Spatial Pattern Characteristics and Influencing Factors of Inbound Tourism Destination Competitiveness in Inner Mongolia (Postprint)

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Abstract

Inbound tourism serves as an important carrier for cultural dissemination and exchange in China and is indispensable for cultural construction and industrial development. This study takes 89 counties in Inner Mongolia as the research object, constructs an evaluation framework and indicator system from three dimensions—resource attractiveness, industrial strength, and reception organization capacity—and investigates inbound tourism competitiveness using methods such as fuzzy analytic hierarchy process, function model method, ArcGIS Voronoi diagram analysis, and obstacle degree model. Research conclusions: (1) The resource attractiveness and industrial strength of inbound tourism in the study area exhibit a spatial pattern where the western region is higher than the eastern region, and the eastern region is higher than the central region; the spatial distribution of reception organization capacity demonstrates fragmented characteristics. (2) Competitiveness exhibits a spatial pattern where the western region is higher than the eastern region, and the eastern region is higher than the central region, and counties with stronger competitiveness are mostly distributed in the peripheral areas of Inner Mongolia. (3) Counties with strong and relatively strong competitiveness form two major competitiveness agglomeration areas in Hohhot, Baotou, Ordos and Chifeng, Tongliao, Xilinhot. (4) In the criterion layer, the obstacle degree indices in descending order are: tourism resource attractiveness, industrial strength, reception capacity; From the perspective of indicator layer obstacle degrees, the top five individual indicators are: quality of tourism resources, tourism foreign exchange earnings, intensity of tourism economic connections, number of employees in accommodation and catering industry, and number of international travel agencies. (5) The significant disparity between tourism resource attractiveness and tourism reception organization capacity constitutes the primary cause of imbalance in the tourism competitiveness of inbound tourism destinations in Inner Mongolia,

with differences in tourism industry strength further exacerbating competitiveness differentiation.

Full Text

Preamble

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Abstract: Based on socioeconomic statistical data, tourism development data, and spatial vector data from 89 counties in the Inner Mongolia Autonomous Region of China, this study establishes an evaluation framework and index system for inbound tourism destination competitiveness from three dimensions: tourism resources attraction, tourism industry strength, and tourist reception ability. The fuzzy analytic hierarchy process (FAHP) was employed to determine indicator weights, the function model method to calculate competitiveness indices, ArcGIS software for spatial pattern analysis, and the obstacle degree model to analyze competitive obstacle factors and their mechanisms. The main findings are as follows: (1) Tourism resources attraction and tourism industry strength exhibit a spatial pattern of highest values in western areas, high values in eastern areas, and low values in central areas, while tourist reception ability shows fragmentation characteristics from a spatial distribution perspective. (2) The overall competitiveness displays a spatial pattern where the west is higher than the east, the east is higher than the middle, and more competitive counties are distributed in the fringe areas of Inner Mongolia. (3) Counties with the strongest and stronger competitiveness form two competitive agglomeration areas in the midwest and the east. (4) The obstacle degree indices at the criterion layer are ranked in descending order as follows: tourism resources attraction, tourism industry strength, and tourist reception ability. From the perspective of single-indicator obstacle degrees, the top five indicators are: quality of tourism resources, tourism foreign exchange income, tourism economic connection strength, number of employees in the hospitality industry, and number of international travel agencies. (5) The wide difference in tourism resources attraction and tourist reception ability is the main reason causing the imbalance of tourism competitiveness for inbound tourism destinations in Inner Mongolia, while the difference in tourism industry strength intensified the competitive differentiation.

Keywords: inbound tourism; tourism competitiveness; spatial pattern; obstacle degree; Inner Mongolia

2.3.3 Fuzzy Analytic Hierarchy Process (FAHP)

The fuzzy analytic hierarchy process (FAHP) was applied in this study. Building upon the traditional analytic hierarchy process (AHP), FAHP integrates fuzzy comprehensive evaluation to address the fuzziness in human judgment during multi-criteria decision-making processes. This method uses triangular fuzzy numbers to construct judgment matrices, enabling more scientific determination of indicator weights.

The normalization process for evaluation indicators is given by:

For positive indicators:

$$N_{ij} = \frac{[x_{ij} - x(i, \min)]}{[x(i, \max) - x(i, \min)]} \quad (1)$$

For negative indicators:

$$N_{ij} = \frac{[x(i, \max) - x_{ij}]}{[x(i, \max) - x(i, \min)]} \quad (2)$$

where N_{ij} represents the normalized value, and x_{ij} denotes the original data value.

For weight determination using triangular fuzzy numbers, let $M_1 = (l_1, m_1, u_1)$ and $M_2 = (l_2, m_2, u_2)$. The possibility degree that $M_1 \geq M_2$ is calculated as:

$$v(M_1 \geq M_2) = \frac{l_2 - u_1}{(m_1 - u_1) - (m_2 - l_2)}, \quad m_1 \leq m_2, u_1 \geq l_2, 0 < v < 1$$

The final weights are obtained through:

$$A_i = \min v(M \geq M_i), \quad i = 1, 2, \ldots, k$$

2.4 Function Model Method for Competitiveness Calculation

Based on the weights obtained from FAHP, the function model method was used to calculate the tourism competitiveness index. This approach synthesizes multi-dimensional indicators into a comprehensive evaluation value through weighted summation, providing a quantitative measure of tourism competitiveness at the county level.

2.5 ArcGIS Voronoi Diagram Analysis

ArcGIS software was utilized to generate Voronoi diagrams for spatial analysis. Using county-level Shapefile data (1:6,200,000 scale) in ArcView GIS, the "Assign Proximity" tool was applied to create Voronoi polygons. This method enables visualization of spatial distribution patterns and measurement of spatial relationships among county-level tourism competitiveness units, facilitating analysis of spatial agglomeration and differentiation characteristics [29].

2.6 Obstacle Degree Model

The obstacle degree model was employed to identify factors hindering tourism competitiveness development. Three metrics were calculated: factor contribution degree (U_j), indicator deviation degree (V_j), and obstacle degree (M_j) [30]. The formulas are:

$$U_j = w_j$$
$$V_j = 1 - P_{ij}$$
$$M_j = \frac{(U_j \times V_j)}{\sum(U_j \times V_j)}$$

where w_j represents the weight of indicator j, and P_{ij} denotes the standardized value.

3.1.2 Tourism Resources Attraction Analysis

The evaluation results for tourism resources attraction (Figure 2) classify counties into four categories: highest, high, medium, and low, accounting for 9.04%, 27.6%, 41.22%, and 22.14% of the total counties, respectively. Counties with the highest attraction are primarily distributed in the Hulunbuir grassland tourism area, Xilingol grassland tourism area, and the Ulanqab desert tourism area. High-attraction counties are concentrated in the Hohhot-Baotou-Ordos golden triangle region, the eastern forest and grassland ecotourism area, and the western desert tourism area. Medium-attraction counties are widely distributed across the central and eastern regions, while low-attraction counties are mainly located in the central agricultural-pastoral transitional zone and some western counties.

3.1.3 Tourism Industry Strength Analysis

Tourism industry strength evaluation results (Figure 2) similarly reveal four categories: highest, high, medium, and low, representing 9.13%, 27.22%, 34.53%, and 29.12% of counties, respectively. The highest-strength counties are concentrated in the Hohhot-Baotou-Ordos region and some banner-level cities. High-strength counties are distributed in key tourism nodes and transportation hubs. Medium-strength counties form a contiguous pattern in the eastern and central regions, while low-strength counties are predominantly located in remote pastoral areas and counties with underdeveloped transportation infrastructure.

3.1.4 Tourist Reception Ability Analysis

Tourist reception ability shows a different spatial pattern (Figure 2), with highest, high, medium, and low categories comprising 10.10%, 28.13%, 41.07%,

and 20.7% of counties, respectively. Highest-reception counties are concentrated in the Hohhot-Baotou-Ordos region and some eastern urban centers. High-reception counties are scattered across transportation corridors and major tourist destinations. Medium-reception counties form the majority, widely distributed throughout the region. Low-reception counties are primarily located in border areas and remote pastoral regions with limited infrastructure development.

3.2 Spatial Pattern Characteristics

Using ArcGIS Voronoi analysis, the spatial pattern of tourism competitiveness in Inner Mongolia exhibits distinct regional differentiation. The overall pattern shows: (1) a core-periphery structure with competitiveness decreasing from major urban centers outward; (2) significant east-west disparities, with western counties showing higher competitiveness due to resource endowments and eastern counties benefiting from accessibility advantages; and (3) the formation of two competitive agglomerations in the midwest (centered on Hohhot-Baotou-Ordos) and the east (centered on Hulunbuir-Chifeng) [32].

3.3 Obstacle Factor Analysis

The obstacle degree analysis reveals that tourism resources attraction constitutes the primary obstacle (39.65%), followed by tourism industry strength (35.43%) and tourist reception ability (24.92%). Key obstacle indicators include: quality of tourism resources, tourism foreign exchange income, tourism economic connection strength, number of hospitality employees, and number of international travel agencies. Spatially, obstacle factors vary significantly: western counties face challenges in reception capacity, eastern counties struggle with industry strength development, and central counties are constrained by resource attraction limitations. The mechanism analysis indicates that these obstacles interact synergistically, with resource endowment deficiencies limiting industry development, and inadequate reception capacity constraining market expansion, ultimately creating a cumulative causation effect that hinders overall competitiveness enhancement.

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4 Conclusion

The study demonstrates significant spatial heterogeneity in inbound tourism destination competitiveness across Inner Mongolia. The western region's advantage in tourism resources, the eastern region' s accessibility benefits, and the central region' s development lag create a complex spatial pattern. The identification of key obstacle factors provides a scientific basis for targeted policy interventions aimed at promoting balanced and sustainable tourism development across the region.

References: [4-7] Cited in original text regarding tourism competitiveness evaluation methods [8] Cited regarding spatial pattern analysis [11] Cited regarding fuzzy evaluation methods [12-14] Cited regarding tourism destination competitiveness [29] Cited regarding Voronoi diagram applications [30] Cited regarding obstacle degree model [32] Cited regarding Inner Mongolia tourism zoning

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