Analysis Based on Multiple Data Models—Development of Tourism Economy under the Background of the Belt and Road Initiative

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Abstract. The Belt and Road Silk Economic Belt is personally planned and laid out at the national level, and now more than 50 countries have joined the construction of the Belt and Road or benefited from the Belt and Road Economic Belt. This paper takes the "Belt and Road" initiative as the background, discusses the development of tourism economy under the initiative, and adopts multi-data model for in-depth analysis. Through the collection and sorting of relevant data, combined with appropriate economic theories and models, this paper reveals the impact of the "Belt and Road" Initiative on the tourism industry of participating countries and regions and its future development trend. The study found that the Belt and Road Initiative has promoted transnational cooperation and exchanges in tourism, promoted economic growth and job opportunities in relevant countries and regions, but also faced some challenges and problems. By constructing a multi-data model, this paper provides theoretical and empirical support for further deepening the understanding of tourism economic development under the background of "One Belt and One Road".

Keywords: Belt and Road; tourism economy; multi-data model; development trend

1   Introduction

In recent years, the Belt and Road Initiative has become an important strategy attracting international attention. As one of the important initiatives put forward by China, the Belt and Road aims to achieve common development and prosperity by promoting eco-

nomic cooperation and exchanges among countries and regions along the routes. Tourism, as an important economic activity, has also been affected by the Belt and Road Initiative and has become one of the key development areas of participating countries and regions. Most foreign scholars' researches on tourism finance evaluation methods mostly focus on the use of quantitative analysis techniques to improve the accuracy of model evaluation, but lack of relevant theories consistent with related tourism giant companies and their characteristics, as well as their tourism structure characteristics. At the same time, after consulting several literatures, it is found that the object of most foreign studies is a single country or a specific group, so the research results of tourism finance evaluation are not discussed from the perspective of individual tourism objects, especially from the perspective of single questionnaire tourism individuals. On the one hand, different countries have different tourism subjects and main objects. On the other hand, different countries have different modes and degrees of tourism development. Compared with Indonesia and other Southeast Asian countries, China's tourism development is still at a relatively low level. Therefore, such foreign research results have little practical significance for the evaluation and control of China's tourism economy. Most of the existing tourism economic evaluation methods at home and abroad are based on databases with a certain capacity. This study published targeted questionnaires on FACEBOOK for this purpose, conducted a questionnaire survey, and carried out a multivariate summary analysis.

2 The Construction of the Belt and Road Tourism Economy Multi-Analysis System

In order to study the development of tourism economy in many countries, this paper uses Delphi method, analytic hierarchy process and Logit model to build a multivariate analysis system of international tourism economy. In the construction of the whole model, this paper selects the important influencing factors by Delphi method and analytic hierarchy process, and establishes the analysis system by Logit model.

2.1 Methed of Delphi

Delphi method is to use back-to-back communication to consult the forecast opinions of the members of the expert group. After several rounds of consultation, the forecast opinions of the expert group tend to be concentrated, and finally make a prediction conclusion that conforms to the trend of the market in the future. The Delphi method[1], also known as the expert opinion method, is based on a systematic procedure and adopts the method of anonymously expressing opinions, that is, team members are not allowed to discuss with each other, do not have horizontal contact, and can only have relations with the investigators, so as to fill in the questionnaire repeatedly to gather the consensus of questionnaire fillers and collect opinions of all parties. Management techniques commonly used to structure team communication processes and tackle complex task challenges.

2.2   Analytic Hierarchy Process

It is a decision-making method that breaks down the elements that are always relevant to decision-making into the levels of goals, criteria, schemes, etc., and carries out qualitative and quantitative analysis on this basis.[2]

The eigenvector W corresponding to the maximum eigenvalue of the judgment matrix A is obtained by the sum method, which is the weight vector of the relative importance of the corresponding index of the same level to an index of the previous level after normalization. The specific steps are as follows:

(a) Each column vector of the judgment matrix A is normalized:

$$C_{ij} = \frac{A_{ij}}{\sum_{i=1}^{n} A_{ij}} \qquad (1)$$

(b) Sum the normalized matrix Cij by row:

$$\overline{C_i} = \sum_{j=1}^{n} C_{ij} \qquad (2)$$

(c) The Cij is normalized again:

$$W_i = \frac{\overline{C_i}}{\sum_{i=1}^{n} \overline{C_i}} \qquad (3)$$

Comment:the vector $W = (W_1, W_2, W_3 .... W_n)^T$

2.3   Multinomial Logit Model

Logit model is one of the discrete choice model, which belongs to the category of multivariable analysis. Through Logit model, the logarithm of default risk ratio can be estimated.[3]

$$\ln\left(\frac{P_i}{1 - P_i}\right) = \alpha + \beta x + \gamma y + \mu \qquad (4)$$

Comment:P_i is the positive economic less than probability, and x and y are the relevant factors affecting the economic situation.

2.4   The Judgment of Economic Diversification

The following table shows the survey analysis assignment for the sample background of the questionnaire (Table 1):

Table 1. Assignment table of judgment matrix

A	A1	A2	A3	A4	A5	A6	A7
A1	1.00	0.70	0.46	0.66	0.94	0.40	1.76
A2	1.43	1.00	0.59	0.26	1.51	0.31	1.75
A3	2.17	1.69	1.00	1.52	2.42	0.76	3.25
A4	1.52	3.85	0.66	1.00	2.40	0.85	3.89
A5	1.06	0.66	0.41	0.42	1.00	0.28	1.97
A6	2.50	3.23	1.32	1.18	3.57	1.00	3.83
A7	0.57	0.57	0.31	0.26	0.51	0.26	1.00

Note: A1: the basic information of the survey respondents, A2: the basic information of the survey respondents, A3: the wealth of the survey respondents, A4: the income of the survey respondents, A5: the information of the survey respondents, A6: the proportion of family expenses spent on travel, A7: external factors.

Converting the table to matrix A.

$$A = \begin{pmatrix} 1.00 & 0.70 & 0.46 & 0.66 & 0.94 & 0.40 & 1.76 \\ 1.43 & 1.00 & 0.59 & 0.26 & 1.51 & 0.31 & 1.75 \\ 2.17 & 1.69 & 1.00 & 1.52 & 2.42 & 0.76 & 3.25 \\ 1.52 & 3.85 & 0.66 & 1.00 & 2.40 & 0.85 & 3.89 \\ 1.06 & 0.66 & 0.41 & 0.42 & 1.00 & 0.28 & 1.97 \\ 2.50 & 3.23 & 1.32 & 1.18 & 3.57 & 1.00 & 3.83 \\ 0.57 & 0.57 & 0.31 & 0.26 & 0.51 & 0.26 & 1.00 \end{pmatrix} \quad C_{ij} = \frac{A_{ij}}{\sum_{i=1}^{n} A_{ij}} = \begin{pmatrix} 0.10 & 0.06 & 0.10 & 0.12 & 0.08 & 0.10 & 0.10 \\ 0.14 & 0.09 & 0.12 & 0.05 & 0.12 & 0.08 & 0.10 \\ 0.21 & 0.14 & 0.21 & 0.29 & 0.20 & 0.20 & 0.19 \\ 0.15 & 0.33 & 0.14 & 0.19 & 0.19 & 0.22 & 0.22 \\ 0.10 & 0.06 & 0.09 & 0.08 & 0.08 & 0.07 & 0.11 \\ 0.24 & 0.28 & 0.28 & 0.22 & 0.29 & 0.26 & 0.22 \\ 0.06 & 0.05 & 0.06 & 0.05 & 0.04 & 0.07 & 0.06 \end{pmatrix}$$

(5)

$$\overline{C_i} = \sum_{j=1}^{n} C_{ij} = \begin{pmatrix} 0.66 & 0.70 & 1.43 & 1.44 & 0.59 & 1.79 & 0.38 \end{pmatrix}$$

(6)

$$W_i = \frac{\overline{C_i}}{\sum_{i=1}^{n} \overline{C_i}} = \begin{pmatrix} 0.09 & 0.10 & 0.20 & 0.21 & 0.08 & 0.26 & 0.05 \end{pmatrix}$$

(7)

$$AW_i = \begin{pmatrix} 1.00 & 0.70 & 0.46 & 0.66 & 0.94 & 0.40 & 1.76 \\ 1.43 & 1.00 & 0.59 & 0.26 & 1.51 & 0.31 & 1.75 \\ 2.17 & 1.69 & 1.00 & 1.52 & 2.42 & 0.76 & 3.25 \\ 1.52 & 3.85 & 0.66 & 1.00 & 2.40 & 0.85 & 3.89 \\ 1.06 & 0.66 & 0.41 & 0.42 & 1.00 & 0.28 & 1.97 \\ 2.50 & 3.23 & 1.32 & 1.18 & 3.57 & 1.00 & 3.83 \\ 0.57 & 0.57 & 0.31 & 0.26 & 0.51 & 0.26 & 1.00 \end{pmatrix} \times \begin{pmatrix} 0.09 \\ 0.10 \\ 0.20 \\ 0.21 \\ 0.08 \\ 0.26 \\ 0.05 \end{pmatrix} = \begin{pmatrix} 0.67 \\ 0.71 \\ 1.47 \\ 1.50 \\ 0.60 \\ 1.84 \\ 0.39 \end{pmatrix}$$

(8)

$$\lambda_{mac} = \frac{\sum_{i=1}^{4} \dfrac{AW_i}{W_i}}{n} = 7.16$$

(9)

It can be concluded that C_i=0.027, and further according to the definition of consistency test, $C.R$=0.02<0.1, indicating that the matrix passes the consistency test.

3   Kappa Value Verification of the Model

Kappa value is used to detect internal consistency, that is, whether two evaluators have consistency in their evaluations of the same object, and its value ranges from 0 to 1, where 1 means that the evaluations are completely consistent and 0 means that the evaluations are completely inconsistent. When multiple raters and multiple items are involved, the most common practice is to take all possible Kappa statistical values between two different people.[4-5] Then take the mean value of Kappa statistics to measure.

The questionnaire distributed this time was sent by E-mail to the experts and teachers who have research on tourism economy in 20 universities along the Belt and Road. 200 questionnaires were distributed, among which 197 were recovered and 189 were valid. Most of the participants who returned questionnaires were expert professors. The results returned by collating statistics are as follows(Table 2):

Table 2. Calculation of Kappa values in random samples

	1	2	3	4	5	6	7
+	0.64	0.92	0.73	0.64	0.83	0.89	0.27
-	0.00	0.33	0.00	0.00	0.00	0.43	0.00
	8	9	10	11	12	13	14
+	1.00	0.80	0.85	0.85	0.82	0.92	0.83
-	0.17	0.17	0.67	0.33	0.20	0.33	0.25
	15	16	17	18	19	20	21
+	0.77	0.60	0.75	0.85	0.85	0.70	0.85
-	0.00	0.17	1.00	0.00	0.00	0.17	0.67
	22	23	24	25	26	27	28
+	0.87	0.85	0.92	0.67	0.85	0.77	0.92
-	0.00	0.00	0.33	0.00	1.00	0.33	0.33

By calculating that the mean values of positive consistency and negative consistency are 0.79 and 0.25 respectively, it shows that the consistency of experts' evaluation of the adopted tourism economic indicators is essential, and the consistency of positive evaluation is significantly higher than that of negative evaluation, indicating that the inconsistency mainly comes from the negative evaluation. In general, the indicators screened from the hierarchical analysis basically cover the diversity of economic activity of the Belt and Road.

4   The Belt and Road Tourism Economy Proposals

The Belt and Road Initiative aims to promote economic cooperation among countries along the routes, of which tourism is an important sector. In order to promote the development of the Belt and Road tourism economy, the following suggestions can be considered:

Strengthen regional cooperation: Encourage tourism cooperation among countries along the route, for example, by simplifying visa procedures, increasing direct flights, and establishing tourism alliances to improve the convenience and attractiveness of travel within the region.

Promote cultural exchanges: Make use of the rich historical and cultural resources along the Belt and Road to carry out cultural tourism exchange activities. Hold international cultural festivals, art exhibitions, historical site visits and other activities to enhance the cultural connotation of tourism.

Tourism Infrastructure Development[6]: Invest in the improvement and upgrading of tourism infrastructure, such as transportation, accommodation, information services, etc., to improve the quality of tourism experience and visitor satisfaction.

Green and Sustainable Tourism: Promote the concept of green tourism, protect the natural and cultural heritage along the route, develop ecological tourism and rural tourism, and ensure that tourism development is coordinated with environmental protection.

Diversified tourism products: Develop diversified tourism products, including adventure tourism, health tourism, educational tourism, etc., to meet the needs of different tourists.

Tourism Marketing: Use digital media and social platforms for effective marketing to enhance the visibility and influence of the Belt and Road tourism brand.

Talent training and service improvement: Strengthen the training and education of tourism industry talents, improve the professional level of service personnel, and improve the overall service quality.

Security measures: Strengthen tourism safety management, ensure the personal and property safety of tourists, and establish and improve emergency handling mechanisms.

Policy support and investment guidance[7]: The government provides policy support, such as tax incentives, financial subsidies, etc., to attract more private and foreign investment into the tourism industry.

Through the implementation of these measures, it can effectively promote the development of tourism economy of countries along the Belt and Road and achieve mutual benefit and win-win situation.

5   Summary

Under the background of the Belt and Road Initiative, the tourism economy of the countries along the route shows a diversified development trend. Through strategic planning and cooperation, infrastructure connectivity[8], in-depth exploration of cultural tourism, ecological tourism and sustainable development, improvement of tourism service quality[9], marketing and branding, risk management and security, policy support and

incentive mechanism, and international cooperation and exchanges[10], the tourism economy has been rapidly developed. These measures not only enhance the tourism competitiveness of countries along the routes, but also create more job opportunities and income sources for local residents. At the same time, the development of tourism economy has also promoted the economic growth and social progress of the countries along the route, and enhanced the mutual understanding and friendship between the people of all countries. Looking to the future, countries along the Belt and Road should continue to deepen tourism cooperation, strengthen policy communication and coordination, and jointly promote the sustainable and healthy development of tourism economy.

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