Impact of High-Speed Rail Opening on Tourism Economy in Northwest China and Its Integration Pathways: Postprint

Authors: Bai Yang, Tan Lina, Liu Xiaoyan, Lu Wen

Date: 2025-02-27T00:00:00+00:00

Abstract

As an important component of transportation infrastructure, high-speed rail opening generates a significant "spatiotemporal compression" effect, effectively reshaping the spatial pattern of tourism economy and accelerating high-quality development of the tourism economy. This study closely aligns with the opportunity of high-speed rail construction in Northwest China, and based on municipal panel data from 2010–2021, employs a multi-period difference-in-differences model to examine the impact of high-speed rail opening on tourism economic development in Northwest China. The results indicate: (1) High-speed rail opening significantly promotes tourism economic development in Northwest China. Robustness tests confirm the validity of model specification and reliability of regression results. Heterogeneity analysis reveals that high-speed rail opening exhibits significant heterogeneous characteristics across cities with different tourism economic development levels, with stronger effects on tourism economic development in high- and medium-level cities. (2) High-speed rail opening leads to improved accessibility (impact magnitude: high-speed rail cities > overall region > non-high-speed rail cities) and changes in network centrality (impact magnitude: degree centrality > closeness centrality > betweenness centrality), thereby significantly influencing tourism economy in Northwest China. (3) Based on the analysis results and theoretical foundation, this study summarizes the driving mechanism of high-speed rail opening on regional tourism economic development and the integration path between them, thereby deepening the theoretical system and practical exploration of integrated "high-speed rail + tourism" development.

Full Text

ARID LAND GEOGRAPHY, Vol. 47, No. 12, December 2024

Impact Effects and Integration Paths of High-Speed Rail Opening on Tourism Economy in Northwest China

BAI Yang[1,2], TAN Li' na[3], LIU Xiaoyan[1,2], LU Wen[2]

[1] Key Laboratory of Sustainable Development of Xinjiang' s Historical and Cultural Tourism, Urumqi, Xinjiang, China
[2] School of Tourism, Xinjiang University, Urumqi, Xinjiang, China
[3] School of Culture and Tourism, Xinjiang Normal College, Urumqi, Xinjiang, China

---

Abstract

As a critical component of transportation infrastructure, high-speed rail (HSR) opening generates a significant "space-time compression" effect that effectively reshapes the spatial pattern of tourism economy and accelerates high-quality tourism economic development. This study closely examines the opportunity of HSR construction in Northwest China and, based on city-level panel data from 2010 to 2021, employs a multi-period difference-in-differences (DID) model to test the impact of HSR opening on tourism economic development in the region. The results demonstrate that: (1) HSR opening significantly promotes tourism economic development in Northwest China. Robustness tests confirm the model' s validity and reliability of regression results. Heterogeneity analysis reveals that HSR opening exhibits distinct characteristics across cities with different tourism economic development levels, with stronger effects on high-level and medium-level cities. (2) HSR opening leads to improved accessibility (with impact magnitude: cities with HSR opened > entire region > cities without HSR opened) and changes in network centrality (with impact magnitude: degree centrality > closeness centrality > betweenness centrality), which significantly affect Northwest China' s tourism economy. (3) Based on the analytical results and theoretical foundations, this paper summarizes the driving mechanism of HSR opening on regional tourism economic development and the integration paths between them, thereby deepening the theoretical system and practical exploration of "HSR + tourism" integrated development.

Keywords: high-speed rail opening; tourism economy; influence effect; integration path; Northwest China

---

High-speed rail serves as a major artery connecting regions and urban-rural areas, representing a strategic, pioneering, and critical national infrastructure.

To promote sustainable tourism development and alleviate regional imbalances in Northwest China, the Party and state have continuously increased investment in transportation infrastructure, expanding HSR investment scale and improving network layout. Rapid transportation networks are prerequisites for advancing regional tourism cooperation and optimizing regional tourism spatial structures, profoundly influencing the spatial morphology of tourism resources. Northwest China features vast territory and scattered tourism resources. With accelerating construction and increasing operational mileage, HSR has become a "booster" for tourism economic development in the region. Reviewing domestic and international research, HSR opening affects tourism destination spatial structures and tourism transportation accessibility at the macro level, and influences tourist consumption demand at the micro level. Scholars widely recognize that HSR' s "space-time compression" effect significantly improves inter-destination transportation accessibility, accelerates rapid flow of tourism elements across destinations, and profoundly impacts tourist travel behavior and consumption demand. The agglomeration effects accompanying HSR construction further improve tourism spatial structures and generate differential impacts on regional tourism economic growth. "HSR + tourism" research has diversified in perspectives, methods, and content, yet several gaps remain: studies often focus on iconic HSR lines or economically robust regions like urban agglomerations or the Pearl River Delta, while research on Northwest China with underdeveloped HSR networks remains scarce.

This paper' s potential marginal contributions include: selecting Northwest China as the study area, employing city-level panel data from 2010 to 2021, and using a multi-period DID model to test HSR opening' s impact on regional tourism economic development. This enriches case studies on HSR and tourism economy, deepens the theoretical system and practical exploration of "HSR + tourism"integrated development, expands new perspectives for inter-city tourism economic cooperation in Northwest China, and supports the implementation of the "Transportation Power" strategy.

1 Theoretical Mechanism and Research Hypotheses

Transportation is a crucial pillar of the tourism industry, significantly influencing coordinated tourism economic development and tourism spatial pattern reconstruction. HSR saves tourists' travel time, promotes urban tourism transportation accessibility, and its "space-time compression"and "economic spillover" effects lay a solid foundation for regional tourism economic development. Currently, Northwest China operates seven HSR lines, including Zhengzhou-Xi' an, Lanzhou-Xinjiang, and Yinchuan-Lanzhou, forming a network that reshapes regional tourism development patterns and serves as a representative area for studying "HSR + tourism" integration.

Based on tourism economic development history and HSR construction charac-

teristics, the driving mechanism of HSR opening and regional tourism economic development can be divided into five stages: initial emergence, rapid growth, steady development, temporary stagnation, and network optimization (Figure 1). According to growth pole theory, Northwest China' s tourism growth poles are primarily cities like Xi' an, Lanzhou, Baoji, Urumqi, and Baiyin—most of which are HSR cities. These cities possess inherent advantages in economy, resources, market, and transportation, attracting numerous tourism element growth poles and driving positive development in surrounding cities. During the initial emergence and rapid growth periods, HSR opening tends to generate agglomeration and polarization effects in the short term, exacerbating accessibility disparities, spatial imbalances, and regional non-coordination between HSR and non-HSR cities, necessitating a coordinated development pattern. According to point-axis theory, as HSR coverage expands, HSR cities gradually become transportation hubs during steady development and temporary stagnation periods, facilitating diffusion of tourist flows, capital flows, and other tourism elements along HSR lines to surrounding areas. Characteristics such as improved accessibility, closer economic ties, better spatial structures, and optimized network centrality gradually emerge, forming a regional tourism economic development pattern with HSR cities as cores and HSR lines as axes. During network optimization, the point-axis development pattern accompanying HSR opening helps break boundaries of urban tourism economic development, narrow regional disparities, and form internal momentum for continuous strengthening of tourism industry integration and agglomeration. HSR opening shortens spatial distances between multiple tourism growth poles, and the resulting diffusion effects cause radiation areas of tourism growth poles to wax, wane, or grow synchronously, profoundly influencing Northwest China' s tourism economic spatial pattern and catalyzing sustained "tourism fever." The restructured tourism economic spatial pattern, in turn, affects HSR construction. Leveraging HSR opening dividends creates internal drivers that promote coordinated regional tourism economic development, creating favorable conditions for HSR expansion and advancing regional HSR network formation.

Based on the above analysis, we propose the following hypotheses:

H1: HSR opening significantly affects tourism economic development in Northwest China, with heterogeneous impacts across cities.

H2: HSR opening-induced accessibility improvement significantly affects Northwest China' s tourism economic development, with differential effects across cities.

H3: HSR opening-induced changes in urban network roles generate differential impacts on city-level tourism economy.

---

2 Research Methods

2.1 Study Area Overview

Northwest China connects North, Central, and Southwest China to the east, Central Asian countries and Europe to the west, Pakistan and India to the south, and Russia and Mongolia to the north. It is a hotspot region for the Silk Road Economic Belt initiative and world-class tourism destination construction. By the end of 2021, Northwest China had a permanent population of 7.32$×10^{8}, GDP of 1.04×10^{12}$ yuan, and total tourism revenue of 6.39$×10^{11}$ yuan. By the end of 2021, the region had seven HSR lines forming two vertical and three horizontal main routes: Lanzhou (Xining)-Guangzhou Corridor, Baotou (Yinchuan)-Haikou Corridor, Eurasia Land Bridge, Beijing-Lanzhou Corridor, and Qingdao-Yinchuan Corridor. The 初具规模 (initial scale) of Northwest China' s HSR network has reshaped regional tourism development patterns, making it representative for studying "HSR + tourism" integration. Exploring dynamic patterns of tourism economic development and summarizing integration paths between HSR opening and regional tourism economic development provides case support and practical reference for deepening transportation-tourism integration.

2.2 Research Methods

DID Model: The difference-in-differences method is commonly used to evaluate policy implementation effects by constructing individual and time dummy variables to conduct double-difference analysis between policy-affected cities (treatment group) and unaffected cities (control group). Treating HSR opening as a quasi-natural experiment, this study selects 45 prefecture-level and above administrative regions in Northwest China as treatment group and non-HSR cities as control group, employing multi-period DID to test HSR opening' s impact on regional tourism economic development. Given varying HSR opening times across cities, we adopt the DID model designed by Feng Feng et al.:

$$Y_{it} = \alpha + \beta_1 City_{it} + \beta_2 Year_{it} + \beta_3 (City_{it} \times Year_{it}) + \gamma X_{it} + \mu_i + \delta_t + \varepsilon_{it}$$

where i and t represent city i and year t; *Y_{it}* is the dependent variable (city tourism economic development level); *City_{it}* and *Year_{it}* are city and time dummy variables; the interaction term *City_{it}* × *Year_{it}* is the core explanatory variable, with coefficient β_3 effectively representing the net impact of HSR opening on city tourism economy; *X_{it}* represents control variables; *_i* and *δ_t* are individual and time fixed effects; *_{it}* is the random disturbance term; α is the constant term; β and γ are coefficients.

Accessibility: Accessibility reflects the convenience of traveling from origin to destination, influenced by transportation modes, infrastructure quality, and

network completeness. Tourism transportation accessibility refers to tourist convenience in traveling between origin and destination via transportation modes. We calculate tourism transportation accessibility using an accessibility model and replace the *Year*×*City* interaction term with accessibility to test its impact on Northwest China' s tourism economy:

$$A_i = \frac{\sum_{j=1}^{n}(T_{ij} \times M_j)}{\sum_{j=1}^{n} M_j}$$

where *T_{ij}* is the shortest railway travel time between cities *i* and *j*; *M_j* represents city *j*' s economic scale, characterized by city *j*' s total tourism revenue to highlight tourism functions; *n* is the number of cities; *A_i* is city *i*' s accessibility (lower values indicate better accessibility).

Centrality: Based on social network analysis, we select degree centrality, betweenness centrality, and closeness centrality to verify differential impacts of urban network role changes on city-level tourism economy in Northwest China. Degree centrality describes a city' s importance in the network—higher values indicate greater importance and stronger cohesion. Betweenness centrality reflects a city' s control over other cities—higher values indicate stronger bridging functions. Closeness centrality shows the degree to which a city is independent from others—higher values indicate less control by other cities.

2.3 Sample Selection and Data Sources

We selected 45 prefecture-level and above administrative regions in Northwest China as research samples, including national-level cities, prefecture-level cities, prefectures, and autonomous prefectures, uniformly referred to as "cities" for narrative convenience. City tourism economic data were sourced from 2010-2021 provincial statistical yearbooks and city-level national economic and social development statistical bulletins, with missing data supplemented by linear interpolation. We obtained shortest railway travel times between city coordinate centroids from the 2010-2021 China HSR operation line statistics via railway travel apps and timetables, excluding transfer and waiting times. Northwest China currently operates seven HSR lines that gradually opened and differentially impacted regional tourism economic development. Xi' an, Lanzhou, Urumqi, and 11 other cities that opened HSR during the sample period constitute the treatment group, while Yan' an, Yinchuan, Zhongwei, and 30 non-HSR cities form the control group. Considering potential lag effects, we used July 1st as the cutoff date: cities opening HSR before this date were considered opened in that year; otherwise, opening was counted in the following year.

2.4 Variable Selection

2.4.1 Dependent Variable: Tourism economic development level is influenced by multiple factors. Changes in tourist arrivals and revenue directly

affect tourism economic scale through industrial linkages and multiplier effects, while per capita tourism economic indicators reflect destination comprehensive attractiveness. Following previous studies and based on data availability and indicator validity, we selected per capita tourism revenue (*Income*) and per capita tourist arrivals (*Number*) to represent regional tourism economic development levels.

2.4.2 Core Explanatory Variable: The interaction term between HSR opening (*City*) and year (*Year*) (*Year*× *City*) serves as the HSR opening variable. During the study period, if a city opened HSR, *City* takes the value of 1; *Year* takes the value of 1 for the opening year and subsequent years.

2.4.3 Control Variables: Referencing previous research, we controlled for factors potentially affecting tourism economic development: economic level (*lnGDP*, per capita GDP in logarithmic form); industrial structure (*Industry*, ratio of tertiary industry added value to GDP measuring service sector level); investment level (*lnInvest*, total fixed asset investment in logarithmic form); fiscal level (*lnFiscal*, total government fiscal expenditure in logarithmic form); communication level (*lnInform*, total postal and telecommunications business volume in logarithmic form); market potential (*Market*, Baidu search index using "city name + tourism" as keyword); and population density (*Density*, ratio of year-end population to administrative area). Table 1 presents descriptive statistics.

---

3 Empirical Analysis

3.1 Baseline Regression

Table 2 presents baseline regression results of HSR opening' s impact on Northwest China' s tourism economy. In regressions (1)-(4), regardless of whether control variables are included, the HSR opening (*Year*× *City*) coefficient is significantly positive for both per capita tourism revenue (*Income*) and per capita tourist arrivals (*Number*), indicating that HSR opening significantly promotes regional tourism economic development. When the dependent variable is *Income*, economic level and industrial structure are significantly positive, suggesting cities with sound economic foundations and industrial structures more easily attract tourism elements to HSR cities. Communication level and market potential are significantly negative, likely affected by HSR' s siphon effect, indicating suboptimal matching with Northwest China' s tourism economy whose positive growth effects have not fully emerged. Investment level, fiscal level, and population density are insignificant. When the dependent variable is *Number*, economic level and industrial structure remain significantly positive, indicating that cities with better industrial structures and more tourist flows can accommodate more arrivals, thereby driving tourism economic development. Local population scale is significantly negative, possibly because Northwest China' s small population base limits tourism growth; market potential and investment

level are insignificant, suggesting large inter-city differences requiring further exploration of their impacts. Adding control variables appropriately improves model fit (R^2).

3.2 Robustness Tests

Counterfactual Test: Following previous studies, we constructed "pseudo HSR opening times" by advancing Northwest China' s HSR opening timeline to test whether other factors influenced tourism economic development. If the *Year*× *City* coefficient remains significantly positive, other factors drive tourism growth and baseline results are invalid; otherwise, tourism development is genuinely affected by HSR opening. Advancing opening times by 1-3 years (Table 3) shows insignificant coefficients in regressions (5)-(10), confirming baseline result robustness.

Variable Replacement: To mitigate indicator measurement impacts, we replaced control variables, lagged core explanatory variables, and excluded dependent variable outliers. For control variables, we measured industrial structure as the ratio of tertiary to secondary industry added value. Considering lag effects and simultaneous equation bias, we lagged the core variable by one period. To exclude outlier interference, we removed the top and bottom 1% of *Income* values. Regressions (11)-(16) show consistently significant positive coefficients, aligning with baseline results.

3.3 Heterogeneity Analysis

Northwest China' s long-standing economic imbalance means high-economic-level cities are mostly provincial capitals and central cities with higher administrative levels, stronger economic resilience, favorable policy environments, and efficient management, attracting more factor inflows and broadening development channels. Using per capita GDP to measure economic levels, we classified the top 15 cities as high-level, middle 15 as medium-level, and bottom 15 as low-level. Table 4 shows HSR opening significantly and positively impacts high- and medium-level cities' tourism economies, enabling them to attract tourism elements and maintain diversified supply through continuous innovation in services and products. HSR network expansion better promotes tourism economic development in these cities. In contrast, regressions (17)-(18) show positive but insignificant effects on low-level cities, suggesting polarization effects may widen inter-city tourism development gaps and create marginalization risks for cities unable to fully capture HSR dividends, confirming H1.

3.4 Impact of Accessibility on Tourism Economy

As HSR networks improve, urban tourism transportation accessibility enhances overall. Baseline and robustness tests confirm HSR opening' s significant heterogeneous impact. We further test whether accessibility improvement significantly affects city-level tourism economy and whether effects differ between HSR and

non-HSR cities. Accessibility is a negative indicator; we replace the *Year*×*City* interaction with accessibility for re-estimation (Table 5).

Panel A examines full-sample effects. Regardless of control variables, accessibility (A) coefficients are significantly negative—lower accessibility values (better accessibility) significantly increase per capita tourism income. Adding control variables improves explanatory power. For *Number*, accessibility coefficients are significantly negative, confirming that accessibility improvement positively impacts tourism economy, verifying H2.

Panel B examines subsamples. For HSR cities, A coefficients are significant at the 1% level. Only economic level is significantly positive, indicating economically strong cities more easily attract factor agglomeration. Communication, fiscal, and investment levels show negative effects, likely because these public infrastructure-oriented variables face long construction cycles and slow returns in Northwest China' s vast, topographically complex terrain, failing to significantly stimulate tourism growth. For non-HSR cities, A coefficients remain significant, with absolute values decreasing from 0.307 to 0.251, indicating larger accessibility improvement space but limited ability to increase tourist arrivals due to geographical location.

3.5 Impact of Network Centrality on Tourism Economy

HSR opening significantly promotes Northwest China' s tourism economic development, raising the question of whether resulting urban network role changes differentially impact city-level tourism economy. We select network centrality indicators (degree centrality, betweenness centrality, closeness centrality) and construct interaction terms with HSR opening to test effects:

$$Y_{it} = \alpha + \beta_1(Dc_{it} \times Hsr_{it}) + \gamma X_{it} + \mu_i + \delta_t + \varepsilon_{it}$$

$$Y_{it} = \alpha + \beta_1(Bc_{it} \times Hsr_{it}) + \gamma X_{it} + \mu_i + \delta_t + \varepsilon_{it}$$

$$Y_{it} = \alpha + \beta_1(Cc_{it} \times Hsr_{it}) + \gamma X_{it} + \mu_i + \delta_t + \varepsilon_{it}$$

where *Dc*×*Hsr*, *Bc*×*Hsr*, and *Cc*×*Hsr* are interaction terms between degree centrality, betweenness centrality, closeness centrality and HSR opening.

Table 6 shows regression (31)-(32) where *Dc*×*Hsr* is significantly positive, indicating that cities with higher degree centrality (more important network positions) significantly promote tourism economic development. As Northwest China adds HSR routes and increases speeds, cities like Xi' an, Urumqi, and Jiuquan show substantially increased degree centrality, enhancing radiation and control capabilities. Regressions (33)-(34) show *Bc*×*Hsr* is positive but insignificant, suggesting Northwest China' s HSR bridging function needs improvement

–HSR benefits have not reached all cities, and effective indirect connections between HSR and remote non-HSR cities remain underdeveloped. Regressions (35)-(36) show $Cc \times Hsr$ is significantly positive, indicating cities with stronger network influence significantly boost tourism economy. Rapid HSR development has enhanced cities' self-control and influence, while HSR-induced "polarization-trickle-down" and "agglomeration-diffusion" effects further optimize the regional tourism economic network.

3.6 Integration Paths of HSR Opening and Tourism Economic Development

Existing research emphasizes empirical analysis over theoretical synthesis. Therefore, combining research findings with theoretical foundations, we summarize integration paths from city, regional, and national perspectives (Figure 2).

From the city perspective, HSR opening promotes new spatial patterns of urban tourism economy, with HSR opening, tourism economy, and development environment mutually reinforcing. On one hand, growth pole and center-periphery theories suggest HSR opening further strengthens tourism center cities' dominance, generating agglomeration effects that attract information, capital, and tourist flows from peripheral cities. On the other hand, diffusion effects excavate and integrate quality tourism resources, promoting tourism element spillovers to HSR cities and tourism centers. Under combined agglomeration and diffusion effects, HSR significantly influences urban tourism economic network density, centrality, and role positioning. "HSR + tourism" integration advances all-for-one tourism, the "Transportation Power" strategy, high-quality development, and Belt and Road construction, whose sustained dividend release reciprocally facilitates HSR construction and tourism development, reconstructing regional tourism economic spatial patterns and promoting high-quality urban tourism economic development.

From the regional perspective, promoting "HSR + tourism" integration requires optimizing tourism development environments, strengthening cultural exchange cooperation, continuously enriching tourism product formats, and facilitating industrial transformation and upgrading. Post-HSR opening further develops potential source markets, breaks geographical restrictions, improves talent and technology flows, enhances tourism market dominance in resource allocation, and creates "same-city effects" that promote resource sharing, accelerate industrial gradient transfer, optimize industrial division of labor, and boost tourism industry chains around HSR networks. Provinces should leverage HSR' s spatial advantages and locational potential to allocate quality tourism production factors, actively respond to the HSR era, and encourage inter-city HSR tourism trains such as the "Symphony Silk Road · Ruyi Gansu" themed brand between Ningxia and Gansu, accelerating tourism transformation and coordinated complementary development.

From the national perspective, strengthening top-level design for HSR opening and cross-border tourism cooperation promotes railway interconnectivity, expands "HSR + tourism" international influence, and improves regional tourism cooperation mechanisms. Facing Central and West Asia, HSR facilitates outbound tourism cooperation, enhances international influence, and supports high-quality tourism economic development. Simultaneously, improving "HSR + tourism" brand image and developing differentiated characteristic HSR tourism products satisfies people' s diverse needs for a better life and leverages synergistic effects where "1+1>2." Emphasizing HSR and cultural tourism inheritance expands HSR tourism audiences and stimulates development potential.

---

4 Discussion

Transportation and tourism development are closely related. HSR's "space-time compression" effect effectively improves Northwest China city accessibility, promotes rational flow of tourism elements in terms of volume, velocity, and quality, and optimizes resource allocation between destinations. Northwest China contains multiple comprehensive transportation hubs serving as critical transfer stations for tourism economic elements, playing important roles in coordinating national tourism economic development. Kong Lingzhang et al.' s national-level study shows HSR network evolution significantly impacts urban tourism economy, with inter-city differences affecting HSR' s tourism promotion effects. Wu Guihua et al., using PSM-DID, found HSR significantly promotes urban tourism development with differential impacts along HSR lines. This paper extends such research by employing multi-period DID to verify HSR opening' s significant promotion of Northwest China' s tourism economic development, with results comparable to existing scholarship. Unlike previous paradigms that rarely explored intrinsic HSR-tourism relationships, this paper synthesizes theoretical mechanisms from growth pole and point-axis theories and summarizes integration paths from city, regional, and national scales, providing detailed theoretical and practical foundations for deepening regional transportation-tourism integration.

---

5 Conclusions and Recommendations

5.1 Conclusions

(1) Baseline regression results indicate HSR opening significantly promotes Northwest China' s tourism economic development. Robustness tests including counterfactual tests and variable replacement confirm result reliability. HSR cities should guide regional coordinated development through long-term HSR tourism planning. Heterogeneity analysis shows

differential impacts: HSR opening significantly affects high- and medium-economic-level cities but insignificantly impacts low-level cities.

(2) HSR opening-induced accessibility improvement and network centrality changes significantly affect Northwest China' s tourism economy. Accessibility improvement shows heterogeneous impacts: cities with HSR opened > entire region > cities without HSR opened. Network centrality changes affect tourism economy in the order: degree centrality > closeness centrality > betweenness centrality, requiring optimization of betweenness centrality in the HSR network.

(3) Northwest China' s "HSR + tourism" interactive development progresses through initial emergence, rapid growth, steady development, temporary stagnation, and network optimization stages. Short-term agglomeration-diffusion effects cause regional tourism economic imbalances. As HSR coverage expands, a balanced regional tourism economic development pattern emerges with HSR cities as cores and HSR lines as axes. Integration paths are summarized from city, regional, and national scales.

5.2 Recommendations

(1) **City-level perspective:** Cities should formulate "HSR + tourism" integration policies tailored to local conditions. Economically strong cities like Xi' an and Urumqi should optimize tourism industrial structure, improve tourism transportation services, and innovate tourism products. Less-developed cities should explore HSR-driven tourism economic transformation, making HSR a strategic focus for upgrading and quality improvement to escape low-level development traps.

(2) **Provincial-level perspective:** Provinces should fully utilize HSR's driving effect on 沿线 (along-the-line) city tourism economies to coordinate balanced regional development. Shaanxi should operate regular trains using HSR and trunk railways, optimizing transfer functions. Gansu should coordinate provincial infrastructure layout and strengthen tourism cooperation with other regional cities. Ningxia should build an all-for-one tourism circle centered on Yinchuan based on HSR and expressways. Qinghai should optimize comprehensive tourism transportation networks, resolving "last-mile" access to destinations. Xinjiang should accelerate HSR construction and densify medium-short intercity routes.

(3) **National strategic perspective:** Regions should actively respond to changing urban status and tourism roles in the HSR network, establishing long-term goals to continuously capture HSR dividends and support the "Transportation Power" strategy. Strengthen intra-regional cultural-tourism integration and all-for-one development to promote coordinated intra- and inter-provincial tourism economic development. With Shaanxi as the tourism economic center and Xinjiang as the western gateway, Qinghai, Gansu, and Ningxia should leverage mutual strengths and develop

"transportation + tourism" to promote high-quality development of the Silk Road Economic Belt and Eurasian Land-Sea Trade Corridor' s cross-border tourism economic belt.

References

[1] Yin Ping. High speed railway (HSR) and establishment of new pattern of regional tourism: A case study of the high speed railway between Zhengzhou and Xi' an[J]. Tourism Tribune, 2012, 27(12): 47-53.

[2] Wen Hu, Han Xu. The impacts of high speed rails on the accessibility and the spatial pattern of regional economic development in China[J]. Human Geography, 2017, 32(1): 99-108.

[3] Guo Jianke, Wang Shaobo, Li Bo, et al. The spatial effect of Harbin-Dalian high speed rail to the northeast city tourism economic link[J]. Scientia Geographica Sinica, 2016, 36(4): 521-529.

[4] Liu Anle, Yang Chengyue, Ming Qinzhong. Spatial-temporal pattern and driving force evolution of accessibility and economic ties in underdeveloped region: A case of Lanzhou-Xinjiang high speed rail[J]. Areal Research and Development, 2020, 39(5): 19-22, 35.

[5] Liu Jia, Wang Juan, Lu Ju. High speed rail operation and tourism in the HSR site city: "Engine" or "corridor" ?[J]. Business and Management Journal, 2020, 42(2): 175-191.

[6] Masson S, Petiot R. Can the high speed rail reinforce tourism attractiveness? The case of the high speed rail between Perpignan (France) and Barcelona (Spain)[J]. Technovation, 2009, 29(9): 611-617.

[7] Harvey J, Thorpe N, Caygill M, et al. Public attitudes to and perceptions of high speed rail in the UK[J]. Transport Policy, 2014, 36: 70-78.

[8] Xie Kai, Qin Zhilong, Zhang Rongjie, et al. Improved transportation infrastructure and household tourism consumption: Empirical evidence from counties with high speed railway[J]. Journal of Quantitative & Technological Economics, 2023, 40(12): 90-110.

[9] Shao Haiyan, Jin Cheng, Lu Yuqi, et al. Response pattern and driving mechanism of virtual tourism flow to high speed rail construction in the Yangtze River Economic Belt[J]. Geographical Research, 2024, 43(3): 791-808.

[10] Wang Xinyue, Liu Xiaoyan. Development and evolution of urban tourism economic network structure and its optimization under the influence of high speed rail in the Yellow River Basin[J]. Economic Geography, 2022, 42(9): 211-218.

[11] Bai Yang, Wu Jian, Dou Kailong, et al. Spatial-temporal evolution of tourism economic connection in Xinjiang from the perspective of supply and demand potential[J]. Arid Land Geography, 2023, 46(12): 2086-2097.

[12] Chen Zhao, Fu Mingsu. Promoting effect of national new area on economic development: Verification based on multi-period DID method[J]. Research on Development, 2021(6): 18-25.

[13] Kong Lingzhang, Li Jinye. The opening of high speed rail, network centrality, and tourism economy development[J]. Industrial Economics Research, 2021(5): 113-127.

[14] Bai Yang, Tan Lina, Chen Chunyan, et al. Influence effect and driving mechanism of intercity trains on high quality development of tourism economy in Xinjiang[J]. Arid Land Geography, 2023, 46(4): 658-666.

[15] Liu Ruiming, Li Lin, Kang Yankui, et al. Selection activities of scenic spots, the supply of government public services and regional tourism economic development[J]. China Industrial Economics, 2018(2): 118-136.

[16] Zhang Hua, Feng Feng. Green high speed railway: Does high speed railway reduce haze pollution?[J]. China Journal of Economics, 2019, 6(3): 114-147.

[17] Zhang Yan, Zheng Heyun, Ge Liming. The impact of sustainable development policy of resource-based cities on carbon emissions[J]. Journal of Finance and Economics, 2022, 48(1): 49-63.

[18] Wu Guihua, Zhang Xiaojuan, Li Yongquan. The influence of high speed railway on the development of urban tourism economy based on the PSM-DID model[J]. Journal of Huaqiao University (Philosophy & Social Sciences Edition), 2020(5): 53-64.

[19] Wei Lili, Hou Yuqi. Research on the impact of China' s digital economy on urban green development[J]. Journal of Quantitative & Technological Economics, 2022, 39(8): 60-79.

Note: Figure translations are in progress. See original paper for figures.