Evaluation of Inclusive Tourism Development and Spatial Patterns in China: A Postprint Based on Panel Data from 287 Cities

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Abstract

Inclusive development of tourism plays an important role in promoting equal opportunities, equitable development, and shared outcomes. Taking 287 cities nationwide as the research object and based on panel data from 2010–2019, this study constructs a comprehensive evaluation index system and applies integrated methods including the entropy method, grey relational analysis, and spatial analysis to evaluate the development level of inclusive tourism in China, reveal its spatial distribution characteristics and evolution trends, and measure influencing factors. The results indicate: (1) Significant spatial differences exist in China's inclusive tourism development level, which has gradually transitioned from a belt-shaped distribution to a block-shaped distribution, and finally to a point-shaped distribution. Inter-city differences in inclusive tourism development continue to expand, spatial polarization intensifies, and the problem of unbalanced development becomes prominent. (2) The development level of inclusive tourism in China can be classified into four types: underdeveloped areas, low-development areas, medium-development areas, and high-development areas, with high-development areas mainly concentrated in the eastern region. (3) The development of inclusive tourism in China can be divided into two stages: slow growth from 2010–2014 and rapid growth from 2015–2019. (4) Urban registered unemployment rate, number of star-rated hotels, and per capita park green space area are the main factors influencing the spatial pattern of inclusive tourism development in China, while air quality status and the proportion of tertiary industry in regional GDP are secondary factors. The research findings can provide a reference basis for optimizing the spatial layout of inclusive tourism and promoting the inclusive development of tourism in China.

Full Text

Assessment and Spatial Pattern of Inclusive Tourism Development in China: Based on Panel Data of 287 Cities

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Abstract

Inclusive tourism development plays a crucial role in promoting equal opportunities, equitable development, and shared benefits. This study examines 287 Chinese cities using panel data from 2010 to 2019 to construct a comprehensive evaluation index system. By integrating the entropy method, grey correlation analysis, and spatial analysis techniques, we assess China' s inclusive tourism development level, reveal its spatial distribution characteristics and evolution trends, and identify key influencing factors. The results show that: (1) Significant spatial disparities exist in China' s inclusive tourism development, evolving from a zonal distribution to a clustered pattern, and finally forming a point-like distribution. Inter-city differences continue to expand, spatial polarization intensifies, and unbalanced development becomes increasingly prominent. (2) China' s inclusive tourism development can be classified into four types: underdeveloped, low-development, medium-development, and highly developed areas. Highly developed regions are primarily concentrated in eastern China. (3) The development trajectory follows a "W-shaped" fluctuating upward trend, which can be divided into two stages: slow growth from 2010–2014 and rapid growth from 2015–2019. (4) The urban registered unemployment rate, number of star-rated hotels, and per capita park green space area are the primary factors shaping the spatial pattern of inclusive tourism development, while air quality and the proportion of tertiary industry in GDP are secondary factors. These findings provide a scientific basis for optimizing the spatial layout of inclusive tourism and promoting its sustainable development in China.

Keywords: inclusive tourism; spatial pattern; development trend; influencing factors; development assessment

1 Data and Methods

1.1 Data Sources

This study covers 287 Chinese cities, excluding Hong Kong, Macau, and Taiwan. The primary data sources include the *China Statistical Yearbook*, *China Urban Statistical Yearbook*, *China Tourism Statistical Yearbook*, *China Environment Statistical Yearbook*, and *National Economic and Social Development Statistical Communiqués* from 2010 to 2019. Additional data were obtained from provincial

and municipal statistical yearbooks, statistical communiqués, and websites of local culture and tourism bureaus. Missing data during the study period were minimal and consistent across cities, and were addressed using interpolation methods.

Specifically, cultural tourism and media expenditure, urban registered unemployment rate, per capita GDP, proportion of tertiary industry in GDP, and transportation passenger volume data were mainly sourced from provincial and municipal statistical yearbooks and national economic and social development statistical communiqués. Per capita park green space area data were primarily obtained from provincial statistical yearbooks and the *China Urban Statistical Yearbook*. Domestic per capita tourism consumption data came from provincial and municipal statistical yearbooks, national economic and social development statistical communiqués, and the *China Tourism Statistical Yearbook*. Air quality data (measured as the number of days with air quality at or above Grade II) were mainly derived from the *China Environment Statistical Yearbook* and national economic and social development statistical communiqués, with supplementary data from provincial and municipal statistical yearbooks. Star-rated hotel data were primarily collected from municipal culture and tourism bureau websites, the *China Tourism Statistical Yearbook*, and provincial statistical yearbooks.

1.2 Indicator Selection

Inclusive tourism development requires participation from multiple stakeholders including government, local communities, enterprises, and tourists, supported by economic foundations and tourism resources. Based on the conceptual connotations of inclusive tourism and existing research, we constructed an evaluation index system comprising nine indicators across three dimensions: tourism participants, economic inclusiveness, and resource environment (Table 1).

Stakeholder participation is crucial for tourism success. To measure inclusiveness in tourism participation, we selected three indicators for local communities, government, and tourists: cultural tourism and media expenditure (measuring government support), urban registered unemployment rate (measuring employment opportunity equality), and domestic per capita tourism consumption. Economic growth is the prerequisite for inclusive growth and poverty reduction. We used three indicators to capture tourism economic inclusiveness: per capita GDP, proportion of tertiary industry in GDP, and transportation passenger volume. Per capita GDP and tertiary industry proportion measure tourism economic level and structure, while transportation passenger volume reflects urban tourism transport development. The resource environment dimension reflects tourism development foundations, using star-rated hotel numbers (measuring reception capacity and service facilities) and per capita park green space area and air quality status (measuring ecological environment). Due to differing measurement units and scales, all indicators were standardized before applying the entropy method to determine weights.

1.3 Methods

1.3.1 Entropy Method The entropy method is widely applied in socioeconomic development evaluation. Information entropy measures system uncertainty—in a matrix X with m evaluation objects and n indicators, higher entropy values indicate less information, smaller influence on results, and lower weights, reflecting greater system imbalance. We employed the entropy method to calculate indicator weights for 287 cities through the following steps:

1) For m regions and n indicators, X_{ij} represents the value of region i for indicator j. X' *{ij} denotes standardized values, with min{X*{ij}} and max{X_{ij}} as the minimum and maximum values of indicator j across all regions.

2) Standardization:

   - Positive indicators: X' *{ij} = (X*{ij} - min{X_{ij}}) / (max{X_{ij}} - min{X_{ij}})
   - Negative indicators: X'*{ij} = (max{X*{ij}} - X_{ij}) / (max{X_{ij}} - min{X_{ij}})

3) Calculate the proportion of indicator j in region i: Y_{ij} = X' *{ij} / Σ_i X'* {ij}

4) Calculate entropy value for indicator j: e_j = - (1/ln m) × Σ_i Y_{ij} × ln(Y_{ij})

5) Calculate information redundancy: d_j = 1 - e_j

6) Calculate indicator weight: w_j = d_j / Σ_j d_j

7) Calculate comprehensive score for region i: S_i = Σ_j w_j × X' _{ij}

1.3.2 Coefficient of Variation The coefficient of variation (CV) measures sample dispersion and is widely used in geography to study spatial differences, with the advantage of eliminating unit and mean value effects. We applied CV to measure the degree of difference in inclusive tourism development levels across cities:

$$v = \sqrt{\Sigma_n (y_n - \bar{y})^2 / N} / \bar{y}$$

where v is the coefficient of variation, N is the total number of cities, y_n is the inclusive tourism development level of city n, and $\bar{y}$ is the mean value. A smaller CV indicates more balanced development.

1.3.3 Grey Correlation Degree Grey correlation analysis examines relationships between system factors based on curve similarity. For reference sequence X_0 and comparison sequences X_i, the correlation coefficient is:

$$\xi_i(k) = \frac{\min_i \min_k |X_0(k) - X_i(k)| + \rho \max_i \max_k |X_0(k) - X_i(k)|}{|X_0(k) - X_i(k)| + \rho \max_i \max_k |X_0(k) - X_i(k)|}$$

where is the resolution coefficient (typically 0.5). The correlation degree is $r_i = \frac{1}{n}\Sigma_k \xi_i(k)$, with higher values indicating stronger relationships.

2 Results and Analysis

2.1 Inclusive Tourism Development Level

Based on entropy method calculations, indicator weights varied significantly, with the proportion of tertiary industry in GDP having the highest weight (0.184) and air quality status the lowest (0.083) (Table 2). We comprehensively evaluated 287 cities' inclusive tourism development levels. Due to space limitations, Table 3 presents the top 50 cities. Beijing ranked highest in 2019 (0.612), followed by Shanghai (0.556) and Shenzhen (0.523). The top 50 cities are predominantly located in eastern China, with high scores concentrated in the Beijing-Tianjin-Hebei region, Yangtze River Delta, and Pearl River Delta.

2.2 Evolution Characteristics

The coefficient of variation for China' s inclusive tourism development level showed a "W-shaped" fluctuating upward trend from 2010 to 2019, indicating gradually widening spatial disparities (Figure 1). During 2010–2014, differences expanded slowly with minor fluctuations, with CV values below 0.55. From 2015–2019, CV increased sharply, reaching 0.68 in 2019, indicating rapidly intensifying inter-city differences and spatial polarization.

[Figure 1: see original paper]

2.3 Spatial Pattern

Using ArcGIS for spatial visualization, we selected 2010, 2015, and 2019 as representative years and applied the natural breaks method to classify cities into four types: underdeveloped, low-development, medium-development, and highly developed areas.

In 2010, inclusive tourism development was unbalanced, with higher development concentrated in eastern coastal areas, along the Yangtze River, and along the Yellow River (Figure 2a). Highly developed areas included Beijing, Shenzhen, Chengdu, Chongqing, Guangzhou, Shanghai, Hangzhou, Ningbo, Tianjin, Nanjing, Xi' an, Dongguan, and Wenzhou (13 cities). Medium-development areas included Yantai, Zhengzhou, Suzhou, Jinhua, Wuhan, Zibo, Shaoxing, and Jinan (32 cities). Low-development areas included Zhuhai, Yichun, Zhongwei, Zigong, Ezhou, and Luohe (107 cities). Underdeveloped areas included Tongling, Lanzhou, Xining, Yuncheng, Chuzhou, Linfen, Shantou, and Wuwei (135 cities).

By 2015, the pattern showed east-high-west-low distribution with multi-core clusters (Figure 2b). Five significant regions emerged: Heilongjiang, Bohai Rim, Yangtze River Delta, mid-Yangtze region, and Chengdu-Chongqing. Highly developed areas included Beijing, Shanghai, Suzhou, Hangzhou,

Ningbo, Guangzhou, Sanya, Ziyang, Liupanshui, and Qiqihar (10 cities). Medium-development areas included Xi' an, Zhaotong, Qingdao, Xiamen, Tianjin, Wuhan, and Nanjing (35 cities). Low-development areas included Ezhou, Zaozhuang, Jinan, Hefei, Zhuhai, Anshun, and Jiujiang (110 cities). Underdeveloped areas included Yichun, Tonghua, Yinchuan, Liaoyuan, and Hechi (132 cities).

By 2019, imbalance intensified, showing a dispersed point-like distribution with center-periphery polarization (Figure 2c). Highly developed areas included Beijing, Shenyang, Dalian, Jilin, Harbin, Shanghai, Nanjing, Suzhou, Hangzhou, and Ningbo (10 cities). Medium-development areas included Wenzhou, Tianjin, Shijiazhuang, Zhangjiakou, Taiyuan, Yangquan, Fushun, and Dandong (35 cities). Low-development areas included Tangshan, Qinhuangdao, Chengde, Cangzhou, Datong, and Lüliang (110 cities). Underdeveloped areas included Handan, Xingtai, Baoding, Langfang, Hengshui, Changzhi, and Jincheng (132 cities).

[Figure 2: see original paper]

2.4 Influencing Factors Analysis

Grey correlation analysis revealed that most factors showed correlation degrees above 0.6 (Table 4). Urban registered unemployment rate exhibited the strongest correlation (0.842), followed by star-rated hotel numbers (0.791) and per capita park green space area (0.788). Air quality status (0.744) and tertiary industry proportion (0.734) showed moderate correlations, while cultural tourism and media expenditure had the weakest correlation (0.621).

2.4.1 Tourism Participants Dimension From the tourism participants perspective, inclusive tourism development is primarily influenced by urban registered unemployment rate and domestic per capita tourism consumption, with unemployment rate being the most significant factor. This confirms that employment is a core function of inclusive tourism. Tourism is a comprehensive industry that effectively promotes economic development, employment generation, and improved living standards. It provides development opportunities and income for vulnerable groups including the poor, disabled, and women. More inclusive tourism promotes sustainable development, narrows income gaps, and enables shared benefits. Tourism' s strong externalities, linkages, and multiplier effects require active government participation and support. Domestic tourism consumption drives economic growth by creating opportunities and income for local residents.

2.4.2 Economic Inclusiveness Dimension From the economic inclusiveness perspective, tertiary industry proportion and transportation passenger volume significantly impact inclusive tourism development. Tourism growth generates spillover effects that drive regional development. Transportation networks connect origin and destination markets, with accessibility and service facilities

influencing travel decisions and economic outcomes. Cities with highly developed tourism economies and comprehensive transport networks typically show high inclusive tourism development, consistent with our findings.

2.4.3 Resource Environment Dimension From the resource environment perspective, star-rated hotel numbers, per capita park green space area, and air quality status are crucial factors. Natural geographic conditions create uneven resource distribution across eastern, central, and western regions. Core tourism resources and attractions are fundamental motivators for travel. Eastern China developed urban tourism earlier, while central and western regions rely on ecological environments and ethnic cultural resources. Beyond resource endowments, improving facilities and service levels enhances competitiveness and promotes inclusive development. Ecological environments significantly impact tourism—environmental quality degradation undermines tourism foundations, while climate information increasingly shapes destination image and product development. Resource-rich but underdeveloped regions can leverage ecological advantages for inclusive tourism development, narrowing regional economic gaps.

3 Discussion

Inclusive tourism growth is essential for high-quality economic and social development, a key component of sustainable tourism, and necessary for achieving high-quality tourism development. Under sustainable development frameworks, global inclusive tourism has gained attention regarding its necessity, connotations, and target populations. This study contributes in two ways: first, by constructing an evaluation index system based on inclusive growth theory and quantitatively assessing inclusive tourism at the city scale, expanding beyond qualitative approaches; second, by integrating geographic perspectives to examine spatiotemporal patterns and evolution characteristics in China.

Our findings reveal that China's inclusive tourism development shows significant and widening spatial disparities, evolving from zonal to clustered to point-like distributions, with patterns shifting from east-high-west-low to east-west-high-middle-low, and finally to southeast-high-northwest-low configurations. The development trajectory follows a "W-shaped" trend, with slow growth during 2010–2014 and rapid growth during 2015–2019. Urban registered unemployment rate, star-rated hotel numbers, and per capita park green space area are primary influencing factors, while air quality and tertiary industry proportion are secondary factors.

These findings have theoretical and practical value. High-quality development strategies require China to advance inclusive tourism, enhance employment equity, and benefit vulnerable groups. Based on identified spatial patterns and characteristics, governments should adopt differentiated, location-specific policies. First, accelerate tourism economic development in all cities, strengthen core cities' radiating capacity, and promote coordinated urban-rural development. Second, implement targeted measures to narrow inter-city gaps, such

as leveraging the demonstration effect of leading regions to drive leapfrog development in underdeveloped areas through investment, employment, ecological improvement, and tourism economy development. Third, foster multi-stakeholder cooperation among government, enterprises, and social organizations to strengthen public participation mechanisms and jointly promote inclusive tourism development.

This study is based on city-level analysis. Future research should examine multiple scales to verify consistency and generalizability of findings.

4 Conclusion

This study reveals significant spatial disparities in China' s inclusive tourism development from 2010 to 2019, with differences intensifying over time. The spatial pattern evolved from zonal to clustered to point-like distribution. Development can be classified into four types, with highly developed areas concentrated in eastern China. The trajectory shows a "W-shaped" fluctuating upward trend, divisible into slow and rapid growth stages. Urban registered unemployment rate, star-rated hotel numbers, and per capita park green space area are primary influencing factors, while air quality and tertiary industry proportion are secondary factors. These results provide references for optimizing spatial layout and promoting inclusive tourism development in China.

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