Research on the Relationship between the Analysis of China's Tourism Economic Growth Factors and Time Evolution

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Abstract: According to DEA data envelopment analysis method and optimal output function, a nonparametric decomposition framework for measuring tourism economic growth sources is constructed. The tourism industry of 30 provinces in China is used as a research unit in 2011-2018, combined with input and output indicator data. Decompose and measure the source of tourism economic growth. Among them, technological progress is the key to the increase in the contribution of total factor productivity, and the technical efficiency, especially the scale efficiency among them, contributes relatively little to the growth of tourism economy, and is in a downward trend. The impact of pure technical efficiency is minimal. In terms of regions, there are certain differences in the sources of tourism economic growth in various regions, which makes the growth rate of tourism in the central and western regions surpass the eastern region. The acceleration of tourism economic growth in the central region is mainly driven by scale efficiency, while the western region is mainly dominated by pure technology. Efficiency driven. From 2011 to 2018, China's tourism economic growth mode has become increasingly intensive, and the contribution of total factor productivity of tourism in more provinces and regions has exceeded the contribution of resource elements, and tourism economic growth has been driven more by total factor productivity.

1. Introduction

In the process of tourism development, China's tourism economic growth reflects the level of tourism destination construction and tourism resource development, and has an important impact on tourist perception, marketing, tourism destination image and economic benefits. After 1978, driven by the reform and opening up policy, China's inbound tourism industry, especially in the eastern coastal areas, developed rapidly. After 1996, the state has successively issued a number of policies to support the national tourism industry, especially the development of tourism in the central and western regions [1], which has accelerated the pace of tourism development. At the end of 2006, the original value of tourism fixed assets accumulated to 693.478 billion yuan, the number of employees was 2,713,400, and the annual operating income was 344.326 billion yuan [2]. Summarize the development process of China's tourism industry for 30 years since the reform and opening up, especially the development process of China's western development strategy in the past 10 years. What factors have contributed to the rapid growth of China's tourism industry economy? Is there a significant difference between the three major regions of East, Central and West? From the published literature at home and abroad, the research focuses on the factors affecting economic growth [3], the measurement of factor contribution rate, and the mode of economic growth. Judgment and other aspects. These research results have important guiding significance for improving China's resource utilization efficiency and economic growth rate and changing the economic growth mode. From the perspective of the research object, it mainly involves macroeconomic growth in agriculture, industry or the whole region. Compared with the study of national economic growth, the study of tourism economic growth is relatively weak, mainly related to the relationship between the number of inbound tourists, tourism foreign exchange income, tourism and employment and economic growth. Research on the relationship between investment in tourism elements and economic growth in the

tourism industry has yet to be developed. Based on this, the paper analyzes the factors of tourism economic growth in different regions of China, and analyzes the relationship between factor changes and time evolution, and finds the point of stimulating tourism economic growth to promote the development of China's tourism economy.

2. Analytical method research

2.1 DEA data envelopment analysis method

The process of tourism economic activities involves complex input and output elements. DEA is an effective method to compare the relative efficiency and effectiveness of several similar input and multiple decision-making units (DMU). The BCC model is the main model used by the DEA method in analyzing efficiency. It is based on the assumption that the scale returns are variable, and the technical efficiency is decomposed into pure technical efficiency and scale efficiency. Among them, the pure technical efficiency indicates that under the current technical level, the measurement of the efficiency of the existing input resource allocation is measured by the technical efficiency of variable-scale compensation; the scale efficiency refers to the certain premise of the system, management and technical level. The difference between the existing scale and the optimal scale is measured by the degree of non-effective production in production and reflects the reasonable allocation of input and output factors. Therefore, this paper uses the BCC model to discriminate and analyze the efficiency of the tourism industry [4].

It is assumed that the labor input, capital investment, tourism resource endowment and tourism economic income production possibility of the province $i = 1, 2, ..., I$ in the $t = 1, 2, ..., T$ year are set to $\left(l_i^t, k_i^t, e_i^t, y_i^t \right)$, that is, the resource factor input $\left(l_i^t, k_i^t, e_i^t \right) \in R^+$ can be transformed into the tourism economic income $y_i^t \in R^+$ under the production technology $T^t \left(x^t \right)$ condition. Refer to the sequence DEA construction idea to avoid the phenomenon of "technical regression", and the corresponding mathematical expressions of production technology are constructed as follows:

$$T^t \left(l_i^t, k_i^t, e_i^t, y_i^t \right) = \left\{ \left(l_i^t, k_i^t, e_i^t, y_i^t \right) \right. \tag{1}$$

$$\sum_{p=1}^{t} \sum_{i=1}^{I} \lambda_i^p y_i^p \geq y_{i'}^t \qquad \sum_{p=1}^{t} \sum_{i=1}^{I} \lambda_i^p l_i^p \leq l_{i'}^t$$

Among them, $\sum_{p=1}^{t} \sum_{i=1}^{K} \lambda_i^p k_i^p \leq k_{i'}^t \qquad \sum_{p=1}^{t} \sum_{i=1}^{K} \lambda_i^p e_i^p \leq e_{i'}^t$.

$$\lambda_i^p \geq 0, i = 1, 2, ..., I$$

Where: $T^t \left(l_i^t, k_i^t, e_i^t, y_i^t \right)$ is a closed, bounded, convex output set, i' is the tourism industry of the assessed province, p is the corresponding year of the evaluated decision-making unit referenced by the construction technology frontier structure, and λ is the tourism of the i province. Observed value weight, if the sum of the weights is 1, it indicates the change in scale return (VRS), otherwise it is the same as the scale return (CRS).

2.2 Productivity Index Model

Tourism output is the result of the combination of increased investment and total factor productivity. Improving productivity is an effective way to transform the growth mode of tourism economy and improve the quality of tourism economic growth. The DEA method can better analyze the utilization of tourism industry elements, but the trend of the efficiency of the tourism industry in the time dimension and the main factors causing the changes cannot be clearly reflected. Based on the production techniques constructed above, this paper constructs a production-oriented model of scale return invariance as follows:

$$D_{i'}^t\left(l^t,k^t,e^t,y^t\right)=\max_{\theta_{i'}}\left\{\theta_{i'}:\left(l_i^t,k_i^t,e_i^t,y_i^t,\theta_{i'}\right)\in T^t\left(l^t,k^t,e^t,y^t\right)\right\} \tag{2}$$

Where: $D_{i'}^t\left(l^t,k^t,e^t,y^t\right)^{-1}$ is the distance function; $\theta_{i'}^t$ is the relative efficiency value of the tourism industry in the i' reviewed province in t years. If $\theta_i^t=1$, the province's tourism economy is relatively efficient. Conversely, the larger the $\theta_{i'}^t$, the relative tourism economy of the province. The lower the efficiency. If the convex condition $\sum_{p=1}^{t}\sum_{i=1}^{I}\lambda_i^p=1$ is added to the production technology set, it evolves into a BCC model of variable returns (VRS) [5]. The efficiency value calculated by the BCC model is purely technical efficiency, and the scale efficiency of the tourism economy of the assessed province can be calculated by combining the CCR model. Based on the intrinsic relationship between optimal tourism economic output, actual tourism economic output, and relative efficiency, the optimal output function is constructed as follows:

$$y_{i'}^t\left(l_{i'}^t,k_{i'}^t,e_{i'}^t\right)=\sum_{p=1}^{t}\sum_{i=1}^{I}\lambda_i^p y_i^p=\theta_{i'}^t\left(l_{i'}^t,k_{i'}^t,e_{i'}^t\right)y_{i'}^t \tag{3}$$

3. Data sources

This paper intends to use China's 30 provinces (municipalities and autonomous regions) as the basic research unit, excluding Tibet and Hong Kong, Macao and Taiwan regions. This study is based on the classification and classification of tourist scenic spots (GB / T17775-2003). For the number of scenic spots above 3A in each city, the scores are converted into the scores of tourism resources endowment. At the same time, the total income of the tourism industry is used as an output indicator. The number of employees in the tourism industry is measured by the number of employees in the tourism industry at the end of the year, and the fixed asset investment price index and the consumer price index respectively convert the tourism fixed assets investment and total tourism revenue, and eliminate the impact of price fluctuations. Fixed assets investment in tourism and total income from tourism industry at constant prices. The above data are all from the "China Statistical Yearbook", "China Tourism Statistics Yearbook", "China Tourism Yearbook" and some provincial and city travel notes [6].

4. Results analysis

4.1 Overall characteristics and timing changes of tourism industry efficiency

It can be seen from Table 1 that the average comprehensive efficiency of the national tourism industry in 2011-2018 is 0.607, which is 60.7% of the optimal level. From the perspective of timing changes, the overall efficiency is spiraling and the overall upward trend. The insufficient input of production factors makes the overall efficiency only 0.407 in 2011. The highest value of DEA in 2018 is the best, which is increased by 0.593. This is mainly due to the fact that under certain production conditions, when one or more tourism industry input factors are increased to a certain extent, and the increased utilization of these input resources is rationally utilized, the overall efficiency is promoted. In terms of pure technical efficiency, the national average is 0.890, and the overall trend is to decline first and then increase. In 2012, pure technology efficiency was the lowest, indicating that the input and allocation of national tourism industry factors were unreasonable this year, which affected the efficiency level; while the average scale efficiency was 0.683, which was higher than the overall efficiency and lower than the average level of pure technical efficiency. There is an upward trend.

Table 1. Comprehensive efficiency and composition of national tourism industry in 2011-2018

Years	Comprehensive efficiency	Pure technical efficiency	Scale efficiency	Economies of scale
2011	0.407	1.000	0.407	Increment
2012	0.418	0.927	0.451	Increment
2013	0.524	1.000	0.524	Increment
2014	0.555	0.956	0.580	Increment
2015	0.354	0.849	0.417	Increment
2016	0.459	0.821	0.559	Increment
2017	0.529	0.784	0.674	Increment
2018	0.523	0.777	0.673	Increment

4.2 Differences in Sources of Regional Tourism Economic Growth

In order to study the regional differences and evolution characteristics of China's tourism economic growth sources, this paper chooses to further analyze and interpret the decomposition results of tourism economic growth from a spatial perspective. As shown in Figure 1, the average annual contribution of factor productivity in the eastern, central, and western regions of China in 2018 was 38.2%, 18.5%, 24.5%, and 17.9%, respectively. Total factor productivity is the main source of tourism economic growth in all regions.
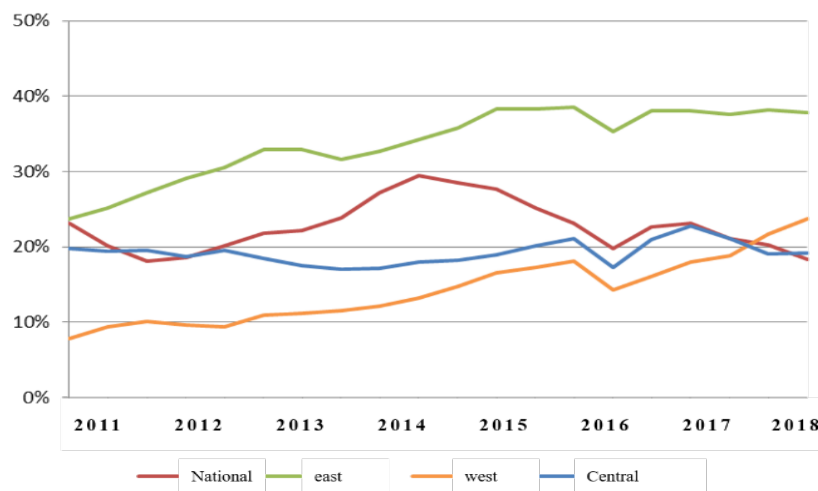

Figure 1. Contribution of the source of tourism economic growth in the eastern, central, western, and national regions

It is worth noting that the total factor productivity of the tourism economy here refers to the remainder of the tourism economic growth that cannot be explained by the input of resource elements. Therefore, the concept of total factor productivity is broader, and it not only has innovations related to tourism-related technologies and processes, the introduction and absorption also include improvements in the internal organization and management methods of the tourism economic system, institutional reform dividends, and macroeconomic volatility. Therefore, the total factor productivity of China's tourism economy, especially the total factor productivity of tourism in the central and western regions, should not only focus on the technological factors related to tourism, such as advanced equipment, technology, patents, technological innovation, but also focus on culture. Non-technical factors such as institutional arrangements and management concepts and methods, attach importance to the expansion of tourism economy scale to promote total factor productivity.

4.3 Time dynamics of tourism industry productivity index and decomposition

It can be seen from Table 2 that from the time change, the average value of the tourism industry productivity (TFP) index in the eight years is 1.086, indicating that the average annual growth rate

of the total factor productivity of the tourism industry is 8.6%, indicating that the tourism industry in the eastern region has invested in various developments. The utilization factor of production factors is good, and the utilization efficiency is basically in an overall increasing state. Among them, technological progress contributed 9 percentage points, while technical efficiency growth decreased by 0.4 percentage points, indicating that the technical efficiency level of its tourism industry has declined. At the same time, the tourism industry's total factor productivity growth showed significant volatility, with 3.1%, 0.4%, 19.3% and 0.2% in 2011-2012, 2013-2014, 2015-2016 and 2017-2018, respectively. Among them, the economic downturn in 2018 hindered the development of the national tourism industry, resulting in a large number of idle and inefficient use of tourism resources.

Table 2. Distribution of productivity of tourism industry

Years	Technical efficiency change	Technological progress	Pure technical efficiency change	Scale efficiency change	Malmquist productivity index change
2011-2012	1.166	1.022	1.021	0.958	1.001
2013-2014	0.921	1.245	1.076	1.050	1.406
2015-2016	0.979	1.147	1.003	1.027	1.183
2017-2018	1.130	1.102	0.957	1.027	1.083
The annual average	1.049	1.129	1.01425	1.0155	1.16825

4.4 Spatial Differences and Evolutionary Characteristics of Tourism Industry Productivity Index

As can be seen from Table 3, the tourism industry productivity index (TFP) of the three major regions in the country showed a volatility overall growth, and their volatility trends were basically the same, indicating that the overall factor productivity level of the tourism industry in the whole region increased overall. There is a significant difference in the total factor productivity of the regional tourism industry. The total factor productivity in the eastern region is higher than that in the central and western regions as a whole. Among them, the average annual growth rate of total factor productivity in the eastern region is relatively fast (15.0%), followed by the western region (11.5%), and the central region is slower (8.2%), indicating the technical strength of the eastern region in terms of tourism industry development in recent years. The comprehensive management capability is gradually increasing, and the central region relies on science and technology to drive the progress of productivity is not enough. It can be seen that in addition to continuing to strengthen tourism technology investment, speeding up tourism technology promotion, and promoting the promotion of tourism industry productivity, the development of tourism industry in the country should also pay attention to the application of advanced management methods in tourism development. Realize the optimal combination and rational allocation of input resources, and promote the effective improvement of the comprehensive technical efficiency of the tourism industry.

Table 3. Spatial Differences and Evolutionary Characteristics of Tourism Industry Productivity Index

Years	east	Central	west	National
2011-2012	1.043	0.938	1.021	1.001
2013-2014	1.552	1.388	1.037	1.406
2015-2016	1.164	1.188	1.328	1.183
2017-2018	1.215	0.911	1.224	1.083
The annual average	1.243	1.106	1.152	1.168

5. Conclusion

After research, it is found that the overall efficiency of the tourism industry in the whole country has spiraled and the overall upward trend; the technical efficiency has generally declined and then increased, and the scale efficiency has shown an upward trend as a whole. From the perspective of spatial evolution characteristics, the overall efficiency of the tourism industry in the eastern region shows a clear leading edge, while the central and western regions are comparable, showing a steady dynamic trend over the years, and the gap between the two has expanded. The total factor productivity of the tourism industry in the whole country has maintained rapid growth as a whole. The development of tourism industry has a good utilization of various production factors, and its utilization efficiency is basically in an overall increasing state. From the perspective of spatial evolution characteristics, the total factor productivity of tourism industry in the eastern, central and western regions showed a volatility growth, and the trend of change was basically the same, indicating that the productivity of the tourism industry in the three regions was relatively high. Therefore, in order to improve the tourism economic growth point, we must improve the level of urbanization, optimize the structure of the tourism industry, and promote the comprehensive benefits and high-quality growth of the tourism industry. Accelerate the process of new urbanization construction, improve the construction of tourism infrastructure and related facilities, adjust the supply structure and consumption patterns of the tourism industry, promote the rationalization, upgrading and balanced development of the tourism industry structure, accelerate the optimization and upgrading of the tourism industry structure, and promote The overall efficiency of the tourism industry in the coastal areas has increased.

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