

Assessing the impacts of the high-speed train on tourism demand in China

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The high-speed railway has been an appropriate embodiment both of China's phenomenal rise and of its inherent economic and social dilemmas, which are assuming growing regional and international relevance. This study develops an econometric model to investigate the impacts of the Wuhan–Guangzhou high-speed railway on domestic tourism receipts in three Chinese provinces. The auto regressive and moving average (ARMA) model is integrated into a time series approximation and analysis. The results indicate that, while the provinces of Guangdong and Hunan have benefited from the high-speed railway, it has limited influence on Hubei province. The theoretical contributions and practical implications of the study are also elaborated.

Keywords: high-speed railway; tourism receipts; ARMA model; China

Advancement in transportation technology has long been regarded as one of the three pillars underlying the prosperity of modern tourism, the other two being soaring disposable income and increased leisure time (Cooper and Wahab, 2001; Fayos-Sola and Bueno, 2001). It has even been argued that tourism itself is about transport, semantically and practically (Kaul, 1985). A common agreement has been reached that the provision of transport infrastructure is a necessary precondition for the development of the tourism industry, and even

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for the destination dependent on tourism at large (Abeyratne, 1993; Chew, 1987; Page, 1994). In China, which is projected to become one of the world's top destinations by 2020 (UNWTO, 2010), a landmark development in the field of tourism transportation has been the construction and operation in the past decade of the China Railway High-speed (CRH) Train. At the end of 2012, 18,000 km of high-speed railway had been constructed, and the highest speed the train had reached was 350 km/h, both taking first position in the world (MOR, 2011). It is planned that by 2020 10,000 km of high-speed railway will have been built, connecting all major cities and covering 90% of the country's population.

However, ever since the planning of the high-speed railway, it has been the subject of considerable controversy, which peaked after a fatal collision of two high-speed trains in July 2011. In addition to potential safety concerns, the majority of disputes have centred on the economic contributions of the railway, especially in light of the huge costs involved in the construction of the railway and the train, as well as the business efficiency of the current trains. While consideration from the tourism perspective is assuming growing significance in the literature on the cost and benefits of CRH trains both in China and internationally (Shao, 2012), little work has been undertaken to address the relationships between the operation of CRH trains and tourism development in local destinations. This paper intends to fill this research gap by analysing the tourism impact of CRH trains in a comprehensive, consistent and context-relevant manner. Our objectives are twofold: to explore and model the major factors pertinent to the tourism impacts of CRH trains; and to evaluate and compare the economic impacts of CRH trains on the tourism development in selected Chinese destinations.

Literature review

Transport and tourism development

The importance of transport in destination development has been acknowledged from economic, socio-cultural, anthropological, environmental and technical perspectives (Martin and Witt, 1988; Hall, 1991; Inskip, 1991; Gunn, 1994; Page, 1994, 1999). Pan (2005) portrays tourism transport as a dynamic and complex system constantly interacting with other components of the tourism system. In the classic tourism system proposed by Leiper (1990), transport serves as the key channel linking traveller generating and destination regions. According to elaborations on core-periphery interactions by Hohl and Tisdell (1995), transport provides the very medium through which resources, capital, technologies, industries as well as markets are clustered, thereby rippling the economic potential of the core to the peripheral regions. In this sense, transport plays an important role not only in shaping the relationships between the core and peripheral regions, but also in shifting such relationships should there be changes in the transport contexts (Pearce, 2002). Therefore, the dynamics of regional tourism industries hinge greatly on the transport conditions, especially when it comes to those regions under the transformation from reliance on external support to self-sustainability (Prideaux, 2000).

At the destination level, meanwhile, the issue of accessibility has long been regarded as the main facilitating and inhibiting factor in local tourism development (Mill and Morrison, 1998; Goeldner and Ritchie, 2003). For destinations in underdeveloped countries, transport always tops the priority list in feasibility studies of local tourism endeavours. At the other end of the scale, for high-end attractions, such as tourism resorts, a sound transport infrastructure is a prerequisite for the provision of high-quality products and experiences (Prideaux, 2000). Prideaux (2005) also recognizes the upgrading of transport conditions and facilities as an effective approach in contributing to the sustainable development of resort destinations, especially during the renovation stages of their lifecycles. In addition, transport underlies inter-destination and intra-destination networks, and the categorizations of different destinations thus derived can shed light on optimization of destination attractiveness and cooperation (Lew and McKercher, 2002). For instance, it has been claimed that gateway hub cities are in an excellent position to stimulate inter-modal transport, on one hand, and enlarge access to the further hinterland, on the other (Van Klink and Van den Berg, 1998; Palhares, 2003).

From a tourist's perspective, the influence of transport on the decision-making process can be incorporated into elaborations on the theories of distance decay and market access. The theory of distance decay was first put forward by Bull (1991). It proposes an inverse relationship between the demand for travel and the distance to be covered, with the transport considerations exerting a moderating influence. In addition, transportation costs usually take a dominant proportion of the trip expense – 30 to 40%, transport can be regarded as a proxy for the cost factor, which is another inhibiting force on travel demand (Mill and Morrison, 1998). Hence, the manipulation of the potential tourist's perceptions of transport, with the time factor inherently involved with it, can unleash travel demand to an extent few other approaches can rival (McKercher, 1998a). Furthermore, several authors have also questioned the validity of distance decay theory by revealing the existence of so-called effective tourism exclusion zones at some distance – not necessarily a great distance – where there may be little or no demand and beyond which some kind of secondary peak demand can be observed (McKercher and Lew, 2003). Compensating for the impacts of such zones, favourable transport factors can effectively maintain and boost motivations of travel.

In addition, as has been pointed out by McKercher (1998b), according to the theory of market access, given equality of the products offered, the competitive advantage will go to the destination with the greater proximity to the market. Market access can be measured by the relative difference in the time, cost, distance or effort required to access different destinations (Pearce 1989). In this sense, transport conditions are positively correlated with the extent of market access, and thereby contribute to the consolidation of competitive advantages of the destination. McKercher (1998b) goes further and specifies the two practical benefits that can be gained by destinations that allocate a substantial degree of recognition and emphasis to their market access. For one thing, stronger market access will guarantee sufficient visitations, especially from people who cherish time and effort spent en route as precious commodities. For another thing, places with stronger market access will have a better chance of functioning as secondary locales of attraction

diverting would-have-been transit consumer flows heading to their primary destinations.

Railways and tourism

The railway has long been identified with modern tourism (Li and Liu, 2005). Compared with other modes of transportation, railways are seen as having such competitive advantages as safety, convenience, timeliness, flexibility and economic value for the tourist. The railway is of vital significance to destinations located in a geographically challenging terrain where air transport is impractical (Hall, 2000). Also, chartered train journeys are regarded as the prototypes of their air and cruise counterparts (Mill and Morrison, 1998). Frandberg (1998) suggests that the railway should be the ideal choice for the development of sustainable tourism. According to Mill and Morrison (1998), railway transportation is usually characterized by multi-stakeholder interrelationships, covering all major components of the destination tourism system. Particularly, given the enormous financial costs concerned with railway infrastructure, Murphy *et al* (2000) consider support from the government to be a crucial factor of the success of destinations dependent on railway transportation, with Europe being a case in point.

Besides, there has also been an academic consensus that the railway itself and the trains running on it have become a unique category of tourist attractions in their own right (Dallen, 2007). Papatheodorou (2001) attributed the emergence of this new form of attraction to both the lineage of the railway trip with the broader travel experiences, and the cultural values concomitant with such trips. Accordingly, the special segment of railway tourists can be profiled and targeted in marketing. Hall (2000) proposed the initiation of innovative themes and the integration of other products – especially sightseeing and entertainment – in destination planning to cater to this market segment more effectively.

Related research

Empirical research on the interrelationships between transport and tourism developments has largely been lacking, not to mention studies exploring the consequences of railway developments in tourism terms. Generally, transport-related variables have been incorporated into broader models of forecasting tourism demand through applications of such approaches as regression and time series analyses (Song and Li, 2008). The costs of transportation, in both temporal and monetary terms, have also constituted models for evaluating tourist expenditures and the mechanisms of the absorption of those expenditures into the local economy of the destination (Li and Liu, 2005). Khadaroo and Seetanah (2008) employ a gravity framework in confirming the importance of transport infrastructure in determining the tourism attractiveness of destinations. More specifically, Zhang and Lu (2002) compare different functions of rail, highway and air transport in tourism development and elaborate on their respective strengths and deficiencies. Furthermore, a unique sociological perspective of transportation is provided by Yeoman (2006) on how transportation might help enhance authentic experiences of the tourist.

When it comes to the issue of high-speed railway and tourism, existing

research efforts have concentrated on cases in Europe, where the high-speed railway was first completed and operated, in France in 1983. Beneficial effects that can be brought about by the high-speed rail to local tourism development have been addressed, particularly the cultivation of new market segments, like business and urban tourism (Masson and Petiot, 2009). In particular, the environmental advantages represented by the high-speed mode have often been raised in response to challenges concerning its costs (Nakagawa and Hatoko, 2007). However, potential challenges that could arise, while still lacking evidence from empirical examinations, are highlighted. For instance, the availability of high-speed railway may deprive business opportunities for other components of the tourism industry – for example, accommodation nights in hotels (Bull, 1991). Furthermore, the effects of high-speed rail could be unbalanced in spatial terms, with gains for one destination being losses for another along the route (Sinclair and Stabler, 1997). Masson and Petiot (2009) further argue that high-speed rail should not be treated as a panacea for tourism, and the existing tourism potential of the destination, with no exception of its current transport infrastructure, should be taken into account for high-speed rail to exert positive effects on destination development. At the same time, managerial challenges and financial concerns have further clouded the prospects of high-speed railways and the confidence of both public and private investors, with the latest evidence in Taiwan (Rong and Zhang, 2010).

Since CRH trains have been in operation for only a few years, studies on their tourism impacts have been quite limited, mostly centring around general planning and development strategies (Hu, 2010; Zhang, 2010; Huang, 2011). Considering the scale of the high-speed railway in China, as well as recent controversies over its economic and social effects, it is imperative in both theoretical and practical senses to explore the economic values of the CRH trains in tourism terms. In this paper we aim to assess the tourism impacts of CRH trains in a comprehensive, consistent and context-relevant manner. Specifically, the objectives are to explore and model the major factors pertinent to the tourism impacts of CRH trains, and to evaluate and compare the economic impacts of CRH trains on tourism development in selected Chinese destination areas.

Methodology

This study selects the three provinces along the Wuhan–Guangzhou high-speed railway as its research samples; namely, Hubei, Hunan and Guangdong. The selection is based on the peculiarities of this route, which contribute to the validity of the study. First, the route spans 11 destinations in three provinces in the middle and south of China with varying levels of economic and social development. For example, the destination of Guangzhou in Guangdong, the terminus of the railway, is an internationalized metropolitan city with rich tourist attractions and advanced infrastructure. The destination at the other end, Wuhan in Hubei province, is a regional centre in the middle of China. For cities such as Shaoguan in Guangdong and Xiangtan in Hunan, where the economies are much less developed, pro-poor tourism styles have been long practised. Therefore, investigations of these destinations can yield the broadest picture of

the tourism impacts brought by the high-speed railway. Second, the Wuhan–Guangzhou route was the longest high-speed railway – nearly 1,070 km – with the fastest trains at the time of its completion in December 2009, attracting considerable attention from both policymakers and the mass media. So assessing the tourism impacts of this route is expected to attenuate discourses from the tourism field in the broader public debate. Third, while there have already been high-speed railways connecting more representative Chinese destinations such as Beijing and Shanghai, the effects of mega events like the 2008 Olympic Games in Beijing and 2010 World Expo in Shanghai may have overwhelmed the influences of the high-speed railway itself.

In accordance with the requirements of the construction of this model, the periods of January 2008 to December 2009, preceding the operation of the high-speed railway, and January 2010 to December 2011, after the start of its operation, are chosen as the time series frame.

This study expresses the tourism receipts of the three provinces of Guangdong, Hubei and Hunan during the research period as a function of income, prices and the high-speed railway as follows:

$$Y = f(X, P, D)$$

where Y is the tourism receipts of the province; X is the disposable income of the tourists visiting the province; P is the price of tourism goods and services in the province; and D is a dummy variable indicating the high-speed railway.

We use only domestic tourism receipts as the measure of the high-speed railway's tourism impacts on the three provinces. The exclusion of international tourism receipts is based on the rationale that, compared with the volume of national domestic tourism receipts, which totalled around US\$30.60 billion, US\$27.27 billion and US\$62.41 billion in 2011 in Hubei, Hunan and Guangdong, respectively, that of international revenue is quite small (at US\$0.94 billion, US\$1.04 billion and US\$13.91 billion in 2011, respectively), therefore exerting limited influence on the overall picture.

Meanwhile, the disposable income of the domestic tourists to the province (X) is measured as the average of those of the top three origins. In accordance with criteria set by Dwyer *et al* (2000), the consumer price index (CPI) in the province is used as a proxy for the price of tourism goods and services in the province (P). The data above can be obtained from the *Yearbook of China Tourism Statistics*, as well as the *Annual Report of Economic and Social Developments* of the respective provinces. Finally, a value of 0 is assigned to D for the time series period before the operation of the high-speed railway, and a value of 1 is assigned to D for the period after the start of operation.

Specifically, the regression model of this study is constructed as follows:

$$\log(Y_t) = \beta_0 + \beta_1 \log(X_t) + \beta_2 CPI_t + \beta_3 \log(X_t) * D$$

Taking cognizance of its peculiarities, this study employs the auto regressive and moving average (ARMA) model to refine the time series relationships between the dependent and independent variables. ARMA is based on the assumption of a stationery time series with 'smooth' fluctuations along a time-invariant mean (Chatfield, 2004). It consists of three components of auto

regression, individual dependence and moving average (Neuman, 2000). ARMA is considered suitable for prediction uses with desired accuracy and scale parsimony, particularly for estimating the significance of certain variables to the system (Monserud, 1986). Furthermore, ARMA contributes to model perfection by removing the effects of potential persistence factors irrelevant to the variables under investigation (Chatfield, 2004). Since the introduction of high-speed railway can be regarded as a 'shock' event to the tourism development of the investigated localities, AMRA is deemed as an appropriate statistic platform to compare the domestic tourism receipts of the three provinces before the introduction of the high-speed railway with those after the railway introduction, from which the effects of the high-speed railway can be delineated. For the model testing, the 8.0 version of the software of Statistic Analysis System (SAS) is utilized.

Results

First, a linear test is conducted to explore the regressive nature of the proposed relationships as follows:

$$y_t = a + bx_t + x_{t2} + \dots + x_{tm} + e_t.$$

Results of the linear testing are presented in Table 1. According to corresponding criteria concerning the value of Dw, the relevance of time series data for Hubei province is rejected, indicating little difference between the period before the introduction of the high-speed railway and the period after. In other words, the impact of the high-speed railway on domestic tourism receipts of Hubei are indistinct. The linear regression model for Hubei province is confirmed as follows:

$$\log(Y_t) = -1.0978 + 1.3526\log(X_t) - 0.0421 \text{ CPI}_t + 0.0711\log(X_t)*D$$

(−0.47) (3.41) (−3.43) (5.94).

In contrast, for the provinces of Hunan and Guangdong, respective Dw values have exhibited satisfactory time series relevance ($\text{sig} < 0.05$). Thus, the high-speed railway has exerted a distinct influence on the domestic tourism receipts of these two provinces. To further delineate the influence, an ARMA model is applied to the series of the linear regression model as follows:

Table 1. Results of linear testing.

	Dw	Significance	R ²	F
Hunan	1.6217	0.0463	0.9831	247.52
Hubei	2.2792	0.7014	0.7811	52.35
Guangdong	1.6434	0.0457	0.9999	11747.2

$$\begin{cases} x_t = \phi_0 + \phi_1 x_{t-1} + \phi_2 x_{t-2} + \Lambda + \phi_p x_{t-p} + \varepsilon_t \\ \phi_p \neq 0 \\ E(\varepsilon_t) = 0, \text{Var}(\varepsilon_t) = \sigma_\varepsilon^2, E(\varepsilon_t \varepsilon_s) = 0, s \neq t \\ E x_s \varepsilon_t = 0, \forall s < t. \end{cases}$$

After the integrated calculation, the respective final linear regression models for Guangdong and Hunan provinces are presented as follows:

Guangdong:

$$\log(Y_t) = 0.70817 \log(X_t) - 0.00084 \text{CPI}_t + 0.04937 \log(X_t) * D + 0.13833 \text{AR}(4)$$

$$(7.69) \quad (-0.12) \quad (7.34) \quad (3.84).$$

Specifically, from January 2008 to December 2009:

$$\log(Y_t) = 0.70817 \log(X_t) - 0.00084 \text{CPI}_t + 0.13833 \text{AR}(4).$$

From January 2010 to December 2011:

$$\log(Y_t) = 0.75754 \log(X_t) - 0.00084 \text{CPI}_t + 0.13833 \text{AR}(4).$$

Hunan:

$$\log(Y_t) = 2.6431 + 0.64601 \log(X_t) - 0.00154 \text{CPI}_t + 0.0608 \log(X_t) * D + 0.12643 \text{AR}(4)$$

$$(0.6) \quad (8.86) \quad (-0.123) \quad (4.08) \quad (4.04).$$

Specifically, from January 2008 to December 2009:

$$\log(Y_t) = 2.6431 + 0.64601 \log(X_t) - 0.00154 \text{CPI}_t + 0.12643 \text{AR}(4).$$

From January 2010 to December 2011:

$$\log(Y_t) = 2.6431 + 0.70232 \log(X_t) - 0.00154 \text{CPI}_t + 0.12643 \text{AR}(4).$$

All of the β values are significant at 0.05 level. Therefore, the goodness-of-fit indices are achieved satisfactorily, and the proposed model is confirmed. Domestic tourism receipts in Guangdong and Hunan provinces from January 2008 to December 2011 can be validly accounted for by the disposable income of the domestic tourists, the CPI level in the two provinces, as well as the operation of the high-speed railway. For Guangdong, before the operation of the high-speed railway ($D = 0$), an increase of 0.70817% in domestic tourism receipts is recorded for every 1% growth in the disposable income of the domestic tourists; after the operation of the high-speed railway ($D = 1$), with every 1% surge of disposable income, there is a rise of 0.75754% of domestic

tourism receipts. In terms of Hunan province, before the operation of the high-speed railway ($D = 0$), an increase of 0.64601% in domestic tourism receipts is recorded for every 1% growth in the disposable income of domestic tourists; after the operation of the high-speed railway ($D = 1$), with every 1% surge of disposable income, there is a rise of 0.70232% of domestic tourism receipts. Hence, the high-speed railway has been proved to render significant improvement on the domestic tourism receipts in Guangdong and Hunan provinces, while the domestic tourism income in Hubei province has benefited little from the high-speed railway.

Discussion and implications

The high-speed railway is one of the few public projects in which so many economic, political and environmental stakes are combined (Masson and Petiot, 2009). This study takes a systematic econometric approach to analyse the tourism impacts of a typical high-speed railway in south China, making its due contribution to theoretical and practical elaborations on the tourism implications of the high-speed railway. Taking cognizance of the scale of development of the high-speed railway in China, such elaborations may well assume significance at a global level. First, the results of this study empirically echo those of previous research proposing a positive relationship between transportation and tourism development (Prideaux, 2000; Pan, 2005). In the cases of Guangdong and Hunan provinces since the end of 2009 considerable effects on local domestic tourism receipts have been detected from the operation of the high-speed railway. Such effects become all the more pronounced when the respective characteristics of the two provinces are taken into account, with Guangdong a traditional power player in China's tourism development and Hunan a less developed inland region in which tourism has begun to prosper only recently. In this sense, the impact of the high-speed railway are widespread and profound, benefiting destinations with varying infrastructure conditions and stages of development. In fact, comparing the specific impact, greater growth is recorded in Hunan than in Guangdong, thus consolidating previous theoretical discussions that recommend a greater leverage of transportation development for less developed destinations (Palhares, 2003). There have also been reports that destinations in the two provinces that are not on the railway route have been benefiting from the spill-over effects of the high-speed railway, with some achieving a growth of 100% in tourism receipts after the railway started to operate.

Meanwhile, the profound tourism influence of the high-speed railway can be reflected in the peculiarities of the tourism products in the two provinces. Guangdong, as the epicentre of manufacturing industries and gateway for neighbouring Southeast Asian source markets, is primarily characterized by business, vacationing and cultural tourism products, while natural scenery and ethnic minority-based products are the dominant 'selling points' for Hunan. Our observations of the effects of the high-speed railway on local domestic tourism receipts, therefore, are consistent with the postulations of Hall (2000) and Dallen (2007) that transportation can contribute to the optimization of tourism product structures and enhance the overall attractiveness of the broader

destination. Particularly, since tourists from Guangdong have been the traditional leading source market for Hunan (Huang, 2011), the high-speed railway has brought new opportunities for inter-destination cooperation and integration, as noted by Lew and McKercher (2002).

From a consumer's perspective, the results of this study indicate that the high-speed railway has stimulated demand for travel, which is described by Hu (2010) as a facilitator in the decision making and consumer behaviour stages. The effects of the high-speed railway on tourists have been most evident in the shortening of travel time, from 11 hours to 3 hours from Wuhan to Guangzhou. The removal of the time restraint has led to a diversification of tourists' travel modes, especially with the growing popularity of weekend short-haul themed tours. Further evidence of this is the stiff competition posed by the high-speed rail to the airline industry along the route, and the response of the airlines, which included lowering prices, greater flexibility in flight schedules and, ultimately, connection packages with the high-speed trips. All this means a wider range of choices for the tourist and may have a profound influence on many aspects of their 'travel career' beyond increased spending. In addition, considering the relatively high prices of the high-speed tickets (at around RMB450 (US\$1 = RMB6.2) per person per trip for Wuhan to Guangzhou against RMB330 for a normal speed train), it can be anticipated that the high-speed railway has become a tourist attraction in its own right.

Furthermore, this study has identified limited impacts of the high-speed railway on domestic tourism receipts of Hubei province. This finding is underpinned by the argument of Masson and Petiot (2009) that the effects of the high-speed railway are unbalanced and even polarized. The most convincing rationale for this finding is the small number of high-speed railway stops in Hubei – three, compared to four in Guangdong and eight in Hunan. The synergistic effects of the high-speed rail are less articulated. In addition, except for the capital city of Wuhan, which is a regional metropolitan centre, Hubei province is primarily characterized by second-tier destinations that depend on natural scenery. Thus, there may be polarization repercussions of the high-speed railway between node destinations along the high-speed route and the more peripheral ones, especially the rural areas. Meanwhile, for destinations reliant on ticket income from homogenous tourist attractions such as natural landscape, tourist visitation may be siphoned off by the high-speed railway through the reduction of overnight stays. However, it should be mentioned here that the high-speed railway may have affected general tourism development in Hubei at the current stage, but that positive impacts may be manifest in the longer-term.

In addition to concurring with existing theoretical elaborations and highlighting some new findings, the results of this study also have practical implications for the development of the high-speed railway in China, particularly from a tourism perspective. After the exponential growth in construction and operation over the past decade, the high-speed railway has been the subject of heated debate among people from all walks of life with regard to its economic and social impacts. The findings of this study, although limited to the tourism field, provide solid evidence for the positive effects of the high-speed railway on the development of an industry that is assuming rising significance in the Chinese economy, thereby contributing to better

articulation of the current public discourse on the high-speed railway. Meanwhile, destination planners can initiate corresponding product development and marketing strategies to explore more fully the vast potential brought about by the high-speed railway. Regional cooperation, enrichment of tourism products and integration of the broader tourist transport infrastructure are appropriate strategies. With regard to industry practitioners, more innovative marketing campaigns should be devised to incorporate the high-speed rail components into the general travel package. An issue worthy of immediate attention is the design of itineraries that will ensure both time efficiency and experience optimization (Zhang, 2010). At the same time, efforts should be made to improve the service quality of the staff from all components of the industry, so that the 'software aspects' of the tourism industry can keep abreast with the 'hardware aspects', as represented by the high-speed railway.

This study is not without its limitations. First, there is room for refinement of the econometric model used. Other important independent variables can be integrated into the current model to enhance its validity and approximation of reality. Especially, factors relevant to inbound tourism such as exchange rates and international transport expenses could be explored, through which a more complete delineation of the effects of the high-speed railway on local tourism development can be derived. Meanwhile, the periods studied could be extended to include more data for model testing, and better models than ARMA could be used to produce more tenable results, particularly in terms of diminishing the influence of external factors. Furthermore, since this study focuses only on the economic effects of the high-speed railway at the macro level, research efforts on the decision-making and travel behaviour of tourists taking the high-speed train would definitely enhance our understanding of the tourism implications of the high-speed railway. Last but not least, the research subject could be expanded to other high-speed routes in China and around the world, and the samples could be extended to include international visitors, thus enhancing the reliability of results.

References

- Abeyratne, R.I.R. (1993), 'Air transport tax and its consequences on tourism', *Annals of Tourism Research*, Vol. 20, pp 450–460.
- Bull, A. (1991), *The Economics of Travel and Tourism*, Pitman, Melbourne.
- Chatfield, C. (2004), *The Analysis of Time Series: An Introduction*, 6th edn, Chapman & Hall/CRC, New York.
- Chew, J. (1987), 'Transport and tourism in the year 2000', *Tourism Management*, Vol 8, No 2, pp 83–85.
- Cooper, C.P., and Wahab, S. (2001), *Tourism in the Age of Globalization*, Routledge, London.
- Dallen, J. (2007), 'The challenge of diverse visitor perceptions: rail policy and sustainable transport at the resort destination', *Journal of Transport Geography*, Vol 15, No 2, pp 104–115.
- Dwyer, L., Forsyth, P., and Rao, P. (2000), 'The price competitiveness of travel and tourism: a comparison of nineteen destinations', *Tourism Management*, Vol 21, No 1, pp 9–22.
- Fayos-Sola, E., and Bueno, A.P. (2001), 'Globalization, national tourism policy and international organizations', in Cooper, C.P., and Wahab, S., eds, *Tourism in the Age of Globalization*, Routledge, London, pp 45–65.
- Frandsberg, C. (1998), 'Tourism as long distance mobility: a quantitative analysis of Swedes' leisure travel from a sustainability perspective', *Section of Human Ecology*, Vol 7, pp 35–46.
- Goeldner, R.C., and Ritchie, J.R.B. (2003), *Tourism: Principles, Practices, Philosophies*, 9th edn, John Wiley & Sons, Hoboken, NJ.

- Gunn, C.A. (1994), *Tourism Planning Basics Concepts Cases*, Taylor & Francis, London.
- Hall, C.M. (1991), *Introduction to Tourism in Australia: Impacts, Planning and Development*, Longman, Melbourne.
- Hall, C.M. (2000), *Tourism Planning*, Prentice Hall, Harlow.
- Hohl, A.E., and Tisdell, C.A. (1995), 'Peripheral tourism: development and management', *Annals of Tourism Research*, Vol 22, pp 517–534.
- Hu, L. (2010), 'An SWOT analysis of the impact of high-speed railway on tourism development of Tianjin', *Economic Research Guide*, Vol 6, pp 62–65.
- Huang, A. (2011), 'Effects of high speed railway on regional tourism development: case of high speed railway between Wuhan and Guangzhou', *East China Economic Management*, Vol 25, No 10, pp 47–49.
- Inskoop, E. (1991), *Tourism Planning: An Integrated and Sustainable Development Approach*, Van Nostrand Reinhold, New York.
- Kaul, R.N. (1985), *Dynamics of Tourism: A Trilogy (Vol. III). Transportation and Marketing*, Sterling Publishers, New Delhi.
- Khadaroo, J., and Seetanah, B. (2008), 'The role of transport infrastructure in international tourism development: a gravity model approach', *Tourism Management*, Vol 29, pp 831–840.
- Leiper, N. (1990), 'The partial industrialization of tourism systems', *Annals of Tourism Research*, Vol 17, pp 600–605.
- Lew, A.A., and McKercher, B. (2002), 'Trip destinations, gateways and itineraries: the example of Hong Kong', *Tourism Management*, Vol 23, pp 609–621.
- Li, G.Y., and Liu, H.H., eds, (2005), *The Tourism Syllabus*, Peking University Press, Beijing.
- Martin, C.A., and Witt, S.F. (1988), 'Substitute prices in models of tourism demand', *Annals of Tourism Research*, Vol 15, pp 255–268.
- Masson, S., and Petiot, R. (2009), 'Can the high speed rail reinforces tourism attractiveness? The case of the high speed rail between Perpignan (France) and Barcelona (Spain)', *Technovation*, Vol 29, pp 611–617.
- McKercher B. (1998a), 'The effect of distance decay on visitor mix at coastal destinations', *Pacific Tourism Review*, Vol 2, No 3/4, pp 215–224.
- McKercher, B. (1998b), 'The effect of market access on destination choice', *Journal of Travel Research*, Vol 37, pp 39–47.
- McKercher, B., and Lew, A.A. (2003), 'Distance decay and the impact of effective tourism exclusion zones on international travel flows', *Journal of Travel Research*, Vol 42, pp 159–165.
- Monserud, R. (1986), 'Time series analyses of tree-ring chronologies', *Forest Science*, Vol 32, pp 349–372.
- Mill, R.C., and Morrison, A.M. (1998), *The Tourism System: An Introductory Text*, 3rd edn, Kendall/Hunt, Dubuque, IA.
- MOR (2011), 'Blueprint for China's high-speed railway development 2020' (<http://gtjschina.com/gh/2.html>, accessed 8 March 2012).
- Murphy, P., Pritchard, M., and Smith, B. (2000), 'The destination product and its impact on traveler perceptions', *Tourism Management*, Vol 21, pp 43–52.
- Nakagawa, D., and Hatoko, M. (2007), 'Reevaluation of Japanese high-speed rail construction: recent situation of the North Corridor Shinkansen and its way to completion', *Transport Policy*, Vol 14, No 2, pp 150–164.
- Neuman, W.L. (2000), *Social Research Methods, Qualitative and Quantitative Approaches*, 4th edn, Allyn & Bacon, Boston, MA.
- Page, S.J. (1994), *Transport for Tourism*, Routledge, London.
- Page, S.J. (1999), *Transport and Tourism*, Addison Wesley/Longman, Harlow.
- Palhares, G.L. (2003), 'The role of transport in tourism development: nodal functions and management practices', *International Journal of Tourism Research*, Vol 5, No 5, pp 403–407.
- Pan, J.Y. (2005), 'The positive research on transportation and Tibet economic development', *Guizhou Ethnic Studies*, Vol 25, No 6, pp 97–105.
- Papatheodorou, A. (2001), 'Why people travel to different place?', *Annals of Tourism Research*, Vol 28, No 1, pp 164–179.
- Pearce, D.G. (1989), *Tourist Development*, 2nd edn, Longman Scientific, Harlow.
- Pearce, D.G. (2002), 'Tourism and peripherality: perspectives from Asia and the South Pacific', *Tourism and Hospitality Research*, Vol 3, No 4, pp 295–309.
- Prideaux, B. (2000), 'The role of the transport system in destination development', *Tourism Management*, Vol 21, pp 53–63.

- Prideaux, B. (2005), 'Factors affecting bilateral tourism flows', *Annals of Tourism Research*, Vol 32, No 3, pp 780–801.
- Rong, C., and Zhang, Z. (2010), 'Discussion on the problem of financial crises of Taiwan high-speed railway', *Comprehensive Transportation*, Vol 7, pp 34–40.
- Shao, Q.W. (2012), 'Speech on the national tourism work meeting 2011' (<http://www.cnta.gov.cn>, accessed 8 March 2012).
- Sinclair, T., and Stabler, M. (1997), *The Economics of Tourism*, Routledge, London.
- Song, H., and Li, G. (2008), 'Tourism demand modelling and forecasting – a review of recent research', *Tourism Management*, Vol 29, pp 203–220.
- UNWTO (2010), *World Tourism Highlights 2010*, World Tourism Organization, Madrid.
- Van Klink, H.A., and Van den Berg, G.C. (1998), 'Gateways and intermodalism', *Journal of Transport Geography*, Vol 6, No 1, pp 1–9.
- Yeoman, I. (2006), 'Current issue in tourism: the authentic tourist', *Tourism Management*, Vol 30, pp 27–29.
- Zhang, J., and Lu, L. (2002), 'Wuhu Yangtze river bridge and the improvement of tourist transport in Anhui province', *Human Geography*, Vol 4, pp 75–79.
- Zhang, M. (2010), 'High-speed railway's prospective impact on Chinese tourism and consideration of countermeasures', *Value Engineering*, Vol 11, pp 227–228.