



Evolution and optimization of China's urban tourism spatial structure: A high speed rail perspective



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HIGHLIGHTS

- To divide the hinterland of tourist cities in non-HSR and HSR networks.
- To analyze the impact of the HSR on national tourism hinterland.
- To propose China's tourist urban agglomeration and optimization measures.

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ABSTRACT

High-speed rail (HSR) networks in China profoundly altered China's urban tourism spatial patterns. This paper examines the characteristics and evolution of spatial patterns of the urban hinterland before and after HSR network. Economic relation model and spatial analysis in ArcGIS were utilized on 338 national prefecture-level administrative units. The results show: (1) HSR strengthens tourism-based economic relationships between cities, and demonstrates a "corridor" effect of the spatial distribution of the change rates of tourism external economic relationships; (2) Center cities with larger tourism comprehensive scale are enhanced with expanding trans-province hinterland; the hinterland of central cities are enlarged, of which spatial linkages between the hinterlands are increased; (3) the competition and difference for the hinterland of central cities are intensified. Based on these, this paper proposes a tourism spatial structure with 19 urban agglomerations, 6 1st-class and 21 2nd -class tourist economic zones, and strategies for optimizing China's tourist space.

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1. Introduction

Transportation, an important component of tourism industry (Roselyne, 2008) and a bridge between tourists and tourist destinations (Wang, Huang, Zou, & Yan, 2012), has a significant influence on the development of tourism. The development of tourist destinations cannot do without the establishment and improvement of tourism transportation system. The accessibility index of transportation system, including air lines, highways and classified highways, has a high correlation with the development of tourist destinations (Wang & Chen, 2011). Transportation plays an

important role in the development of both new tourist destinations and existing ones (Gilbert, 1939). Appropriate transportation system not only stimulates recessionary tourist destinations, promotes promote the emergence, evolution, growth and expansion of tourist destinations (Kaul, 1985, p. 54). The impact of transportation system on the spatial pattern of tourist destinations is multi-dimensional, and the evolution of the tourism transportation system directly leads to the change of internal organizational structure and the evolution of external form of the tourist destinations (Yang & Lu, 2013). As a result, the transportation system affects the diffusion and attractive range of tourist destinations.

Different transportation modes have varied characteristics in aspects of economy, speed, convenience and safety, causing diverse effects on tourism. The diversification of competition of different transportation modes can be conducive to the reduction of traffic price and the improvement of service quality, which can bring great benefits to the tourism industry (Bruce, 2000). In the nineteenth

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century, depending on the greater convenience and lower travel costs, the development of British seaside resorts has been promoted by railway in the first place (Gilbert, 1939; Robinson, 1976, p. 98). The opening of the English Channel tunnel greatly impacted on sea and air transportation. The Britain government seized this opportunity to promote and sell the railway tourist routes to attract a large number of European tourists to UK, so as to improve the competitiveness of the local travel market (Janet, 1991). By the twentieth century, the development of automobile industry promoted the construction of tourism service facilities, increasing the number and size of the restaurant, the hotel along the road, thus expanded the travel distance. The tourism of Europe and North America gained rapidly development (Nelson & Wall, 1986). As the main means of transportation of urban recreational activities, car becomes a hot spot in the academic field (Connell & Page, 2008). After that, the emergence of aviation technology made intercontinental trips a reality, causing global tourist markets and destinations closely linked (Prideaux, 1993). Air transport and tourism are also interlinked. One the one hand, tourism stimulated the change in air transport, such as charter airlines, a most notably new business models. On the other hand, air transport opened new destinations and tourism forms such as long-haul excursions. The impact of aviation on tourism is influenced by many factors, such as the number of stopover, aviation policies and route planning (Daniel, 2009), as well as the establishment of international aviation hub (Bowen, 2000).

Any application of new technology on transportation will significantly impact tourism (Leiper, 1990) by changing accessibility (Marcin & Piotr, 2013). High-speed Rail (HSR), an important symbol of the “transportation revolution” worldwide (Wang & Chen, 2012), has a time compression effect that will change the accessibility of tourist cities along the HSR line (Wang, 2011), especially for mountain areas (Ravazzoli, Streifeneder, & Cavallaro, 2017). HSR thus impacts the regional spatial structure, society and the economy. The improvement of cities’ accessibility by the HSR differs by the locations of cities and stations as well as the development level of traffic networks (Ortega, López, & Monzón, 2012). Benefits from accessibility are primarily gained by cities that have HSR stations while little is gained by other cities, thus causing an imbalance in regional development; this is called “corridor effect” of the HSR (Andrés, Emilio, & Elena, 2013; Shaw, Fang, Lu, & Tao, 2014). Jin, Jiao, Qi, and Yang (2017) examined high-speed rail in East Asia and found that HSR brings about substantial improvement in accessibility, but also increase the inequality of nodal accessibility. On the one hand, after the HSR opened, the tourist flow became significantly concentrated in certain major tourist nodes and then spread to surrounding tourist nodes, demonstrating an obvious “core-periphery” trend of regional space. The “diffusion effect” of the HSR stimulates the integration of regional tourism development (Wang, Niu, & Chen, 2015). The HSR acted as a catalyst in the integration of European economy, society and culture, thus consolidating international tourism cooperative efforts (Commission of the European Communities, 1989). On the other hand, the opening of the HSR is helpful for the agglomeration of many economic activities in the developed cities (López, Gutiérrez, & Gómez, 2008), thus consolidates the central position of big cities and demonstrates a “siphon effect” from the HSR (Andrés et al., 2013). For example, the opening of Shinkansen in Japan consolidated economic activities and employment opportunities along HSR lines and formed the “Pacific Industrial Zone.” In 1989, with the opening of the Atlantic HSR, business tourism in Le Mans had improved — especially in relation to hosting exhibitions — that extended from provincial to national and even international users.

The agglomeration and diffusion effects brought by the time-space compression of the HSR change the position of a city in

terms of the urban system and the hierarchy structure (Garmendia, de Ureña, Ribalaygua, & Coronado, 2008); thus, the spatial pattern of regional tourism changes. One the one hand, HSR promotes regional economic potentials, on the other hand, it increases the imbalance between primate city and its hinterland (Gutiérrez, González, & Gómez, 1996; Jin et al., 2017; Zhu, Diao, & Fu, 2016). Masson and Petiot (2009) predicted that the influence of the HSR that runs between Spain and France on Perpignan tourism with a core-periphery model. He found that the HSR intensified the spatial competition and strengthened the tourism agglomeration in Barcelona, causing a “Matthew effect,” while spatial competition in Perpignan decreased and resulted in an HSR “filtering effect” (Masson & Petiot, 2009). The HSR strengthens regional connections by increasing the accessibility of the central city of an urban agglomeration, such that significant changes take place in terms of the degree and mode of interaction between key regional center cities (Kingsley, 1997). The regional impact of large cities separated by a medium distance are weakened and replaced by access to a long-distance metropolis after the HSR opens (José, Philippe, & Maddi, 2009). The time distance between these metropolises is greatly shortened and the flow of resources between urban agglomerations is stimulated. The hinterland of urban agglomerations continues to grow and expand so that adjacent urban agglomerations tend to integrate (Liu, 2011). Cities along HSR lines that have good infrastructure conditions and rich tourist resources become centers for elements of the tourism industry, thus introduce a new format for tourism development growth. Therefore, the urban hinterland changes, and the traditional spatial patterns of urban agglomeration are disrupted by the HSR (Jiang & Chu, 2014). Spatial differentiation and reorganization become increasingly complex, which may facilitate the reconstruction of urban agglomeration.

Since the opening of the Beijing-Tianjin intercity rail line in August 2008, China entered the era of the HSR. By the end of October 26, 2014, China’s HSR mileage had reached 12,000 km, ranking number one worldwide. Not only China, countries such as Europe, the United States, India, Turkey - Iran area, Arabia Union and other countries and regions are also planning to build a HSR network in large area in the future. In addition, with the advance of China’s national policy of “One Belt and One Road”, the Trans-Siberian Railway, and four world-class HSR lines, which are Pan-Asian HSR, Central Asia HSR, Eurasian HSR, China-Russia-Canada-USA HSR, will gradually be put on the agenda. The impact of HSR on the regional tourism spatial structure, which will play a leading role in the evolution and optimization of the space structure in the future, has become an urgent research topic. In today’s increasing global HSR construction, China will finish the “four vertical and four horizontal” HSR network by 2020 and go ahead in the forefront of the world’s HSR development. China will also become a typical case for HSR tourism research. China’s HSR construction has provided profound changes of city’s tourism spatial pattern along the lines, which may provide an example for other countries in the world. The evolution of China’s regional tourism spatial pattern revealed by this study shows the important role of HSR in reconstructing tourism space. The theory and method of this research are also applicable to other countries’ HSR tourism research.

At present, researches on the relationship between the HSR and regional tourism spatial structure mainly start with the accessibility. The main measure methods include travel cost indicators (e.g. weighted average travel time (WATT)), daily accessibility (DA), and potential accessibility (Liu, 2011; Jin et al., 2017). Potential accessibility includes the attribute of nodes (economic and demographic data), which enables the result more fit with the actual situation. Meanwhile, the hinterland theory is adopted to study the attraction and radiation power of the HSR, in order to describe the evolution and optimization of regional tourism spatial pattern

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