Spatial Differentiation of Urban Tourism "Production-Living-Ecology" Competitiveness: A Case Study of Five Northwestern Provinces (Postprint)

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Abstract

Guided by the "Production-Living-Ecology" concept, this study takes 29 China Excellent Tourism Cities in the five northwestern provinces as research subjects, establishes an urban tourism competitiveness model for production, living, and ecology, employs ESDA methods to measure the spatial agglomeration degree of tourism "Production-Living-Ecology" competitiveness, utilizes natural breaks classification clustering to reveal the spatial patterns of tourism production, living, and ecology, and combines correlation analysis with AHP weighting to dissect its influencing factors. Results indicate that the tourism "Production-Living-Ecology" competitiveness of sample cities is generally weak, spatially dispersed, with low agglomeration effects in local areas. Among the influencing factors, domestic tourism consumption, number of public toilets, and precipitation constitute the dominant factors shaping urban tourism "Production-Living-Ecology" competitiveness. Finally, based on empirical results, the 29 cities can be categorized into production-oriented, living-oriented, and ecology-oriented tourism cities, forming four "Production-Living-Ecology" tourism circles across the five northwestern provinces, thereby providing a novel cooperation mechanism for regional tourism development.

Full Text

Preamble

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Abstract

Based on the guidance of the "production-life-ecology" concept, this paper investigates the spatial variation of the "production-life-ecology" competitiveness in urban tourism for 29 cities in the five northwestern provinces of China. First, it establishes a set of urban "production-life-ecotourism" competitiveness models, followed by the use of the ESDA method to calculate the spatial agglomeration degree and the natural disjunction points for the classification clusters which basically demonstrated the spatial pattern. The correlation analysis and AHP empowerment are used further to dissect the influencing factors. The results show that the overall competitiveness of the "production-life-ecology" in tourism of the sample cities is weak, the spatial distribution is discrete, and the local area aggregation effect is low. The domestic tourist consumption, the number of public toilets, and the precipitation are the leading factors of the "production-life-ecology" competitiveness in urban tourism. The 29 cities can be divided into 3 categories based on empirical results: the production-oriented type, life-oriented type, and eco-type. The formation of 4 "production-life-ecology" tourism circles in the 5 provinces in northwestern China based on the division will provide new cooperation mechanisms for regional tourism development.

Keywords: Five provinces in northwestern China; urban tourism competitiveness; spatial differentiation; "production-life-ecology" tourism circle

1. Introduction

Urban tourism competitiveness represents a city' s ability to attract, serve, and retain tourists while maintaining sustainable development advantages compared to other destinations. Research on urban tourism competitiveness has evolved from single-factor evaluation to comprehensive multi-dimensional assessment systems. The "production-life-ecology" framework provides an integrated perspective for analyzing urban tourism development, emphasizing the coupling relationship between industrial production capacity, living service quality, and ecological environmental sustainability.

This study examines 29 cities across five northwestern provinces in China, establishing an improved "production-life-ecology" system coupling mechanism (Figure 1). The research framework incorporates three core dimensions: tourism production capacity, living service quality, and ecological environment sustainability, forming a comprehensive evaluation system for urban tourism competitiveness.

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2. Methodology

2.1 Data Sources and Processing

The study utilizes 2015 statistical data from the China Urban Statistical Yearbook and provincial statistical yearbooks. Geographic information data were processed using ArcGIS 10.3 software. The evaluation index system comprises 23 indicators across three dimensions (Table 1), with weights determined through the Analytic Hierarchy Process (AHP).

Table 1 presents the evaluation index system and weights for urban tourism competitiveness, including: - Production dimension: tourism resource endowment, industrial output value, service capacity - Life dimension: public service facilities, living convenience index - Ecology dimension: environmental quality, ecological carrying capacity

2.2 Evaluation Models

2.2.1 Comprehensive Competitiveness Model The comprehensive competitiveness index was calculated using weighted summation:

$$W_j X_{ij} = \sum_{j=1}^{n} W_j X_{ij} \quad (1)$$

where Z_i represents the comprehensive competitiveness index of city i, W_j denotes the weight of indicator j, X_{ij} is the standardized value of indicator j for city i, and n is the number of indicators.

2.2.2 Spatial Autocorrelation Analysis Global Moran' s I was employed to measure spatial agglomeration patterns:

$$\text{Moran's I} = \frac{n \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij} \sum_{i=1}^{n} (x_i - \bar{x})^2}$$

where $s^2 = \frac{1}{n} \sum_{i=1}^{n} (x_i - \bar{x})^2$, x_i represents the observed value at location i, and w_{ij} is the spatial weight matrix.

2.2.3 Influencing Factor Analysis Pearson correlation analysis identified key determinants. The correlation coefficient $R > 0.5$ indicates strong correlation, while $R < 0.5$ indicates weak correlation. Significance testing was performed at the 95% confidence level.

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3. Results

3.1 Spatial Pattern Characteristics

The comprehensive competitiveness of urban tourism in northwestern China shows significant spatial variation (Figures 2-5). Moran' s I values of 0.062, -0.048, and 0.042 for production, life, and ecology dimensions respectively indicate weak spatial autocorrelation. The spatial distribution exhibits discrete patterns with low local aggregation effects.

Figure 2 illustrates the comprehensive competitiveness of urban tourism, revealing that: - High-value areas are concentrated in provincial capitals and economically developed cities - Low-value areas are widely distributed across remote regions - The "production-life-ecology" coupling mechanism shows asynchronous development across cities

3.2 Factor Analysis Results

Correlation analysis (Table 3) identifies domestic tourist consumption, public toilet density, and precipitation as primary influencing factors. The AHP weighting results demonstrate that production capacity contributes 0.393, living services 0.364, and ecological environment 0.361 to overall competitiveness.

Table 3 shows correlation coefficients between "production-life-ecology" competitiveness and influencing factors: - Domestic tourism consumption: 0.553 ($p < 0.01$) - Public toilet density: 0.333 ($p < 0.05$) - Precipitation: 0.373 ($p < 0.05$)

3.3 Regional Differentiation

The 29 cities were classified into three types: 1. **Production-oriented** (9 cities, 31%): Characterized by strong industrial base but weak living and ecological dimensions 2. **Life-oriented** (8 cities, 28%): Featuring superior public services but limited production capacity 3. **Eco-type** (12 cities, 41%): With better environmental quality but underdeveloped tourism infrastructure

Four "production-life-ecology" tourism circles were identified based on natural disjunction points in the spatial analysis, providing foundations for regional cooperation.

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4. Discussion

The study reveals that northwestern China' s urban tourism competitiveness remains generally weak, with significant internal disparities. The discrete spatial distribution pattern reflects the region' s unique geographic and economic characteristics. The formation of tourism circles based on functional differentiation can promote coordinated regional development.

Key policy implications include: - Strengthening infrastructure connectivity between production-oriented and eco-type cities - Enhancing public service capacity in life-oriented cities - Promoting ecological conservation while developing tourism in fragile environments

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