Application of Count Data Models in Inbound Tourism Source Markets based on Data mining technology

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Abstract: This paper applies Application of Count Data Models based on Data Ming technology by the index of Familiarity Degree of Scenic Destination and the index of Competitive State to carry out quantitative analysis on the inbound tourism market of Jiangxi Province in 2001-2012. The results show that: Most inbound tourism source markets are with low familiarity degree or strong unfamiliarity degree. The inter-annual variability of the familiarity degree of inbound tourism source markets shows three concurrent trends of high-position oscillation, middle-position volatility, and low-position coexistence, with significant disparities among source markets; competitive state of the tourist source markets mainly concentrates in Skinny-Dog Market and Children Market. These indicate there are considerable spatial disparities among the inbound tourism source markets of Jiangxi Province, the overall development situation is not optimistic, and it is necessary to carry out further strengthened development and study on the tourism source markets of the Jiangxi province in order to further improve the development of inbound tourism and realize its goal to build a competitive tourism in Jiangxi province.

Keywords: Familiarity degree of scenic destination; competitive state; agglomeration; inbound market; Computer software engineering model

I. INTRODUCTION

Inbound tourism development is an important symbol of the development of the tourism industry of a country or region. Domestic scholars have conducted a lot of researches on the variation patterns of the inbound tourism source market in temporal series and in spatial series. For instance: Chen Xiuqiong and Huang Fucai [1] adopted Theil coefficient to discuss the temporal and spatial variation patterns of intra-regional, inter-regional, and inter-provincial tourism source markets of China's inbound tourism, and thus laid a foundation for the study on the disparities of intra-regional, inter-regional, and inter-provincial tourism source markets; Yang Jin and Ma Yaofeng [2] adopted the competitive state and familiarity degree model to analyze the temporal and spatial variation patterns of various tourism source markets of Xi'an in different periods; Yao Xiaoyun [3] analyzed the familiarity degree and competitive state of the inbound tourism source market of Zhangjiajie and explored the temporal and spatial variation patterns of the inbound tourism source markets of Zhangjiajie.

This paper takes the 16 major inbound tourism source countries of Jiangxi Province as the research objects, based on the inbound tourism statistical data of 2001-2012, applies the familiarity degree, competitive state and other models and methods, carries out dynamic analysis and research on the temporal and spatial variation patterns of the inbound tourism source markets of Jiangxi Province, The sources of the Data are the Statistical Yearbook of Jiangxi Province and China Tourism Statistics Yearbook (2002-2013).

II. BASIC CHARACTERISTICS OF THE INBOUND TOURISM MARKET OF JIANGXI PROVINCE

A. Inbound tourist arrivals and revenues are constantly rising

(1) Tourist arrivals. As can be seen from Figure 1, inbound tourist arrivals of Jiangxi Province have kept a rapid growth trend expect for the decline in year 2003 due to the impact of SARS. The number has increased from 196,000 people-times in 2001 to 1,560,000 people-times in 2012, a cumulative increase of up to 8 times. Obviously, the overall situation of inbound tourism development of Jiangxi Province is optimistic, and inbound tourism has become an important constituent part of tourism development in Jiangxi Province and made huge contribution to the development of foreign economy in Jiangxi Province.

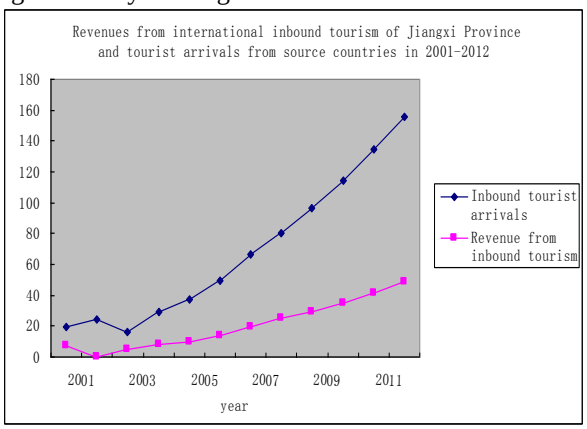

Figure 1. Revenues inbound tourism and tourist arrivals from source countries of Jiangxi Province in 2001-2012

(2) Inbound tourism revenues. As can be seen from Figure 1, inbound tourism revenues also showed a growing trend since 2001. Inbound tourism revenue increased from7 million U.S. Dollars in 2001 to 48.5 million U.S. Dollars in

2012, with a growth rate of 7 times during the period. The foreign exchange earnings of Jiangxi Province from tourism showed an upward trend in all years except for the slight decline in 2003 than the previous year. Due to the impact of SARS in 2003, the foreign exchange earnings of Jiangxi Province from tourism were hard hit, the same as the situation nationwide. But this also shows that tourism industry is with strong frangibility. The industry recovered in 2004 and has kept sound development status since then.

B. *Volatility of inbound tourist arrivals and growth rate of foreign exchange earnings is significant*

As can be seen from Figure 2, the change rate of inbound tourism of Jiangxi Province is basically identical to that of tourist arrivals. Both experienced a negative growth in 2003, which indicates that SARS generated a big impact on the development of the inbound tourism in Jiangxi and that the tourism industry with strong frangibility. But with a turnaround, both revenue and tourist arrivals rose considerably in 2004. The growth rate of revenue was 68.1% and that of tourist arrivals was 73.8%. Generally, a steady status has been kept since 2005, although with fluctuations, but in modest magnitude. After 2008, the growth rates of revenue and tourist arrivals showed a downward trend that lasted to 2012. The growth rate of revenues dropped from 28.7.1% in 2008 to 16.8% in 2012, and the growth rate of tourist arrivals dropped from 20.7% to 15%. To sum up, in the latest several years, the inbound tourism industry of Jiangxi Province has kept sound development trend, but the speed of development is still not strong enough, and need further accelerating.

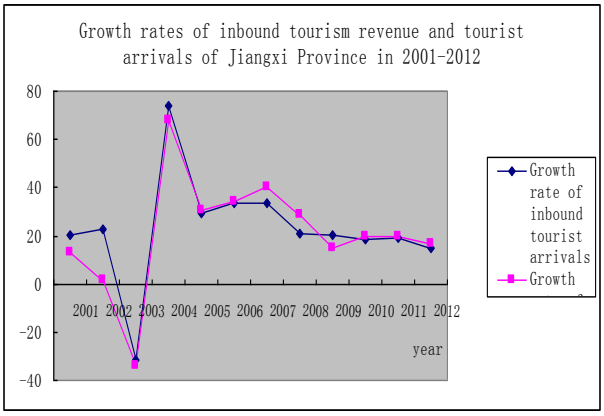

Figure 2. Growth rates of inbound tourism revenue and tourist arrivals of Anhui Province in 2001-2012

III. Analysis on the Familiarity Degree of Scenic Destination of Tourism Source Countries

The Familiarity Degree of Scenic Destination is analysis model to study the preference degree of the inbound tourism source market to a scenic destination. It is represented by the ratio of the proportion of tourists from a certain tourism source country in the market of a certain scenic destination against the proportion of tourists from the source in the market nationwide [4]. The formula is as follows:

$$P(\text{familiarty degree of the scenic}) = \frac{S_d\,(\text{number of tourists from tourism source country to the scenic destination}) \Big/ F_d\,(\text{total number of foreign tourists to the scenic destination})}{S_c\,(\text{total number of tourists to china}) \Big/ F_c\,(\text{total number of foreign tourists to china})}$$

P is the familiarity degree of the scenic destination; S_d is the number of tourists from a tourism source country to the scenic destination; F_d is the total number of foreign tourists to the scenic destination; S_c is the number of tourists from the source country to China nationwide; and F_c is the total number of foreign tourists to China nationwide. If the familiarity level P≥1, the source country is a familiar source country to the scenic destination; if P=0, it indicates the country is not a source country; if P<1, the country is an unfamiliar country to the scenic destination. Besides, among the familiar countries, those with P≥2 are further subdivided as strongly familiar source countries; and those with 1≤P<2 are source countries with low familiarity. And among the unfamiliar countries, those with 0.5≤P<1 are subdivided as low-unfamiliar countries, and those with 0≤P<0.5 are strongly unfamiliar source countries [4]. Meanwhile, the familiarity degree is relevant to the total number of tourists to China, and not necessarily has a positive correlation with the number of inbound tourist arrivals from the source country. This Paper carries out analysis on the 19 major inbound tourism source markets based on the data of the Tourism Statistic Yearbook of Jiangxi Province and comes up with the following analysis results as shown in Figure 3.

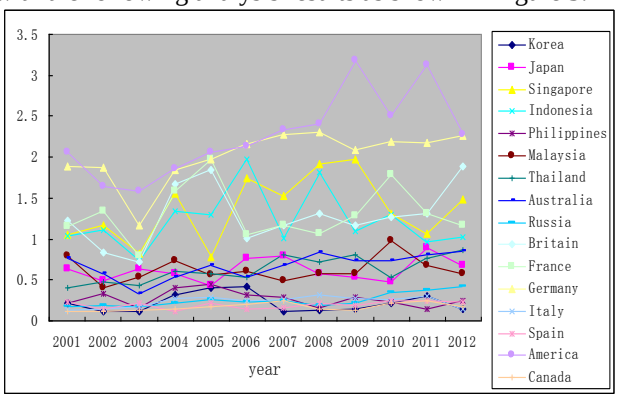

Figure 3. Inter-annual changes in familiarity degrees of major inbound tourism source countries of Jiangxi Province

A. *Temporal and spatial disparities of familiarity degrees are significant*

As can be seen from Figure 3, among the inbound tourism source countries of Jiangxi Province during 2001-2012, only 3/8 of the countries have familiarity degrees greater than 1. while 5/8 of the source markets have familiarity degrees less than 1. Disparities are significant among the sources countries. Judging from the average familiarity degrees of various source countries in the 12 years, America, Germany is a source country with strong

familiarity degree, which is greater than 2; The familiarity degrees of Britain, France, Singapore, and Indonesia are all between 1 and 2 so these source countries are with low familiarity degrees; The familiarity degrees of Thailand, Japan, Malaysia and Australia are between 0.5 and 1 and therefore these are slightly unfamiliar source countries; The familiarity degrees of the Philippines, Korea, Russia, Canada, Italy and Spain are less than 0.5, so these are strongly unfamiliar source countries. These indicate that Japan, South Korea, Singapore, Malaysia, Germany, the United States, the United Kingdom, and France are major source countries for inbound tourism in Jiangxi and the tourism industry of Jiangxi is relatively more attractive to them; while the Philippines, Indonesia, Russia, Switzerland, the Netherlands, Italy, Spain, and New Zealand are strongly unfamiliar source countries and the tourism industry of Jiangxi is less attractive to them. In the overall, the tourism industry of Jiangxi is not quite attractive to foreign tourists; it is necessary to continuously strengthen the development of tourism resources in Jiangxi, improve tourism products, and enhance external marketing so as to constantly raise the competitiveness of the inbound tourism in the Jiangxi province.

B. *Inter-annual changes in familiarity degrees are significant*

As shown in Figure 3, the inter-annual changes in the familiarity degrees of source markets of inbound tourism of Jiangxi are significant, and show the three trends of high-position oscillation, middle-position volatility, and low-position coexistence [5]. Specifically, the familiarity degrees of slightly familiar source countries show significant fluctuations, that of slightly unfamiliar source countries show modest fluctuations, while that of the strongly unfamiliar countries almost stay unchanged. These indicate that the tourism industry of Jiangxi has inadequate competitiveness even toward source countries with relatively high familiarity degrees; whereas the inter-annual changes in familiarity degrees of strongly unfamiliar countries such as Britain, France, Singapore, Indonesia, Thailand, Japan, Malaysia and Australia are relatively stable with fluctuation magnitudes between 0.21-0.64, indicating the attractiveness of the tourism of Jiangxi Province is further smaller to them, and need to be constantly strengthened in the future.

IV. COMPETITIVE STATE OF INBOUND TOURISM SOURCE MARKET

A. *Analysis of competitive state*

Competitive state refers to the basic state of the entire tourism market which is shown under the influence of the two different indicators, i.e., its share in all markets (αi) and its growth rate (βi), expressed as Ωi(αi,βi) [6], its model is as follows:

$$a_i = \frac{X_i^t}{\sum_{i=1}^{n} X_i^t} \times 100\% \qquad (1)$$

$$\beta_i = \frac{X_i^t - X_i^{t-1}}{X_i^{t-1}} \times 100\% \qquad (2)$$

In the equation, Xi is the number of tourists of the i-th source market in a year; The corresponding point of the competitive state Ωi(αi,βi) in the two-dimensional coordinate system will represent the competitiveness of the market, which indicates the status of the market among similar markets as well as its future development trend. In the coordinate system, when the lines α = m and β = n are taken as borders to divide the source markets into the four categories of Star Market, Golden-OX Market, Children Market and Skinny-Dog Market [6].

B. *Analysis on the competitive state of inbound tourism source markets*

The paper takes the 16 major source markets of inbound tourism in Jiangxi Province as the research subjects, based on the relevant data in China Tourism Statistics Yearbook 2002-2013, takes year 2006 as the demarcation point, respectively calculates the average market growth rate and market share in the 2001-2006 period and those of the 2007-2012 period, as well as the temporal and spatial variation patterns of these average values over the 12 years. [6] It is obtained through analysis with the Spss software that the market share and growth rate of inbound tourism of jiangxi Province during 2001-2006 were respectively M1= 3.45 and N1 = 45.23; The market share and growth rate during 2007-2012 were respectively M_2 =3.67, N1=38.04; The market share and growth rate during 2001-2012 were respectively M3=3.61, N3=41.72, as shown in Table 1.

TABLE I. THE MARKET SHARE AND GROWTH RATE OF TOURISM SOURCE COUNTRIES OF JIANGXI PROVINCE

Year	2001-2006	2007-2012	2001-2012
Star Market α≥M, β≥N	Germany	America	Germany, America
Golden-OX Market α≥M, β<N	Japan, Singapore, Britain, America	Japan, Singapore, Britain, Germany	Japan, Singapore, Britain
Children Market α<M, β≥N	Indonesia, France, Russia, Philippines, Australia	Indonesia, France, Philippines, Australia	Indonesia, Philippines, France, South Korea
Skinny-Dog Market α<M, β<N	Malaysia, Thailand, South Korea, Canada, Spain, Italy	Malaysia, Thailand, Russia , Italy Canada, Spain, South Korea,	Malaysia, Thailand, Canada, Australia, Italy, Spain, Russia

As can be seen from Table1, Malaysia, Thailand, Korea, Canada, Spain, Italy were Skinny-Dog markets during 2001-2006 as the market share they accounted for and the corresponding growth rates were both very low; Indonesia, the Philippines, France, Russia, Australia were children markets during this period, as their market shares were small,

but the growth rates were considerable, indicating that these markets have great development potential, and Jiangxi Province should continuously analyze their resources and market conditions, make full use of its advantages and create favorable market environment, so as to improve its market attractiveness and competitiveness; Japan, Singapore, Britain and America were Golden-OX Markets during this period as their market shares were considerable but the growth rates were low, indicating that these markets were stabilizing, and therefore Jiangxi Province should continuously excavate new products, increase market growth rate and maintain the market share; Germany were Star Markets during this period, as their market shares and growth rates were both very high, representing the major stale and mature markets of Jiangxi Province, therefore Jiangxi Province should continuously stabilize the attractiveness of these markets.

As shown in Table 1, not only Malaysia, Thailand, Canada, Spain, Italy, South Korea were still Skinny-Dog Markets during 2007-2012, but the Russia also reduced from formerly Children Markets to Skinny-Dog Markets during this period, indicating that the competitiveness of overseas tourism source markets of Jiangxi Province were continuously shrinking, and therefore Jiangxi should constantly strengthen marketing of their demand, raise attractiveness, and expand the inbound tourism markets; Germany downgraded from Star Market to Golden-OX Market; Japan Britain and Singapore were still Golden-OX Markets; while America go up from Golden-OX Market to Star Market during 2007-2012. These were all high-position markets to be developed by the inbound tourism industry of the province. Jiangxi Province should seize this profitable opportunities, continuously strengthen promotional and investment efforts, so as to promote the development of inbound tourism in Jiangxi Province and enhance benefits from foreign exchanges.

As shown in Table 1, the competitive state of the tourism source markets of Jiangxi Province experienced significant temporal and spatial changes during 2001-2012, reflected by the constantly expanding Star Markets, moderately shrinking Golden-OX markets and Children Markets, and constantly climbing trend of the proportion of Skinny-Dog Markets; Especially, the growth rates of Russia and Australia both showed a gradually declining trend [6]. The constant expansion of the size of Skinny-Dog Markets indicate the monotony in the development of inbound tourism of Jiangxi Province, the lack of emphasis on the Skinny-Dog Markets, the lack of specialty products and effective marketing instruments, and the low attractiveness and competitiveness. Therefore, Jiangxi Province should continuously attach more importance on these markets, launch corresponding development policies, maintain the high-position growing source markets, and enhance low-position fluctuating source markets, so as to revitalize the inbound tourism industry [6].

C. Analysis on the correlation between the familiarity degree and the competitive state of the inbound tourism source markets

It can deduced from Figure 3, Table2 that America and Germany is a strong familiarity Star Markets; Britain, Singapore, Indonesia and France are low familiarity source markets, among these, Britain, Singapore are Golden-OX Market, Indonesia, France are a Children Market, Japan Thailand, Australia, and Malaysia are all low unfamiliarity source markets, among these, Japan is a Golden-OX Market, while Thailand, Australia, and Malaysia are Skinny-Dog Markets. The other countries are strong unfamiliarity source markets, among these, Korea, Philippines are Children Markets, and the Canada, Italy, Spain, Russia are Skinny-Dog Market; To sum up, during 2001-2012 a total of 66.7% (2/3) of the strong familiarity and low familiarity source markets of Jiangxi Province are Star Markets / Golden-OX Markets, accounting for 80% (4/5) of the total number of Star Markets and Golden-OX Markets; and a total of 90% (9/10) of the strong unfamiliarity and low unfamiliarity source markets are Children Markets / Skinny-Dog Markets, accounting for 81.8% (9/11) of the total number of Children Markets / Skinny-Dog Markets. The analysis results show there is correlativity to a certain extent between the familiarity degree and the competitive state. Markets with familiarity degrees above 1 are mostly Star Markets or Golden-OX Markets, while those with familiarity degrees below 1 are mostly Skinny-Dog Markets or Children Markets.

TABLE II. PATTERN OF FAMILIARITY DEGREE AND COMPETITIVE STATE OF TOURISM SOURCE MARKETS OF JIANGXI PROVINCE DURING 2001-2012

	Strong familiarity market ($2 \le P < +\infty$)	Low familiarity market ($1 \le P < 2$)	Low unfamiliarity market ($0.5 \le P < 1$)	Strong unfamiliarity market ($0 \le P < 0.5$)
Star Market $\alpha \geqslant 3.61$, $\beta \geqslant 41.7$	Germany, America			
Golden-OX Market $\alpha \geqslant 3.61$, $\beta < 41.7$		Singapore, Britain	Japan	
Children Market $\alpha < 3.61$, $\beta \geqslant 41.7$		Indonesia, France		Philippines, South Korea
Skinny-Dog Market $\alpha < 3.61$, $\beta < 41.7$			Australia, Thailand, Malaysia	Canada, Italy, Spain, Russia

V. CONCLUSIONS AND COUNTERMEASURES

1) Japan, South Korea, the United States, France and Germany are the most important inbound tourism source markets of Jiangxi Province. The five countries have familiarity degrees greater than 1 and have strong tourism preferences for Jiangxi Province. The competitive states of these countries are Star Market / Golden-OX Market, indicating they are tourism source countries contributing the strong competitiveness of Jiangxi Province, and hold a very important position in the structure of the entire inbound tourism market of the province. In the future, Jiangxi Province needs to further enhance the quality of tourism

services, constantly improve and develop new tourism products, enhance marketing efforts, upgrade product features and quality, improve tourist satisfaction, and strengthen the attractiveness of tourism products of Jiangxi Province to foreign tourism source markets.

2) The United Kingdom is a major source market for the inbound tourism market of Jiangxi Province. Its familiarity degree was always near 1, but its competitive state is Golden-OX Market, which indicates it still occupies moderate share in Jiangxi market. Meanwhile, the United Kingdom is an economically developed country with strong outbound tourism capacity, strong contrast to Chinese culture, and high willingness for inbound tourism to China. Therefore, the United Kingdom is the major market for inbound tourism of Jiangxi Province. In the future, Jiangxi should continue to speed up the upgrading of the tourism products, further develop a number of featured products with international attractiveness and influence, increase tourism promotion efforts, meet the demand of different source markets, and ensure high market share and continued growth.

3) Singapore, Malaysia, Australia, Thailand, and Canada potential source markets for inbound tourism in Jiangxi Province. These five countries are slight unfamiliarity tourism source markets, and their competitive states are Skinny-Dog Market / Children Market, which indicates these five countries have moderate preference for tourism in Jiangxi Province, but the attractiveness is inadequate. Therefore, Jiangxi must continue to develop targeted tourism products, carry out targeted travel advertising and promotion activities, improve the attractiveness to them, and inspire their potential in the tourism market.

4) Russia, Italy, Switzerland, the Netherlands, Spain, Indonesia, the Philippines, and New Zealand are markets presenting opportunities for further development of inbound tourism of Jiangxi Province. These countries all fall in the strong unfamiliarity category and their competitive states are children market and skinny-dog market, indicating low preference degree for tourism in Jiangxi. Therefore, Jiangxi should continue to strengthen the cultivation of these markets, adopt effective means of publicity, constantly improve the attractiveness of Jiangxi Tourism to them, and increase their preference degree for Jiangxi tourism, so as to continuously explore the inbound tourism market and improve the competitiveness of international tourism in Jiangxi Province.

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