SPATIAL AND TEMPORAL DIFFERENTIATION OF RESPONSE INTENSITY OF TOURISM URBANIZATION IN INNER MONGOLIA, CHINA

Zhao Yongfeng[1,2] , Zheng Hui[1,2]
(1. Faculty of Geography and Planning, Jining Normal University, Ulanqab China
2. Key Laboratory of Geospatial Big Data Application and Environmental Monitoring, Jining Normal University, Ulanqab, China)

Abstract: With 12 cities in Inner Mongolia as the research object, this paper comprehensively employs standard deviation, coefficient of variation, relative development rate, deviation, ratio and other index models to investigate the spatial-temporal variation pattern of the response intensity of tourism urbanization in Inner Mongolia from 2000 to 2022. The findings reveal that the absolute difference in the response intensity of tourism urbanization in Inner Mongolia from 2000 to 2022 is relatively high, and the overall response intensity is relatively large. The response intensity of tourism urbanization in Inner Mongolia exhibits a significant spatial pattern of being "strong in the east and weak in the west". As time evolves, the response intensity of tourism urbanization in the eastern region keeps increasing, and the gap in the response intensity of tourism urbanization in Inner Mongolia gradually widens.

Key words: Tourism urbanization; Response intensity; Spatial-temporal differentiation; Inner Mongolia

1. Introduction

In the context of China's rapid socio-economic development, urbanization and tourism have exhibited a soaring trend. Urban tourism, as a highly promising green industry, has a strong driving force for urbanization. It serves as a crucial engine for the transformation and upgrading of the urban industrial structure, the enhancement of the urban brand image, the coordinated development of urban and rural areas, the optimization of the urban spatial layout, and the renewal of social concepts. Tourism urbanization, a specific type of urbanization driven by the advancement of the tourism industry, constitutes an important form of new-type urbanization. Tourism urbanization represents an essential means to promote rural revitalization, coordinate urban-rural development, and regional economic, cultural, social, and ecological development. Deepening the research on tourism urbanization in Inner Mongolia will contribute to optimizing the economic development from high speed to high quality, achieving regional green and coordinated development, and holds extremely significant practical implications in adapting to the new development pattern.

Since Mullins [1] first proposed the concept of "tourism urbanization" in 1991,

tourism urbanization has increasingly become a popular research topic for scholars and governments at all levels both domestically and internationally. A considerable number of foreign scholars have focused on studying the conceptual connotation [2], development characteristics [3], driving mechanisms [4], utility impact [5] and development modes [6] of tourism urbanization, concentrating on exploring and establishing the theoretical framework of tourism urbanization. Chinese scholars began their research on tourism urbanization in the early 21st century, focusing on analyzing the social, economic and cultural influences of tourism urbanization in economically developed areas through social surveys, mathematical statistics and spatial modeling approaches, providing significant academic references for the theoretical and practical advancement of tourism urbanization. However, from a quantitative point of view, there has been a lack of research on the temporal and spatial evolutionary characteristics of tourism urbanization in western China. Based on this, this paper introduces quantitative research on the response relationship between tourism and urbanization and analyzes the temporal and spatial evolutionary characteristics of tourism urbanization in Inner Mongolia, with the aim of providing research results that can serve as a basis for the development of Inner Mongolia's tourism industry and urbanization.

2. Research method

2.1 Study area profile and data sources

Inner Mongolia is located on the northern border of China, with a geographical location of 37°24 '~53°23' N, 97°12 '~126°04' E east longitude, with a total area of 1.183 million square kilometers, accounting for 12.3% of China's land area, making it the third largest province in China. With an average elevation of about 1,000 meters, it is a plateau-type geomorphologic region, with a narrow, elongated shape stretching from northeast to southwest. The climate is dominated by a temperate continental monsoon climate. It is a tourist resort with a rich natural landscape and a diverse culture. In recent years, tourism has shown a rapid development trend and has now developed into a leading industry or pillar industry in Inner Mongolia cities. Tourism occupies an extremely important place in the economic structure of the country. By 2022, Inner Mongolia has a total population of 24.012 million, a permanent resident urbanization rate of 68.60 percent, a gross regional product of 2315.865 billion Yuan, 428 A-level tourist attractions, receiving 92.4908 million domestic tourists, and total tourism revenue of 105.392 billion Yuan.

In this paper, we investigated the development and evolution of tourism urbanization response in 12 cities in Inner Mongolia. The data in the study came from the Inner Mongolia Statistical Yearbook from 2001 to 2023, the yearbooks of each city over the years, and the statistical bulletins of national economic and social development. Very little of the missing data is supplemented by linear interpolation of the neighboring years.

2.2 Research method

The response of tourism urbanization refers to the adaptation and feedback effect

of the integration of urban economic aggregate, urban investment and development intensity in the process of urbanization [7]. This paper introduces the index "urbanization response coefficient of industrial structure evolution" to measure the response intensity of tourism urbanization. The model is as follows [8]:

$$R = (f/F) / (m/M)$$

Where R denotes the response coefficient of tourism urbanization; f stands for regional tourism revenue; F stands for gross regional product; m denotes the regional urban population; M denotes the total population of the region. The model measures the response strength of urbanization to tourism development by the ratio of tourism revenue to GDP and the ratio of regional urbanization. The larger the ratio, the stronger the role of tourism in promoting urbanization; in turn, this implies a weaker driving effect.

In this paper, we comprehensively applied multivariate statistical analysis methods and used standard deviation, coefficient of variation, relative development rate, bias, ratio and other indicator models to study the spatial-temporal pattern of tourism urbanization response intensity in Inner Mongolia from 2000 to 2022.

3. The corresponding temporal and spatial differences of tourism urbanization in Inner Mongolia

3.1 The overall evolution analysis of spatial-temporal differences

From 2000 to 2022, the standard deviation of the response coefficient for tourism urbanization in Inner Mongolia showed a trend of first rising and then falling. The standard deviation was 0.0513 in 2000, increased to 0.2646 in 2019 and decreased to 0.0425 in 2022, indicating that the absolute difference in the intensity of urbanization response among Inner Mongolia cities has increased year-on-year from 2000 to 2022. The absolute difference between 2019 and 2022 shows a rapidly decreasing trend due to the short-term impact of COVID-19 over the past three years.

From 2001 to 2014, the coefficient of variation of response to tourism urbanization in Inner Mongolia showed a downward trend. The coefficient of variation was 0.7555 in 2000, increased to 0.7942 in 2003, decreased in 2003, and decreased to 0.4933 in 2022, indicating that the relative difference of urbanization response intensity among cities from 2000 to 2003 was the largest, and the relative difference decreased year by year from 2004 to 2022. The relative difference in the intensity of response to tourism urbanization among cities in Inner Mongolia has gradually decreased, but it is still at a high level, and the difference in tourism urbanization is still large.

3.2 Dynamic evolution characteristics of spatial-temporal differentiation

3.2.1 Relative development rate

By using the relative development rate index model, the difference value of tourism urbanization response coefficient of each city in Inner Mongolia from 2000 to 2022 was calculated to represent the dynamic change of tourism urbanization response coefficient of each city. From 2000 to 2022, the response coefficient of tourism urbanization in 12 cities in Inner Mongolia has greatly increased, reflecting

the evolving trend of the overall response intensity of tourism urbanization in Inner Mongolia. Alxa League, Hulunbuir, Xinggan League, Xilingol League, Hohhot and other five cities have the largest growth rate, among which Alxa League has the fastest growth rate of 2.038, far exceeding other cities. Hulunbuir, Xilingol League, Xinggan League, Hohhot and other cities also show substantial growth characteristics, 1.7697, 1.6319, 1.5134 and 1.2248 respectively. Chifeng, Tongliao, Ulanqab and Baotou showed relatively large growth processes with response coefficients of 0.6-1.0 for tourism urbanization, 0.9876, 0.7962, 0.7488 and 0.6096 respectively. Wuhai, Bayannur and Ordos, which are relatively poor in tourism resources and lack features, had the smallest growth rate in response to tourism urbanization, increasing by 0.2907, 0.2634 and 0.1261, respectively.

3.2.2 Ratio and deviation

The ratio and bias values are indicator models to analyze the spatial pattern of the response strength of tourism urbanization across the region through the relationship between the response coefficient of tourism urbanization in each region and the average value in Inner Mongolia. From 2000 to 2022, the response intensity of tourism urbanization in Inner Mongolia has significant spatial differentiation characteristics, showing a spatial pattern of "strong in the east and weak in the west". In 2000, there were five cities in Inner Mongolia where the deviation of the coefficient for tourism urbanization was positive, including Hohhot, Hulunbuir, Tongliao, Xilingol League and Ulanqab. The above five regions also have ratio values above 100 percent, indicating that the response strength of tourism urbanization in these regions is significantly higher than that of the other cities, with Xilingol League having the highest response strength, up to 273.58%. The difference values of response coefficients of tourism urbanization in seven cities, including Baotou, Xinggan League, Chifeng, Ordos, Bayannur, Wuhai and Alxa League, are all negative, and the ratio is mostly lower than 50%, which reflects the spatial pattern of high response intensity of tourism urbanization in the east and low in the west.

In 2022, the deviation values of Xinggan League, Chifeng, Alxa League and other cities are all positive, and the tourism urbanization ratio value of the above cities also exceeds 100%, while the deviation value of Hohhot is negative, and the tourism urbanization ratio value also shows a decreasing trend, comprehensively reflecting the spatial pattern of "strong in the east and weak in the west" response intensity of tourism urbanization in Inner Mongolia in 2022. At the same time, the number of regions with positive deviation of tourism urbanization response intensity in Inner Mongolia increased from 5 in 2000 to 7 in 2022, which comprehensively reflects that the overall response intensity of tourism urbanization in Inner Mongolia shows a gradually enhanced evolutionary trend from 2000 to 2022.

3.3 Spatial differentiation pattern analysis

According to the response intensity model of tourism urbanization, the coefficients of the response intensity of tourism urbanization were calculated separately for 12 cities in Inner Mongolia. From 2000 to 2022, the response strength

of tourism urbanization in Inner Mongolia showed significant spatial-temporal differences. In terms of time series, the response strength of tourism urbanization continues to increase. Based on the average analysis of the tourism urbanization response intensity coefficient of each city, it can be seen that the tourism urbanization response intensity of Inner Mongolia presents a spatial distribution pattern of "strong in the east and weak in the west", and the tourism urbanization response coefficient can be divided into the following four types:

Strong response type (0.30-0.40): Xilingol League (0.3946), Hulun Buir (0.3802). Xilingol is a national grassland nature reserve, a representative and typical grassland of the temperate grasslands, an important ecological barrier in North China, and the closest grassland pastoral area to the capital Beijing. Hulunbuir is a key development area for grassland tourism in China and a pilot area for national tourism reform and innovation. The Hulunbuir Grassland, one of the four largest grasslands in the world, has boosted its tourism industry and economic development, showing a fast growth trend.

Medium response type (0.20-0.29): Chifeng (0.2435), Xinggan League (0.2426), Hohhot (0.2246). Chifeng, the most populous city in Inner Mongolia, attracts a large number of tourists every year due to Hongshan's history and culture. Hinggan League is close to Xilingol League and Hulunbuir and receives a large number of grassland visitors. As the capital of Inner Mongolia, Hohhot is the political, transportation, economic, cultural, scientific and technological center of Inner Mongolia, and its economic development has shown a fast growth trend.

Low response type (0.10-0.19): Alxa League (0.1918), Tongliao (0.1821), Ulanqab (0.1736), and Baotou (0.1138). Due to its unique desert tourism resources and desert customs, the tourism industry in Alta League, located in western Inner Mongolia, has shown a rapid development trend. Tongliao is close to Jilin and Liaoning provinces and has easy transportation links. Located west of Beijing, Ulanqab is also in the midst of continuous growth in its tourism economy.

Weak response type (0.00-0.09): Erdos (0.0784), Bayannur (0.0747), Wuhai (0.0505). Ordos is a typical resource-based city, Wuhai is mainly a heavy industry city, and Bayannur is located in an irrigated agricultural area of Hetao. The characteristics of tourism resources are not prominent enough, and regional characteristics are lacking. The region has good social and economic development, high levels of urbanization, and low levels of urbanization in response to the development of tourism.

4. Conclusions and Suggestions

4.1 Conclusions

(1) From 2000 to 2019, the absolute difference in the response intensity of tourism urbanization in Inner Mongolia rose year by year. However, due to the impact of the novel corona virus epidemic, it showed a rapidly decreasing trend from 2020 to 2022. The relative difference in the intensity of tourism urbanization response presented a trend of decreasing fluctuations, and the overall difference in the intensity of tourism urbanization response was significant.

(2) The response intensity of tourism urbanization in Inner Mongolia exhibits a distinct spatial pattern of "strong in the east and weak in the west". Nevertheless, the intensity of the response to tourism urbanization in the eastern region continued to increase over time, and the gap among the 12 Inner Mongolian cities gradually widened.
(3) Based on the temporal and spatial differences in the response intensity of tourism urbanization, the response intensity of tourism urbanization in Inner Mongolia can be classified into four types. Xilingol League and Hulunbuir are highly responsive cities, while Chifeng, Xinggan League, and Hohhot are moderately responsive regions. Alxa League, Tongliao, Ulanqab, and Baotou are among the cities with low response. Ordos, Bayannur, and Wuhai are weakly responsive cities.

4.2 Suggestions

There are notable regional disparities in the intensity of response to tourism urbanization among the 12 Inner Mongolian cities. In the future, the government should undertake comprehensive tourism planning, actively explore new paths and models for tourism development, deepen the thickness of the tourism industry, enhance the driving role and correlation effect of the tourism industry, and augment and expand the production capacity and consumption space of the tourism industry. Deeply integrate tourism with the cultural industry and rural revitalization, promote the development of the tourism economy as a new engine for the development of new urbanization, provide new impetus for the high-quality development of urbanization, and continuously enhance the response intensity of tourism urbanization to achieve the strategic goal of new urbanization development in Inner Mongolia.

The highly responsive regions should strengthen the leading function of the government, further improve the construction of tourism infrastructure, and reinforce the coordinated development of urban and rural areas, giving full play to the supporting role played by urbanization in tourism development. The medium-sized metropolises should rely on their geographical locations and tourism resource advantages, deeply optimize the industrial structure and spatial distribution, and promote the coordinated and integrated development of tourism and urban-rural areas. In the future, attention should be paid to the sustainable development and utilization of characteristic resources, promoting the transformation and upgrading of tourism development, and providing dynamic support for the development of tourism urbanization.

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