

Calculation of Tourism Development Income Index Based on Finite Element Ordinary Differential Mathematical Equation

Shuqin Liu
Guilin University of
Technology, Guilin, China
541004

Abstract: Using finite element ordinary differential mathematical equations to analyze the relationship between the number of inbound tourists in my country's tourism industry, the number of domestic tourists, and the total tourism income, time and per capita national income. Significant positive correlation. When the per capita national income increases by 1 U.S. dollar, the number of inbound tourists will increase by 102.18 million, the number of domestic tourists will increase by 715.95 million, and the total tourism revenue will increase by 693.8 million yuan. It is predicted that by 2022, the number of inbound tourists will be close to 1 billion. The number of domestic tourists has exceeded 1.2 billion, and the total tourism revenue will exceed 2 trillion yuan, with an average annual growth rate of 9.10%, 6.51% and 11.16% respectively. This paper uses the novel data mining models to construct the efficient analytic model for the prediction analysis. The experimental results have proven efficiency.

Keywords: Tourism Development, Tourism Income, Finite Element, Differential Mathematical Equation

1. INTRODUCTION

The tourism industry is known internationally as a sunrise industry that never declines. After 20 years of development, my country's tourism industry has become increasingly distinctive and its scale continues to grow. It has become one of the fastest growing industries in the national economy, and it is also an industry with obvious international competitive advantages. For the healthy development of tourism, many domestic scholars have made quantitative and qualitative analysis and forecasts on the development trend of my country's tourism industry from different angles and using different methods [1-7].

Wang Haihong used the grey forecast model to analyze the overall characteristics of the time series of China's inbound tourism since the reform and opening up, and concluded that China's inbound tourism has the characteristics of high volatility. Scholars such as Wen Liling, Zhang Enxiang, Zhang Lisheng and Xu Chuntang also analyzed and predicted the future development of my country's tourism industry from other different aspects. Wang Caihong used the data of China's inbound tourist flow and tourism income in the past 20 years to analyze the fluctuation cycle of China's inbound tourism industry and made predictions on the prospects of China's inbound tourism. Kuang Lin believes that cyclical fluctuations are a normal state in any economy, and are reflected in the inherent movement of economic expansion and contraction, and the constant alternating peaks and troughs. 5 cycles. Ye Guixiang studied the law of the number of inbound tourists, and believed that its approach conforms to the Logistic model, and pointed out that China's inbound tourism will enter the golden season of development in the future [8-16].

However, most of the above-mentioned studies only analyze from a certain aspect of tourism development, and rarely contact the national economic situation. There is no report about the promotion effect of the increase in per capita national income on the tourism industry. The function of

tourism industry has a direct linear relationship with its scale. The industry develops well, but it is too small to form a scale, and it is difficult for the industry to become a growth point. The development of the tourism industry shows the trend of clusters and shows strong competitiveness. As an effective production organization method that prevails all over the world, the realization of industrial clusters must be based on a reasonable industrial structure and industrial layout. Without a reasonable industrial structure and industrial layout, industrial clusters cannot be established, let alone the sustainable development of the tourism industry. Foreign research on tourist sites is sufficient at the end of the year. The earliest literature on tourism from an academic perspective is enough to benefit one person." Such as the mourning of Bodio's "In the Greater Benefits of Foreign Prisoners Moving and Consumption of Money" "An article. Then there appeared a group of scholars who grew up in tourism research in Germany, Switzerland, and Austria. After World War II, the center of tourism research began to shift from Europe to North America, and showed obvious multidisciplinary penetration in research methods. In the century, the research on tourism from the perspective of tourism development evolution started from the process of industrialization, focusing on analyzing and describing the evolution process and level of tourism development [17-21].

Canadian scholar Stephen Smith also made a preliminary definition of the tourism industry in his book *Tourism Analysis Handbook*. The tourism industry is not just a collection of many unrelated companies, but a very policy-oriented industry. Is a collection of related industries. The income effect of tourism is the most important way for tourism to influence economic growth. Modern economic theory believes that tourism income through primary distribution and redistribution forms a multiplier effect to promote the growth of the national economy. Liu Limei et al. (measured the direct and indirect effects of tourism income in Inner Mongolia, and obtained the indirect effect of tourism income through regression: the increase in tourism income per yuan is approximately RMB yuan. Chen Fei, Zhang

Qingzheng (in terms of- The data related to the development of tourism in Jiangxi Province in 2009 is a sample, and the direct and indirect effects of tourism income on the economy are measured, and the indirect influence of tourism income is more important than the direct influence. Zhou Li (through linear regression, gray correlation and gray prediction Models and other methods analyze the income effect of Hunan's tourism economy, and found that the direct income effect and indirect income effect of Hunan's tourism economy are both very significant, and its contribution to the national economy continues to rise [22-24].

2. THE PROPOSED METHODOLOGY

2.1 The Tourism Development Income

Tourism is a play experience or experience, a social phenomenon, not a product, nor a social production activity. The total expenditure of all tourists is not the income of similar enterprises in tourism. Starting from this concept, tourism It is not an industry in the traditional sense. However, from the perspective of the development of the industry, tourism has the characteristics of a modern industry. The reason why the tourism industry can form an industry is because it requires many business systems such as catering, accommodation, entertainment, commerce, information, and transportation. The tourism industry cannot be achieved without any of them. Can form a tourism industry. There are many definitions of the tourism industry, but there is a unified and convenient tourism activity that meets the needs of a tourist by providing their own products and services. Although their main businesses or products are different, this difference lies in the overall tourism products or commodities. Under the premise of unification, it further proves that the tourism product is a comprehensive product.

Therefore, starting from the purpose of the industry, the connotation of the tourism industry is based on the value orientation of big tourism. Under the guidance of the tourism authority, relying on the understanding, support and participation of the society, with the six elements of tourism productivity as the core, with travel agencies as the industry leader, there is one A series of industry sectors composed of social, economic, cultural and environmental integrated industries. Certain service sectors, such as landscaping, post and telecommunications, water supply, etc., are only tourism sectors when they are related to tourism, and the relationship between various sectors and the tourism industry changes with the changes in the status of the tourism industry in the national economy and changes in the industrial structure. Change. The effect of earning foreign exchange is one of the very important economic effects of the tourism industry. The foreign exchange earning effect of tourism refers to the foreign exchange income that the destination country or region directly obtains from foreign tourists in local tourism consumption. It is an important indicator to measure the macroeconomic effects of a country's tourism industry

2.2 The Finite Element Ordinary Differential Equation

The mathematical models of many physical phenomena in engineering and science can be expressed by differential equations (Differential Equations). Based on the energy principle, the differential equation can be transformed into a functional extreme value problem or other weak forms and then solved. Except for a few equations with simple structures or special forms, the true solutions of most equations cannot be expressed in analytical formulas, so numerical methods are usually used. With the rapid development of computer

technology, the role of numerical methods has gradually become prominent, and it has become the three basic methods of modern scientific research, which has become a tripartite with theoretical analysis and scientific experiments.

The finite element method (Finite Element Method, FEM for short) is an important numerical method for solving differential equations. This method first uses a finite number of elements to divide the solution area, uses a piecewise interpolation shape function to limit the function to be solved in a finite dimensional subspace, and then uses the principle of variation to transform it into a finite degree of freedom algebraic equation (Algebraic Equations) Problem, and then solve this algebraic equation system, and finally use the piecewise interpolation shape function to express the solution to the original problem. With the popularization and development of computer technology, finite element has been widely used to solve large-scale scientific and engineering problems, and great achievements have been made. Solving line method ODEs traditional methods generally use ordinary differential equations solvers, such as COLSYS and so on. In order to establish the connection between FEMOL and FEM, and to facilitate the calculation of EEP superconvergence,

In this paper, one-dimensional FEM is used to further discretize the knot line displacement vector d , and the n -th trial function on the one-dimensional FEM unit that introduces ODEs is as follows. The EEP method has been successful in the field of post-processing calculations for the finite element method of one-dimensional problems and the finite element line method of two-dimensional problems, and has given a point-by-point superconvergent solution. These two fields have obvious similarities: the displacement solution of one-dimensional FEM has superconvergence on two edge nodes, while the solution of two-dimensional FEMOL has superconvergence on two edge nodes. The reason for this similarity is that both one-dimensional FEM and two-dimensional FEMOL use superconvergent solutions on a pair of boundaries of the element to repair the solution inside the element. Therefore, using the EEP formulas of one-dimensional FEM and two-dimensional FEMOL in turn, and using the superconvergent solution given by the former as the input parameter of the latter, the superconvergence calculation of the two-dimensional FEM can be smoothly realized.

2.3 The Research on Income Index of Tourism Industry Based on Finite Element Method

The number of inbound tourists, the number of domestic tourists and the total tourism income are selected as the main analysis indicators. The statistical data of various indicators from 1995 to 2005 are used as the basic data, and the per capita national income of the same period is used as the auxiliary analysis data. Inbound tourism arrivals: Refers to foreigners, overseas Chinese, Hong Kong and Macau who come to China to visit, visit, travel, visit relatives, friends, recuperate, investigate, participate in conferences, and engage in economic, technological, cultural, educational, religious and other activities the number of compatriots and compatriots in Taiwan. National arrivals: Refers to domestic residents who travel, vacation, visit relatives, friends, recuperate, shopping, participate in conferences, or engage in economic, technological, cultural, sports, religious and other activities during the analysis period, and the purpose of their outings It's not getting paid through the activities you're engaged in. In the statistics, one person is counted for each trip.

As a high-expenditure activity, there is a close relationship between tourism and the level of the national economy. Many scholars have done research on this issue. Wei Xiaoran and others analyzed the relationship between the per capita GNP and the distance of the tourist flow's accessible space, and believed that the per capita GNP of more than 300 U.S. dollars generated domestic tourism motivation and formed near-field tourism; the per capita GNP of more than 1,000 U.S. dollars generated international tourism motivation and formed neighboring country tourism; The per capita GNP is more than 3,000 US dollars to form tourism to distant countries. The above analysis of this article also believes that the increase in per capita national income can stimulate the development of tourism. However, there is no research report on the research on the promotion effect of the growth of per capita national income on tourism, that is, the quantitative analysis between per capita national income and tourism indicators.

Through communication with the surveyed people, most of the surveyed people affirmed the influence of tourism on the local economy. The tourism industry has a good reputation among local residents, and most of the local residents agree with the development results of the tourism industry. Hangzhou residents have a relatively stable preference for various economic factors, and they also recognize various factors through which the economic influence of the tourism industry can be exerted. This is also in line with the overall economic development of Hangzhou, that is, the more developed the overall economic development, the smoother the channels for the tourism industry to promote the economy.

3. CONCLUSION

This article analyzes the development status and existing problems of the national tourism industry, and conducts a quantitative analysis of tourism development from two aspects of industrial layout and industrial structure. Through the analysis of the imbalanced indicators of the economic benefits of tourism in the province, it is found that the problems in the development of regional tourism come from the geographical space. The regional level of the national tourism industry has a serious gap. Regional differences in tourism reception benefits are relatively large, and the gap in domestic tourism reception benefits is relatively small.

4. REFERENCES

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