

**Research on Time Variation Characteristics of China's Domestic Tourist
Market Based on Fractal Theory**

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Abstract: Based on the time perspective, this paper collects domestic tourism data from 1997 to 2016 in the last 20 years. By using the fractal theory, the Hurst index is calculated to analyze the characteristics of time changes in China's domestic source market. The results of the study show that the Hurst index of domestic travel times and per capita tourism consumption is greater than 0.5. This shows that in the future, the development trend of the domestic tourist market is the same as in the past, and the number of tourists has continued to rise and the per capita tourism consumption has increased. Second, the Hurst index of rural residents' per capita tourism consumption is lower than that of urban residents, indicating that the development trend and stability of urban residents' tourist source markets are better than those of rural tourist sources. In the end, based on this situation, specific suggestions are made for the development of future domestic tourist source markets

Keywords: Domestic tourist market; R / S analysis; Hurst index; Time change.

1. INTRODUCTION

Tourist source market research can provide an important theoretical basis for the development direction of the tourism market. In recent years, with the rapid development of China's tourism industry and the change of concept of people's consumption, China's domestic tourist have increased year by year. Compared with 2015, domestic tourists and tourism consumption in 2016 increased by 11% and 15.2% respectively. Among them, the number of visits from urban residents was 319.5 million, per tourism consumption was 1009.1 yuan, from rural was 120.4 million, and per tourism consumption was 576.4 yuan. Obviously, there is a huge gap between the urban and rural tourist markets. What is the future development situation of the domestic tourist source market and how to reliably predict the development trend of the domestic tourist source market? Through literature research, it is found that the fractal theory can be used as a tool for this research. Fractal theory is a kind of mathematical research method to use the dimension feature and its change to speculate things in the future. The correlation dimension can be used to study the relevance of time series. The R/S analysis method is a common method for studying time series and is generally used in the economic field. The number of

domestic tourists is a complex system, but there is a certain degree of regularity in the process of development and change. Therefore, it can be seen as a complex nonlinear system that evolves according to the time sequence, and then can use the R/S analysis theory for the number of domestic tourists. Study the changes in time. For the first time, this paper adopts R/S analysis method to study the domestic per capita tourist and per capita tourism consumption in China from a macro perspective, trying to make a reliable forecast for the future development trend of the domestic tourism market, and puts forward some constructive suggestions for the healthy development of the future tourist market.

2. DATA SOURCES AND RESEARCH PROCESSES

2.1 Sources of data.

Paper data comes from the National Bureau of Statistics of the People's Republic of China (<http://data.stats.gov.cn>).

2.2 Analysis methods.

Using the Hurst exponent analysis method in fractal theory to research the domestic tourists, domestic per capita tourism consumption, domestic per capita tourism consumption of urban residents, and per capita domestic tourism consumption of rural resident from 1997 to 2016. The specific methods are as follows:

For a time series X_t ($t=1, 2, 3...N$), it is divided into A sub-ranges of length,

Assume:

$$X_m = \frac{1}{n} X_u \quad (1)$$

Calculate cumulative deviation $X_{(t,n)}$ is the cumulative dispersion of the n th interval.

$$X_{t,n} = \sum_u^t (X_u - X_m) \quad (2)$$

Calculate dispersion and standard deviation:

$$R = \max(X_{t,n}) - \min(X_{t,n}) \quad (3)$$

$$S = \sqrt{\frac{1}{n} \sum_{u=1}^n (X_{(u,a)} - X_m)^2} \quad (4)$$

$$R/S = K_{(n)} H \quad (5)$$

Take the logarithm of (5) to get (6):

$$\log \frac{R}{S} = H \log (n) + \log (k) \quad (6)$$

The slope is the desired H index. The value of H is an important indicator to determine the characteristics of time series changes. The specific meanings are as follows:

(1) When $H = 0.5$, the past state of change has no effect on the future, and the time series are independent of each other.

(2) When $H \neq 0.5$, the time series is a non-random sequence and there is a long-term time correlation between them. And, when $0 < H < 0.5$, it indicates that there is a negative correlation between the past time series and the future, and the closer H is to 0, the stronger the negative correlation is. In other words, if the time series is a rising (falling) trend in the past, then the

time series is likely to be a descending (rising) trend in the future; when $0.5 < H < 1$, it indicates that the time series has a positive correlation with the future. The continuity of the state. The closer H is to 1, the stronger the state persists. In other words, if the time series shows a rising (falling) trend over the past period of time, it will continue to rise (fall) for some time in the future. Therefore, by calculating the value of H, we can determine the correlation between the past and the future and predict the trend of change.

$D = H - 2$, D is the dimension in the fractal. The fractal dimension D reflects the irregularity and complexity of the time variation. The larger the fractal dimension is, the stronger the irregularity of the time series change and the more complex the change, that is the less obvious the duration of the change is.

2.3 Analysis results.

Calculating and analyzing the selected indicators of the domestic source market according to the above methods can obtain the future development of the domestic tourism market. The specific analysis results are shown in the following table 2-1.

Table 1. Domestic Tourist Visits and Tourism Consumption Hurst Index

	H index	D
Analysis of Visitors from Domestic Tourists	0.868	1.132
Domestic Tourist Per Capita Consumption	0.9	1.1
Urban per capita domestic tourism consumption	0.908	1.092
Rural residents' per capita tourism consumption in rural areas	0.845	1.155

From the above chart, we can see that the Hurst index of domestic tourist arrivals and per capita tourism consumption is greater than 0.5, indicating that the domestic tourism market has a positive temporal correlation. In the coming period of time, the development trend is consistent with the past development trend, and the domestic tourist source market is on the rise. However, the rising trend of the urban tourist source market and rural tourist source market is different. The development trend of per capita domestic tourism consumption in rural areas is lower than the national per capita level and is lower than the development trend of per capita domestic urban tourism consumption. Reflecting the phenomenon of imbalance in the development of China's tourism market, the rural market is relatively weak. China has a large rural population and rural tourism should have great potential for development. In the future development of the domestic tourist source market, the rural market should attract our attention.

3. DEVELOPMENT COUNTERMEASURES FOR DOMESTIC TOURIST MARKET

3.1 Countermeasures for development of town tourism market.

From the above data analysis, it can be seen that the current development of urban tourist source market is in good condition. The modern tourism activity is essentially an experience activity [1] in which tourists pursue pleasure and satisfaction. Therefore, in the development process, we must focus on tourist experience and improve the perceived quality of tourist in order to maintain its stable development. As the pace of life in urban accelerated, the pressure

on urban residents has increased, and urban residents will increasingly want to ease their emotions through tourism and receive spiritual and psychological satisfaction. Therefore, when developing the urban tourist market, developers should pay attention to the psychological changes of tourists from the perspective of improving tourist experience. For example, sightseeing tours have always been one of the most popular types of tourism. Compared with other tourism types, sightseeing tours tend to cost more physical energy. The feeling of tiredness caused a great difference in the value of tourist experience during and after activities. Some foreign scholars have suggested that the memory after the travel experience has a more stable and far-reaching impact on future travel behavior. After urban residents participate in tourism activities, they must devote themselves to busy work. To avoid the decline in tourist satisfaction caused by physical discomfort, the urban tourist market must pay attention to the addition of leisure elements. For urban tourists, the simple sightseeing experience can no longer meet the needs of tourists, and they are more demanding to participate in tourism and enjoy tourism[2].

3.2 Countermeasures for the development of rural tourism market.

From the analysis of the composition of the tourism market, the tourism market consists of four major factors]: tourists, purchasing power, desire to travel, and right to travel [3]. According to China's census, people living in rural areas account for 50.32% of the country's total population. As far as rural tourism is concerned, the rural tourist market has not yet been fully developed and has strong potential for development. However, there are also many difficulties in excavation, resulting in insufficient effective demand in the rural tourist market. The key factor in the development of the tourist market is the purchasing power of tourists. The International Tourism Organization believes that households with annual per capita income of 300 to 400 US dollars have obvious ability to travel abroad[4]. Therefore, the development of rural tourism market must increase the disposable income of rural residents. Due to the limited consumption level of rural residents, when facing the rural tourism market, they should give preferential prices, according to the consumption level and demand of rural residents, develop tourism products suitable for rural residents' consumption. such as science and technology tour, rich agriculture tour, which enables the rural residents to acquire advanced knowledge while traveling, to improve the production skills of rural residents, and then to raise the income level in rural areas. Urbanization is another factor that affects residents' consumption, and the income gap between urban and rural areas is increased by 1%, which will lead to the decrease of tourism consumption of rural residents by 1.91% [5]. Therefore, in the process of developing rural tourism market, we should pay attention to coordinating urban and rural development and narrowing the gap between urban and rural areas. In addition, the rural areas are relatively closed that we should increase tourism marketing work and improve residents' awareness of tourism and stimulate the tourism desire of rural residents. Compared with cities and towns, rural areas lack a uniform organization of tourism agencies. Government, tourism enterprises and so on need to improve their travel channels when developing rural tourism markets, and provide convenient conditions for rural residents to travel.

4. SUMMARY

In this paper, it is first time to use the fractal theory to quantitatively analyze the temporal change characteristics of domestic tourism market from a macroscopic perspective, and proposed suggestions for the further development of the domestic tourist source market in China. However, the data of this paper is limited, but the data of this paper is limited, only the data of the Annals are adopted. In the future, scholars can start with the quarterly or monthly data and use the fractal theory to do further research on China's domestic tourist market.

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