Original Research Article

Relationship Between Tourism and Economic Growth in Lishui City Based on Multiple Linear Regression

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Abstract: A research method on the relationship between tourism and economic growth in Lishui City Based on multiple linear regression is proposed. Combined with multiple linear regression algorithm, the relationship between tourism industry and economic growth is evaluated and analyzed, and the impact index and management system of tourism industry economic development are constructed, Taking Lishui City as an example, it is confirmed that the proposed research method on the relationship between tourism and economic growth in Lishui City Based on multiple linear regression has high practicability, fully meets the research requirements, and can better guide the healthy and long-term development of regional tourism industry and economy.

Keywords: Multiple linear regression; Tourism industry; Economic development

Introduction

The development of tourism plays an important role in regional economic growth. But because of the difference of economic foundation, geographical location, tourism industry orientation and development stage, economic growth, etc., there are many contents, which are in the mainstream of research. Such studies are adequate, but the conclusions are not uniform. To sum up, there are a lot of research results on the relationship between tourism development and economic growth at home and abroad, forming a rich literature [1]. However, in the study of the relationship between the two, most of the literatures regard each region as an independent individual with less spatial heterogeneity and dependence, and lack of analysis of the spatial relationship between the object and the surrounding area. While some literature considers spatial correlation, such studies also lack accuracy [2]. This paper chooses Lishui City as the research object, studies the impact of tourism development on economic growth from both qualitative and quantitative perspectives, and puts forward relevant policy recommendations on the basis of empirical analysis to provide theoretical basis and development ideas for tourism development. Tourism development and the benign development of local economy in Lishui City.

1. The relationship between tourism and economic growth in Lishui City

1.1 Evaluation algorithm of tourism economic development based on multiple linear regression

According to the above theoretical analysis[3,4], in order to deeply reveal the effective complex mechanism of China's TLG hypothesis in different stages of tourism specialization, this paper empirically tests the nonlinear relationship between the two by constructing the PSTR model of tourism affecting economic growth. The econometric model is set as follows:

$$\ln Y_{i,t} = \mu_i + \varpi \, / \, g\left(TR_{i,t}; \gamma, c\right) + \delta Z_{i,t} u_{i,t} \quad （1）$$

Where, $Z_{i,t}$ is the economic growth level of province I in period T, $u_{i,t}$ is the tourism development level of province I in period T with tourism specialization, and δ is a set of control variable vectors. $g\left(TR_{i,t}; \gamma, c\right)$ is the conversion function with tourism specialization ϖ as the conversion variable. The elasticity coefficient of economic growth of province ∂ to tourism specialization in period $e_{i,t}$ is:

$$e_{i,t} = \ln Y_{i,t} + \beta TR_{b,t} \frac{\partial g\left(TR_{i,t}; \gamma, c\right)}{\delta Z_{i,t} u_{i,t} - \mu_i + \varpi} \quad （2）$$

If x is the independent variable, y is the dependent variable and E is the elastic coefficient, then

$$E = \frac{\Delta y \, / \, y}{\Delta x \, / \, x} - e_{i,t} \left| \frac{\Delta y}{\Delta x} - \frac{x}{y} \right| - \ln Y_{i,t} \quad （3）$$

Let $\ln w = E\ln(a+b)(y-x)$, take the derivative of X on both sides of the equation, and get

$$\frac{dy}{dx}\cdot\frac{1}{y} = Eb - \frac{1}{\ln w - x} \quad (4)$$

$$b = \frac{dy}{dx} + Ea\frac{x}{y} \quad (5)$$

The basic PSTR model of multivariate linear regression univariate two mechanism is defined as follows:

$$\varpi = S\mu_i x + \varphi a_{i,t} g\left(q_{i,t};\gamma,c\right) + Ry u_{i,t} \quad (6)$$

Where, φ is the province and t is the time; The explained variable is y, which is a scalar, and the explanatory variable x is a k-dimensional vector of a time-varying exogenous variable; S is a fixed individual effect; $a_{i,t}$ is the error term. $g\left(q_{i,t};\gamma,c\right)$ is a transformation function, which is a bounded continuous function

with the value range of transformation variable R as [0,1]. For the specific function form of multiple linear regression, Granger and terasvirta define g (Q; c) as the formal graph of logical function

$$\psi = \left(1+(a+b)\exp\left(E-\gamma\prod_{i=1}^{m}\left(q_{i,t}-c_j\right)-R\right)\right)^{-1} \quad (7)$$

Where, C is a position parameter vector of m-dimensional transformation, γ is a smoothing parameter that determines the conversion speed of the conversion function. w_{ij} is the results of descriptive statistical analysis of each variable.

The development of tourism will also stimulate economic growth and contribute to economic growth. The contribution rate of industry to economic growth is an index often used when investigating an industry. It can reflect the proportion of economic growth made by the industry. Generally, the contribution rate of an industry can be calculated by the following formula:

$$R_i = \Delta x_i / \Delta y_i \quad (8)$$

In terms of total tourism revenue, the average value is 12.216 billion yuan, with a range of 41.697 billion yuan. In terms of total retail sales of social consumer goods, the difference between the maximum and minimum is 8.9 times.

Table 1 descriptive statistical analysis of each variable

variable	Variable name	capacity	mean value	standard deviation	Maximum	minimum value
GDP	Regional GDP (100 million yuan)	20	561.5	318.5	1112.2	160. 0
PNT	Total number of tourists (10000)	20	2093.6	2011.6	6285.1	165.1
TTR	Total tourism revenue (100 million yuan)	20	123.65	126.65	426.85	9.19
SALE	Total retail sales of social consumer goods (10000 yuan)	20	372.5	204.5	749.9	85.3

1.2 Construction of tourism economic development impact system

The key to judge whether an industrial element (such as star hotels and hotels) constitutes tourism and whether it belongs to tourism is to see whether its existence meets the needs of tourists. If the core of tourists' demand is removed, the enterprise has no market, and the enterprise element belongs to tourism. On the contrary, if there is still a demand market or less affected, the enterprise element belongs to the category of tourism. If the tourist source accounts for a small proportion of its total tourist source, or does not receive tourists, mainly to serve the local economic and social development, then it does not belong to tourism. For another example, if the same performance is sold to tourists as a characteristic product, it will be included in the tourism industry. If it is only the local people's own customs and activities, it will not be included. In other words, whether the same industrial element belongs to tourism should be determined according to its internal nature. Therefore, to measure the development degree of a regional tourism, we should not look at its potential ownership of tourism elements, but its actual ownership of tourism.
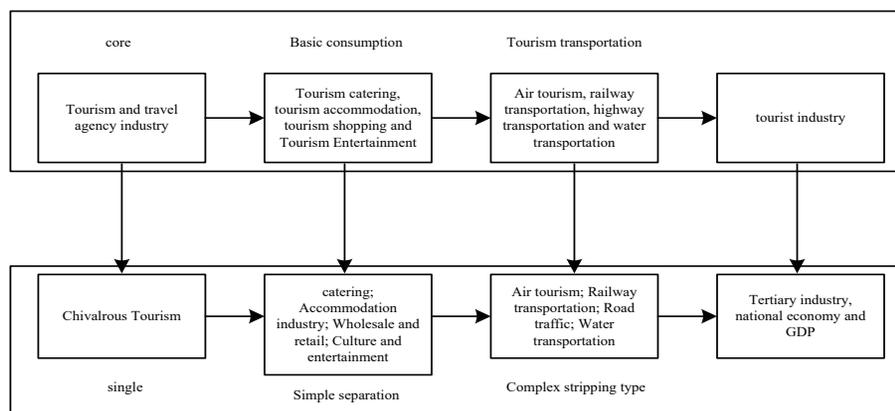

Fig. 1 model of tourism acting on the national economy

The expansion of the tourism industry refers to the process of continuously strengthening itself by absorbing and integrating
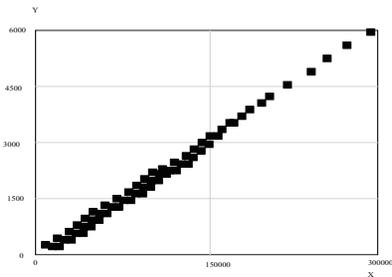
Fig. 3 scatter diagram of economic growth and tourism development
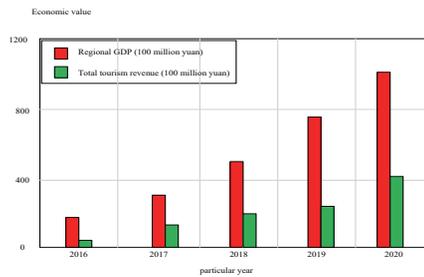

Fig. 4 regional GDP and total tourism revenue of Lishui City (100 million yuan)
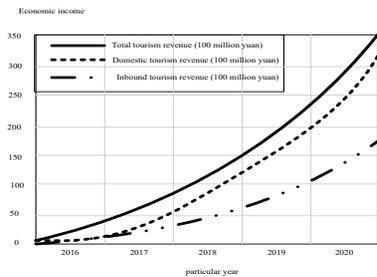

Fig. 5 broken line chart of total tourism revenue, domestic tourism revenue and inbound tourism revenue of Lishui City

various resource elements provided by other industries due to structural surplus and new input from the society after the tourism industry is formed. It contains two contents: one refers to the expansion in the connotative sense, including the improvement of tourism operation and management level, the development of technology, the upgrading of products, and the rationalization of the organizational structure of the tourism industry, etc., these factors are all in the connotative sense. It promotes the expansion of the tourism industry and the evolution to a higher industrial level; the second refers to the expansion in a purely extended sense, such as the increase in the number of companies producing similar tourism products in the tourism industry, the improvement of comprehensive development capabilities, and the extension of industrial distribution in the region As well as the rapid growth of the number of tourism products, the expansion of the tourism industry reflects and describes an evolutionary process formed by the tourism industry in its growth period and rising period due to its failure to grow. It can be measured by indicators such as the proportion of tourists in local residents, the proportion of tourism revenue in GDP, and the proportion of tourism revenue in exports. Foreign scholars often use tourism specialization to reflect the proportion of tourism in GDP. Therefore, from the perspective of measuring indicators, the professionalization of tourism is equivalent to the concept of tourism dependence.

2. Analysis of experimental results

According to the data in Table 1, calculate the correlation coefficient between China's total tourism revenue and GDP in recent years, and fit the regression equation (run on eview s3.1 software). The simple correlation coefficient between them is 0.9861, indicating that they have a great correlation. It can be seen from the scatter plot (Figure) that although the outbreak of COVID-19 has greatly affected the tourism industry, there has been a normal outlier, but this does not affect the obvious linear relationship between economic growth and tourism. Based on this, a linear regression model is established and estimated by the least square method.

This paper selects four variables of Lishui's regional GDP, total tourism income, total number of tourists and total retail sales of social consumer goods as the research object, and makes quantitative analysis with stationarity test, cointegration and regression analysis. According to the economic growth theory, human capital investment, material capital investment and technological innovation are introduced into the model to explore the interaction relationship and temporal and spatial evolution trend between China's tourism development and economic growth, so as to provide reference for the coordinated development of China's tourism and economic growth. Lishui is one of the areas in Zhejiang Province where the development of tourism started last, and it is also the "cold zone" of tourism in the province. However, in recent years, Lishui tourism has risen rapidly and made remarkable achievements. The contribution of Lishui tourism to regional GDP has increased year by year. The following is a further analysis through the trend chart of regional GDP, total tourism revenue, total tourism revenue and domestic and foreign tourism revenue from 2015 to 2020.

As can be seen from the figure 4, from 2016 to 2020, on the whole, the total regional GDP and total tourism revenue maintained an upward trend. Among them, the proportion of total tourism revenue in regional GDP is also rising, especially since 2016, the growth rate of total tourism revenue has accelerated. It shows that Lishui tourism economy is an important part of regional economy.

As can be seen from the figure 5, the growth rate and trend of total domestic tourism revenue and total tourism revenue are consistent, with fast growth, while foreign tourism revenue is also growing, but the growth rate is slow; From another aspect, we can also see that the proportion of domestic tourism revenue in total tourism revenue is far greater than that of inbound tourism revenue.

3. Conclusion

This paper investigates the current situation of the relationship between tourism and regional economic development in Lishui, finds that the development of tourism in Lishui has a positive role in promoting the regional GDP, and further explains that the tourism economy in Lishui plays a role in promoting the economic growth of Lishui. Based on the SWTO analysis of the development of tourism in Lishui, this paper puts forward relevant suggestions for the development of tourism in Lishui.

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