Research on Overall Correlation Analysis between Modern Service Industry and Tourism Industry in Liaoning Province

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Abstract. Modern service industry in Liaoning province gets behind that in the other provinces. As the essential support of tourism industry, modern service industry must speed the development of financial insurance, information technology and so on, aiming to drive the development of tourism industry. This is the key to give an impulse to transforming from a big tourism resources province to a strong tourism province. Thus, the research on driving in tourism has aroused the attention in the academic field widely. The related theories of tourism and modern service industry have certain reference value. Few demonstrations research was carried out with quantitative analysis. This research paper adopts research method of overall correlation analysis, analyzes the tourism industry and modern service industry in Liaoning province, and proposes the countermeasures for the administrative authority.

Keywords: Modern service industry; tourism industry; Liaoning province; the overall correlation analysis.

1. Introduction

Since the 1990s, the global industrial structure has gradually presented the trend of transition from the "industrial economy" to "service economy". As the core of tourism industry, modern service industry has become the major force of the growth of the world economy, and promoted the development of tourism industry. Modern service industry, as a kind of intermediate input, is a kind of indirect service for final consumption. Modern service industry introduces the human and intellectual capital, etc. to the various stages of tourism industry. It can promote the quality of the tourism products. The current development of modern service industry in Liaoning province is relatively backward. Speeding up the development of financial insurance industry, information technology and other modern service industry is the strong driving force for the development of tourism industry. It is the key point for changing from province featured tourism resources to province featured competitive power.

Related theoretical researched on tourism and modern service industry have possessed certain reference value, but few adopt quantitative analysis methods to study on the driving mechanism of tourism. This research paper uses grey correlation analysis method, analyzes the data on Liaoning province tourism industry and modern service, aiming to provide decision-making reference for the development of Liaoning tourism and service industry.

2. Development Status of Liaoning Tourism Industry and Modern Service Industry

2.1 Development Status of Liaoning Tourism Industry

After entering the new century, the Liaoning tourism industry has developed rapidly. Especially during the period of "the 11th five-year plan", the tourism industry in Liaoning province has made remarkable achievements. According to the statistics from the Liaoning Tourism Bureau, in 2006, tourism receipts of Liaoning province was 89.61 billion RMB, the equivalent of 8.7% of the gross economic receipts in Liaoning province. By 2010, the Liaoning province tourism income is 253.34 billion RMB, equivalent to 14.7% of gross domestic product in Liaoning province, increased by 20.7% over 2009, rose by 182.7% over 2006. During the period of "the 11th five-year plan" tourist receipts realized to quadruple. According to the latest statistics of Liaoning Tourism Bureau in 2014,

the gross revenue from tourism industry was 464.81 billion RMB, rose by 18% over 2012. Among them, the domestic tourism income was 443.28 billion RMB increased by 18.5%; Tourist foreign exchange income was 3.48 billion USD, an increase of 3.2%. The gross tourism revenue in 2012 was 394 RMB increased by 18.1% over 2011, including tourism foreign exchange income of 3.18 billion USD, rose by 17.5% over last year. The gross tourism revenue in 2013 was 464.81 RMB, increased by 18% over 2011. Among them, the domestic tourism income was 443.28 RMB, increased by 18.5%; Tourist foreign exchange income was 3.48 billion USD, an increase of 3.2%.

For the number of tourist reception, Liaoning province received 286,393,000 tourists in 2010, increased 17% over the previous year. In 2011 the receiving tourists are 329,738,000, rose by 15.1% over 2010. Among them, 325,635,000 are domestic visitors and 4,103,000 are inbound tourists, respectively rose by 15.2% and 13.4%. In 2012, the total tourists have reached 362,000,000, including 4,800,000 inbound visitors. In 2013, the number has increased by 11.6%, reaching 409,303,000, composed of 5,031,000 inbound tourists. Specific data is listed in table 1.

Table 1 Basic Statistics of Liaoning Tourism Industry

Items / Year	Gross Revenue 10 billion RMB	Domestic Tourism Revenue 10 billion RMB	Inbound Tourism Revenue 10thousand USD	Domestic Tourists 10thousand	Inbound Tourists 10thousand
2006	970.5	896.0	93429.9	13166.0	161.3
2007	1307.0	1214.9	122786.2	16504.0	200.1
2008	1741.5	1635.5	152618.0	19836.4	241.9
2009	2225.1	2098.8	185621.0	24195.0	293.2
2010	2686.9	2533.4	223932.9	28277.5	361.9
2011	3335.6	3159.3	271314.0	32563.5	410.3
2012	3940	3727	318342.3	36200.0	480.0
2013	4648.1	4432.8	348090.0	40427.2	503.1

Statistics Source: Liaoning Tourism Bureau, Liaoning Statistical Yearbook (2006-2012)

2.2 Development Status of Liaoning Modern Service Industry

At present, most parts of Liaoning have entered the essential period of industrial transformation, accelerated urbanization, and economic internationalization promotion. In recent years, commerce, logistics, real estate, tourism, finance, science and technology service, information and culture industry in Liaoning province have developed rapidly. The added value of wholesale and retail trade in Liaoning province in 2013 was 241.43 billion RMB, calculated at comparable prices, an increase of 8.5% over the previous year. Accommodation and catering industry added 54.19 billion RMB, an increase of 5.9%. The total retail sale of social consumer goods was 1.05244 trillion RMB, an increase of 13.7% over the previous year. Transportation, warehousing and postal service added 138.41 billion RMB, increased by 6.5% over the previous year. The completed a variety of modes of transportation freight volume of 2.256077 billion tons, rose by 10.4% over the previous year. The variety of modes of transportation passenger traffic carried 1.079355 billion people, an increase of 3.7% over the previous year. The financial institutions (including foreign) deposit balance was 3.9418 trillion RMB, an increase of 417.1 billion RMB. The added value of wholesale and retail trade in Liaoning province in 2012 was 221.28 billion RMB, calculated at comparable prices, an increase of 9.4% over the previous year. Accommodation and catering industry added 49.87 billion RMB, an increase of 7.6% over the previous year. The total retail sales of social consumer goods are 925.66 billion RMB, an increase of 15.7% over the previous year. The transportation, warehousing and postal service added 128.49 billion RMB, calculated at comparable prices, an increase of 8% over the previous year. The variety of modes of transportation freight 2.043821 billion tons, an increase of 12.2% over the previous year. The post and telecommunications business volume was 51.41 billion RMB, an increase of 8.9% over the previous year. The local and foreign financial institutions (including foreign) the deposit balance was 3.53035 trillion RMB, an increase of 447.34 billion RMB. In 2011, the total retail sales of social consumer goods in Liaoning province achieved 800.36 billion RMB, increased by 17.5% over a year earlier. The freight volume was 1.82 billion tons, up 16.8%.

Container throughput was 12.003 million, increased by 23.9%. Information technology services revenue was 59 billion RMB, rose by 20.9%. Commercial housing sales were 357.63 billion RMB, an increase of 16.88%. Software industry revenue was 145 billion RMB, rose by 41.6%. The added value of cultural industry was 20 billion RMB (not including radio and television and publishing), increased by 33%. Finance in local and foreign loans was 2.28 trillion RMB, rose by 17.2% over a year earlier. In recent years, modern service investment in fixed assets has taken account for more than half of investment in fixed assets in Liaoning province, and become the whole society fixed assets investment of the fastest growing industries. A batch of major services facilities were put into use.

3. The Principle of Least Square Method

Least-square method is a relatively old method. In the early 18th century, it was founded by Guass first and successfully applied in astronomy observation and geodetic survey. Nearly three hundred years, it has widely applied in scientific experiments and engineering technology. With the popularization and development of modern electronic computer, the old methods show the strong vitality.

Least squares method is to solve how to seek a reliable value from a set of measurements. Basic principle of the least square method is precision measure a set of data in pair's x_i, $y_i (i=1,2,...,n)$, trying to find a best fitting curve, and making the fitted curve of each point on the value and the sum of squares of the difference measurements of all the fitting curve minimal.

The dependent relation formula between physical quantity y and variable l;

$y=f(x_1,x_2,...,x_l;a_0,a_1,...,a_n)$. $a_0,a_1,...,a_n$ Is $n+1$ undetermined parameter, in $s=\sum_{i=1}^{m}(y_i-y_i^{'})$, v_i is survey value, $v_i^{'}$ is a function numerical value derived from the result of $a_0,a_1,...,a_n$ and $(x_{i1},x_{i2},...,x_{il};v_i)(i=1,2,...,m)$.

$y=f(x_{i1},x_{i2},...,x_{il};a_0,a_1,...,a_n)$

When designing the experiment, in order to reduce the error, multipoint measurement is applied, making the number of equation larger than the number of undetermined parameter. Thus, it forms the contradictions equations. After transformation by the least squares method of equations, it is called normal equations (the number of equation is equal to the number of undetermined parameters). We can use normal equations to calculate $a_0,a_1,...,a_n$.

4. Empirical Analysis on the Regression Model

Based on the statistical yearbook of Liaoning province in 2003-2012 and the related data of statistical information network in Liaoning province, this research respectively consider the gross revenue of tourism revenue Y and the added value of modern service industry X as the representative indicators of the development level of tourism industry and modern service industry. This is shown in table 2 below. According to the SPSS correlation analysis, correlation coefficient between the variable X and Y is 0.995, showing that there is a strong correlation between them.

Tab 2. Index on Development Level of Liaoning Tourism Industry and Modern Service Development

Years	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
X	2258	2527	2824	3245	3560	4014	4648	5829	6775	7960
Y	397	408	570	735	971	1307	1742	2225	2533	3336

Statistics Source: Liaoning Tourism Bureau, Liaoning Statistical Yearbook (2006-2012)

Added value X of modern service industry is as the independent variable, and tourism revenue is as the dependent variable Y, using Views software to make the regression analysis:

Dependent Variable: Y

Method: Least Squares

Date: 06/12/13 Time: 18:01
Sample: 2003---2012
Included observations: 10

Variable	Coefficient	Std.Error	T-Statistic	Prob
X	0.585798	0.021099	28.62551	0.0000
C	-221.8357	30.08765	-8.328828	0.0000
R-squared	0.986459	Mean dependent var		487.5312
Adjusted R-squared	0.975655	S.D. dependent var		430.6281
S.E. of Regression	51.57515	Akaike info criterion		10.87536
Sum squared resid	26510.23	Schwarz criterion		10.94617
Log likelihood	-64.23214	F-statistic		746.8041
Durbin-Watson stat	0.874399	Prob(F-statistic)		0.000000

The value of DW is 0.871. The model possesses strong correlation. Thus the model should be adjusted by the way such as changing the variables. Because the influence of the modern service industry towards tourism industry is not always reflected immediately, to eliminate the variable is appropriate. Y (-l) and Y (-3) should be kept.

In such a case, regression equation should be shown as:

Y=0.3842456254+0.885122622*Y (-1)-0.687921822*Y (-3)-175.4204835 (1)
(0.101258) (0.167301) (0.231240)

R^2=0.994561; $\overline{R^2}$=0.995850

DW=2.128137; F=729.0247; P=0.00

According to the formula (1) the empirical test results have been obtained. We can see: goodness-of-fit adjusted by equation is 0.995850. The fitting effect is very good, and the equation obviously explains the factors. The output elasticity corresponding to variable X is 0.3842456254, indicating the influence of the modern service industry X towards gross tourism revenue Y is positive. Modern service industry will lead to tourism revenue Y increased 0.3842456254 units, if X increased one unit. The output elasticity of variable Y (-1) is 0.885122622, showing that variable Y (-1) increasing one unit will produce 0.885122622 units of positive influence on Y. The output elasticity of the lag period income Y (-3) is 0.687921822. Y (-3) increases one Yuan will lead to reduce 0.688 units in latter period. But the influence of independent variable on the dependent variable is not obvious.

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