

Research on Comprehensive Evaluation of Tourism Environment in Minority Areas -- A Case Study of Ordos, Inner Mongolia in China

Xueli Li¹

Zhenguo Zhang¹

Abstract

In this paper, taking the city Ordos, Inner Mongolia in China's ethnic minority areas as an example, with the use of regional tourism development meta-analysis methods, tourism environment development, changes and coordination degree in this area between 2000-2011 was evaluated and analyzed quantitatively. The conclusion showed that: Over the past 11 years, economy in the city Ordos developed rapidly, while society and ecological environment development was relatively slow, which resulted in a continuing downward trend in tourism environment coordination degree.

Key Words: Minority areas; Ordos; tourism environment; coordination degree

1 Introduction

Tourism environment is the basis of tourism industry development. Study on tourism environment evaluation could be supportive of the practice of tourism sustainable development and also a hot issue in the field of regional tourism sustainable development in China currently^[1-9]. In minority areas, due to specific geographical environment, the ecology and human environment maintains a relatively original state which provides rich tourist resources for its tourism development, and has become the most important reserve resources in China. But meanwhile it should be caught attention that in these areas economic foundation is relatively weak and ecological environment is relatively fragile. In the long term, tourism development is characterized of strong impetus to economy, less pollution and sustainability which is favorable to local economic development and ecological environment construction.

Ordos City is located in the southwest of Inner Mongolia Autonomous Region, almost occupies the overall Ordos Plateau and lies in the upper and middle reaches of the Yellow River which has a long history and unique natural and humanity landscape and is rich in tourism resources (Figure 1). In recent years, the city's tourism industry is developing rapidly, tourist market is expanding continuously and tourism revenue is also increasing significantly. However, as the part of the arid and semi-arid fragile ecologically areas in the north of China, along with the rapid development and expansion of tourism industry, environmental basis has become very fragile.

¹Economics and Management School, Dalian Nationalities University, Dalian Liaoning, China;

Negative effect of tourism development in both ecology and environment has been demonstrated, and arouse concern from scholars. Therefore, in this article, on the case of Ordos city, Inner Mongolia, tourism environment in minority areas is analyzed and evaluated comprehensively, in order to provide reference for building tourism coordinated development pattern between ecological environment and economy.



Figure 1 Schematic diagram on Ordos's location

2 Research Methods

2.1 Basic Ideas

Regional tourism development meta-analysis method is to take sustainable development as a starting point and ultimate goal, use statistical methods to carry on data analysis on three aspects of economy, society and culture and natural environment at tourism destination, builds time series of tourism development, conducts overall trend analysis and development coordination analysis. This evaluation would be more objective and make theory meeting the practice better.

Combined with the specific situation of Ordos City, tourism environment is analyzed and evaluated using this method. (1) On the basis of determining the scope of study area and collecting relevant data, overall assessment of regional tourism environmental change is carried out, then identify the basic elements framework, clarify the analysis focus, and then according to the principle of sustainable development evaluation, build evaluation index system and determine index weight; (2) Analyze macro trends and development coordination degree of regional tourism based on calculated results; (3) Analyze tourism environmental impact mainly including the economic, socio-cultural and environmental impacts on the micro level, i.e specific phenomena and problems analysis (Figure 2).

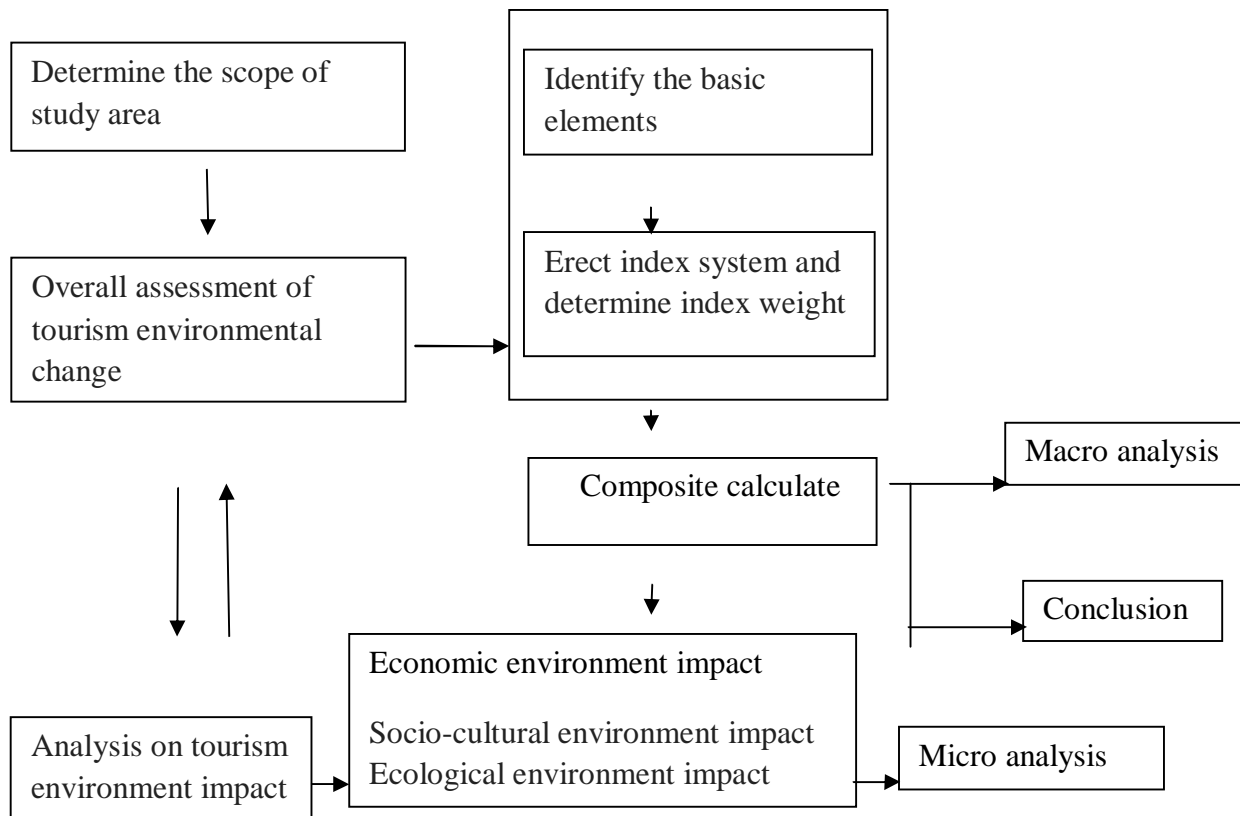


Fig 2 Meta-analysis Method on Regional Tourism Development

2.2 Composite Calculation

(1) Determine index weight

That index weight is reasonable or not would directly affect proper and scientific evaluation. In this article, Analytic hierarchy process (APH method) is used to determine the index weight. AHP is not only a collation and integration of experts' experience, but also an effective way to quantify and concentrate the dispersed advice. It should decompose the complex problem into several levels. At every level, the indicators listed should be judged and scored in pairwise comparisons to judge the degree of importance by experts and decision-makers, then determine the contribution of the underlying indexes to the upper indexes through calculating eigenvector of judgment matrix, thereby obtain ranked results of the importance of primary indexes to the overall target or comprehensive evaluation indexes.

Assumed evaluation objectives as A and evaluation index set $F = \{f_1, f_2, \dots, f_n\}$, build judgment matrix P (A-F) as follows:

$$P = \begin{pmatrix} f_{11} & f_{12} & \dots & f_{1n} \\ f_{21} & f_{22} & \dots & f_{2n} \\ \dots & \dots & \dots & \dots \\ f_{n1} & f_{n2} & \dots & f_{nn} \end{pmatrix}$$

Fij is a relative value to present factors (i = 1,2,, n; j = 1,2,, n), Fij values as Table 1, whereby obtain index weights of evaluation index system(table 2).

Table 1 A-F Judgment Matrix and Its Meaning

Values of Fij	meaning
1	Same important of f _i and f _j
3	A little more important of f _i and f _j
5	Obviously more important of f _i and f _j
7	Very important of f _i and f _j
9	Extremely important of f _i and f _j
2, 4, 6, 8	Ranged between the degree of the above
f _{ij} =1/f _{ji}	Indicates the degree unimportant of i to j

(2) Standardization of indicator values

Divide the indicators into three categories for Standardization based on the evaluation characteristics of meta-Analysis method:

Efficiency indicators are mainly positive effect indicators which could reflect the development of economic and social cross-section and evaluation values would rise with the rise of values of compared years, such as per capita gross social product and per capita net income of farmers, etc. The formula is:

$$\text{Evaluation value} = (\text{compared year} / \text{base year}) * 100$$

Cost-based indicators mainly refer to the social and environmental costs which could reflect development of economic and social cross-section such as Engel's coefficient, unemployment and so on.

Such indicators are characterized that smaller the value, the more able to explain the sustainability of evaluation objectives. The formula is:

$$\text{Evaluation value} = (2 * \text{base year} - \text{Compared years}) * 100$$

Stable indicators refer to those whose best state is that the values remain unchanged in the development process and the evaluation values would decrease due to any changes of compared years, such as social Price Index. The formula is:

$$\text{Evaluation value} = \text{base year} - | (\text{compared year} / \text{base year} - 1) * 100 |$$

(3) Weighted Summation

Each indicator in index system could reflect different aspects of sustainable development in regional tourism. Composite calculation is necessary in order to reflect full view. In this study multi-objective linear weighting function method is used to calculate the value of time series for many years.

The formula is:

$$Y = \sum I_j * R_j$$

Y is the total score, I is the score of a single index; R is weights of a single index and j is index number.

3 Analyses on the Development and Change of the Tourism Environment in Ordos City

3.1 Analysis on the Overall Development Trend

According to methods on above, the calculation results are shown in Table2 and Figure3. Meanwhile, the research generate an exponential regression model with EXCEL software $Y = 74.30e^{0.304x}$, then make the development curve fitting. R is equal to 0.991 which indicate a higher degree of trend fitting. Seen from Figure 3, there are two basic characteristics in Ordos tourism environment developments and changes in nearly 11 years :(1) From 2000 to2011, the overall level of regional tourism environment development sustained an upward trend. Growth rate kept steady from 2000 to2005 and the overall tourism environment change was relatively rapid pace in Ordos from 2005 to 2011.

(2) From the fitted trend line, it goes to a concave curve which indicated that the tourism environment continued to show a rapid growth trend.

Table 2 Comprehensive Evaluation Index System and Values of Tourism Environment

Indexes	Weights	2000	2001	2003	2005	2007	2009	2011
Real GDP per capita	0.07	6.90	11.50	18.05	27.34	52.91	99.34	110.04
output value of tertiary industry	0.04	3.60	5.50	8.21	20.91	40.46	72.64	98.35
local financial revenue	0.01	0.50	0.84	2.66	2.28	9.95	18.12	34.52
total investment of social fixed assets	0.01	0.80	1.32	3.79	6.47	14.19	25.12	35.41
Per capita disposable income of urban and rural residents	0.03	3.40	4.45	5.29	6.81	10.03	13.52	16.24
Per capita income of farmers and herdsmen	0.06	5.80	5.71	7.82	10.88	14.48	18.45	23.86
Total tourism income	0.07	7.30	31.94	38.33	42.30	50.20	55.40	62.81
Total number of tourists	0.05	5.40	9.14	9.64	7.58	13.90	19.30	26.22
Scale of tourism township enterprises	0.02	1.90	4.17	4.31	5.40	6.70	8.80	11.12
The proportion of tertiary industry	0.04	3.60	3.85	4.65	5.28	5.28	5.05	5.42
Retail Price Index	0.01	0.90	2.23	2.27	0.93	0.94	0.91	0.90
Average wage of urban workers	0.05	5.10	7.32	9.70	9.20	36.84	50.76	61.25
Medical Beds	0.03	3.10	3.08	3.15	3.76	4.47	8.66	10.58
Number of Students	0.04	3.60	3.43	2.97	3.28	3.72	3.65	3.80
Expenses on Education, health and sciences	0.05	4.80	7.78	10.35	12.50	14.80	18.40	22.47
TV numbers every hundred households	0.02	2.10	3.68	3.58	2.66	2.92	3.08	3.14
Per capita consumption levels	0.03	3.20	4.11	7.34	6.44	10.15	18.76	25.89
Per capita housing area	0.02	2.10	2.90	3.32	2.68	3.14	4.30	5.13
Engel coefficient of urban residents	0.04	3.50	2.53	2.41	2.25	2.14	1.81	1.70
Unemployment rate	0.02	1.70	1.81	3.49	10.03	9.04	6.32	5.76
Per capita green area	0.08	7.70	3.02	5.00	7.60	6.53	12.28	13.24
Precipitation	0.09	9.30	7.29	10.421	8.92	10.21	11.48	12.57
Garbage Harmless Treatment Capacity	0.05	4.8	6.38	10.07	5.10	5.73	5.23	5.82
The natural population growth rate	0.04	3.50	2.84	2.68	21.74	43.37	53.03	52.68
Arable land per capita	0.05	5.40	4.95	4.35	4.51	4.48	4.62	4.51
Overall rating	1	100	141.495	183.786	229.362	353.083	503.462	590.472

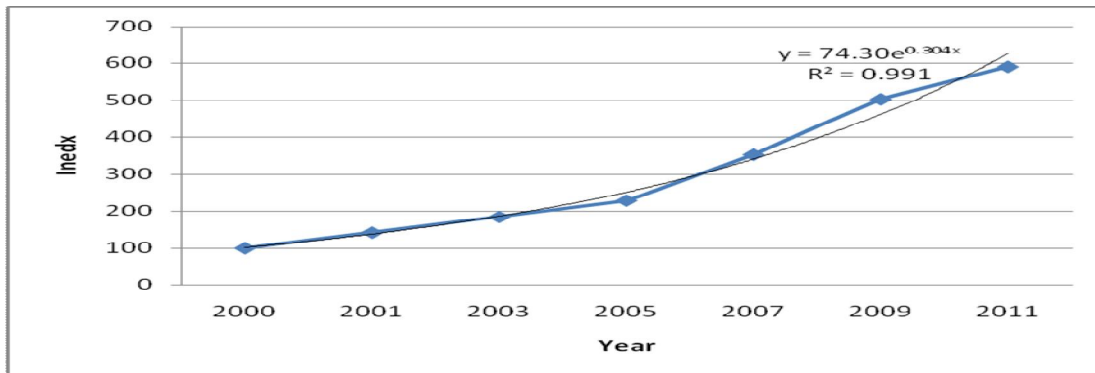


Figure 3 Development and Changes Graph of tourism environment in Ordos City from 2000 to 2011

3.2 Analysis on Development Coordination Degree

Coordinated development degree on the three aspects of the region's economy, society and environment is usually the basic factor to determine tourism environment sustainable development. Whether the three aspects maintain the coordinated development directly determines whether regional tourism environment keeps sustainable and healthy development. Therefore, in order to measure the degree of a balanced development of each section, the formula introduced:

$$CI = \frac{\sum_{i=1}^n A_i}{\sqrt{\sum_{i=1}^n A_i^2}}$$

CI is coordination degree of the system development, A is the subsystem-composite index and n is the number of subsystems. Mathematical connotation of the formulas is that change rate of the various subsystems should be mutually balanced and any biased aspect would lead the efficiency of overall system decreasing. When $n = 3$, the formula can be simplified as:

$$CI = (A_1 + A_2 + A_3) \div \sqrt{A_1^2 + A_2^2 + A_3^2}$$

A_1 , A_2 and A_3 represent the three sections of economy, society and environment separately. When $A_1 = A_2 = A_3$, it can get the best coordination degree of the system. The formula meets the following rules:

- (1) When any single factor changes among A_1 , A_2 and A_3 , the value of C could have the corresponding change in the same direction with the factor;
- (2) When all factor (As) change in the same direction and the change rate maintains a good state of equilibrium, the value of C is close to 1.732;
- (3) When all factor (As) change in the different direction or they change in the same direction but the rate difference is very large, C is much less than 1.732.

By the weighted sum of the values of each index, the composite index of the economic, social and environmental aspects in Ordos City from 2001 to 2006 is obtained and then it was taken into development coordination formula to calculate (Table 3). Meanwhile tourism environmental development coordination variation diagram in Ordos City is drawn with the use of EXCEL software (Figure 4). From figure 4, we can say that coordination degree between tourism and environment has been in a downward trend which indicates that in Ordos tourism development process, the development among economy, society and environment dimensions has been always uncoordinated for nearly 14 years. In the details which are:

Table 3 Tourism Environment Coordination Degree Index with Different Cross Sections

Year	2000	2001	2003	2005	2007	2009	2011
Economic section		4.841	6.229	7.823	13.139	19.573	
Social section	.317	1.011	1.255	1.460	1.715	2.235	23.473
Environmental section	.831	1.578	2.166	2.761	3.687	4.629	2.718
Coordination degree	2.103	1.431	1.437	1.430	1.4348	1.306	4.814
	1.622						1.286

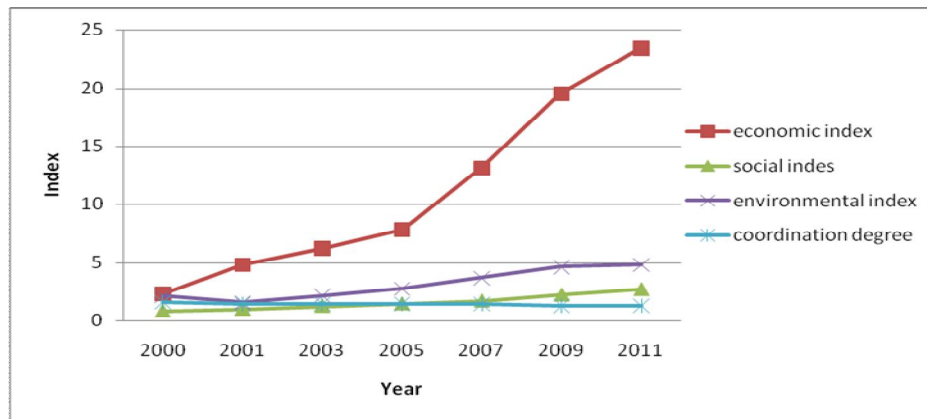


Figure 4 Tourism Environment and Development Coordination variation in Ordos City from 2000 to 2011

- (1) From 2000 to 2005, the coordination degree continued to decline significantly and linearly;
- (2) From 2007 to 2011, the downward trend of coordinated degree has slowed but still linearly.

By analyzing the change of economic, social and environmental indicators combined with the actual situation, The inherent reason of coordinate degree variation condition is that Ordos City's economic, social and environmental indicators was a non-synchronous growth trend for nearly 11 years.

In the detail, the overall economy was a continually rapid growth trend, and despite society and environment grew on the whole, its growth rate and amplitude lagged significantly behind economic evaluation value.

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