTRACT

The Integrated Multimodal Travel Information (IMTI) plays an important role in the evolution process of holiday travel behaviour, which is seldom investigated. To fill this gap, this study analyses holiday travel behaviour dynamics with IMTI usage, based on the life-oriented approach. IMTI usage is taken as a separate life domain in this study, and a two-way relationship between holiday travel biography and IMTI usage biography over the life course, is examined after controlling for the effects of residential, household structure, employment/education, and car ownership biographies. Based on the web-based life history survey data, statistical characteristics of mobilities in each life biography are first analysed. Then, different random-effects ordered logistic models are established to investigate the biographical interdependencies from three aspects: intra-domain interdependency, inter-domain interdependency and outer-domain interdependency. The results show that the life biography is not only affected by a personal life course, but also affected by external background of the times. Under the interaction of inner individual factors and outer environment factors, there is an obvious dynamic two-way relationship between holiday travel biography and IMTI usage biography. Meanwhile, residential, household structure, employment/education and car ownership biographies have significant effects on these two life biographies. Especially, the influence of long-term state dependence for different life domains, over the life course, is much more obvious when explaining holiday travel behaviour dynamics and IMTI usage mobilities. Therefore, the life-oriented approach provides a valid method for analysing the dynamics of holiday travel behaviour with IMTI usage.

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1. Introduction

With the expansion of transport infrastructure and the improvement of people's living standards in China, holiday travel demand is increasing significantly. According to official statistics, the number of domestic tourists reached 3262 million person-times in 2013, with an average growth rate of 14.3% per year from 2004 to 2013 (Shao, 2014). Gradually, holiday travel has become an inevitable part in people's lives in China, but its spatiotemporal characteristics are more concentrated in time and space. Chinese people have an average paid annual leave of 11 days per year, which is less than many other countries (Dahlgreen, 2015). That makes them prefer to arrange their holiday travel in statutory holidays.

Moreover, most tourist attractions, or commercial centers, locate in big cities or tourism cities, thus holiday traffic congestion becomes more and more serious in large commercial centers and tourist attractions during statutory holidays (China

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* Corresponding author.
E-mail addresses: bobinwang@bjtu.edu.cn (B. Wang), cfshao@bjtu.edu.cn (C. Shao), 13114241@bjtu.edu.cn (X. Ji).

News, 2014). As a large number of travellers pouring into their destinations, people's activities and travel scheduling become more diverse and complex (Liu and Sharma, 2008). Therefore, it is necessary to study the characteristics of holiday travel behaviour and analyse the influencing factors for the dynamic evolution process of holiday tours, in order to make an appropriate travel demand management (TDM) policy and alleviate traffic congestion in holidays.

Holiday travel behaviour has different properties, compared with commuting on workdays. Firstly, holiday travel demand is elastic with more flexibility in time and space, thus the destination, departure time, travel mode and travel route in holidays, are not fixed. Secondly, a holiday travel union is usually a group, rather than an individual, so the holiday travel decision process involves multiple facets or portfolio choices concerning the group needs (Dellaert et al., 1998; Grigolon et al., 2013a). Meanwhile, holiday travel choices may take a longer decision-making process and establish long-term agendas. Thirdly, there are many statutory holidays in a year. Some occur in January, some take place in March, and some are celebrated in December. So different holidays occur at different time points, which are discrete in time. Moreover, the vacation time is usually very short, some holidays only have one day off. Thus, it is difficult to investigate holiday travel behaviour dynamics in the short-term (day to day dynamics for one week or several weeks). Therefore, this study analyses the dynamics of holiday travel behaviour in the long-term (year to year dynamics through one's lifetime after 18 years old), and establishes a dynamic evolution model for holiday travel behaviour considering multiple dimensional choices of elastic travel demand.

The dynamic evolution of holiday travel behaviour is a process of activity and travel scheduling changing over time, which results from the interaction of inner individual factors and outer environment factors. From the perspective of an individual level, individual travel behaviour may change in response to the variation of socio-demographic characteristics and self-selection issues in different life domains (Cosenza and Davis, 1981; Zhang, 2014a). On the social environment level, the dynamic balance of holiday travel choices may be broken by external forces in the long-term, such as transport infrastructure expansion and Intelligent Transportation System (ITS) construction (Wang et al., 2015a). Moreover, inner individual factors and outer environment factors are not independent, but inter-related with each other. However, most studies separate these two factors and focus on the influence of certain, or partial variables. Few studies investigate the interdependences between these influencing factors and analyse their overall effects on holiday travel behaviour. Therefore, the life-oriented approach is proposed to fill this gap.

According to the life-oriented approach, the dynamic travel choice results from dynamic influencing factors covering various life domains (e.g. residence, job, education, family life, leisure and recreation, as well as relevant travel behaviour) (Zhang, 2016). Moreover, with the rapid development of information technology, information usage plays an important role in our daily lives. It influences all aspects of people's work, study, and other life domains, and these life choices also affect their information usage at the same time. Similarly to travel behaviour, information usage results from different life choices and life choices are also affected by information usage too. Therefore, this study takes Integrated Multimodal Travel Information (IMTI) usage as a separate life domain, and investigates the two-way relationship between the holiday travel behaviour domain and the IMTI usage domain, after controlling for the effects of residential, employment/education, household structure, and car ownership domains over the life course.

IMTI is defined as a variety of activity and travel information covering all kinds of the trip modes, which can be divided into qualitative information (e.g. real-time traffic accident location, traffic control section, heavy traffic roads, etc.), quantitative information (e.g. queue length, vehicle speed, bus/metro arrival time, total travel time, etc.) and advisory message (e.g. route choice suggestion, departure time suggestion, alternative transfer information, etc.). IMTI usage mainly refers to the number of IMTI queries, query method and the influence degree of IMTI. There are a variety of ways to disseminate IMTI in holidays in China, including web portals, traffic radio, Variable Message Sign (VMS), call centers, Short Messaging Service (SMS) platforms, mobile communication terminals, electronic information boards, etc. (Wang et al., 2015a).

Many studies focus on the information influence on travel decisions, such as mode choice, destination choice and route choice, and take commuting as the research object (Grotenhuis et al., 2007; Liu et al., 2013; Parvaneh et al., 2012). However, very few studies investigate the two-way relationship between holiday travel behaviour and IMTI usage. Moreover, most studies only consider the influencing factors in one life domain, and neglect the influence of other life domains. In reality, IMTI is a critical factor that may influence and constrain holiday travel behaviour significantly, and holiday travel behaviour also has significant effects on IMTI usage at the same time. Therefore, understanding their two-way relationship will help to provide an effective IMTI service to induce the traveller's behaviour in holidays, and alleviate holiday traffic congestions effectively.

In light of the demonstration above, the contribution of this study is threefold: (1) It makes an initial attempt to apply the life-oriented approach to analyse holiday travel behaviour dynamics in the long-term. (2) Extending the major life domains of Zhang (2015) and taking IMTI usage as a separate life domain. The two-way relationship between holiday travel behaviour biography and IMTI usage biography is investigated after controlling for the effects of the other life biographies. (3) Enriching the life-oriented approach and providing the research framework for analysing holiday travel behaviour dynamics, considering biographical interdependencies among different life domains from three aspects: intra-domain interdependency, inter-domain interdependency and outer-domain interdependency.

This study is organised as follows. Section 2 briefly reviews the literature on holiday travel behaviour dynamics and the life-oriented approach. It also indicates the shortage of existing research and then clarifies the content and object of this study. Section 3 proposes the research framework and describes the modelling approach and model variables used in this study. Section 4 contains the survey and sample, and a statistical analysis for data is then presented in Section 5. Section 6