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Research on the Interaction between Information Technology and Innovation of Tourism Service Industry

Wang Kai

South China University of Technology, Panyu District, Guangzhou, Guangdong

114430580@qq.com

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ABSTRACT

Based on the analysis of innovation level of information technology and tourism service industry in 31 provinces and autonomous regions of China between 2004-2015, non-equilibrium and positive correlation is found between information technology and innovation level of tourism service industry. The empirical result shows that there is a long-term equilibrium and two-way Granger causality between information technology and tourism service innovation, and in the short and long term, there is a positive effect between information technology and tourism service innovation.

1. Introduction

In the the 1990s, foreign academia began to pay more and more attention to tourism innovation [1-3]. According to the characteristics of tourism service industry, scholars have made a great deal of research on tourism innovation theory by reference to the theory of innovation and service innovation of Schumpeter. It mainly focuses on the different types of tourism innovation and its characteristics based on the classification [4-5], studies the tourism innovation process in the framework of knowledge management theory [6-7], and studies the tourism innovation system and the tourism industry Cluster from the perspective of system theory, and obtains some stage results [8-10].

Entering the new century, information and communication technology and the industry integration and interaction of tourism service industry has greatly subverted the commercial development model of tourism service industry[11].

2. Data and Index system construction

2.1 Data sources and dimensionless

In this study, 31 provinces and autonomous regions in China are the spatial units. Collect the provincial Statistical Yearbook, the period of 2004-2015 years. The following formulas are used to standardize the original data. The value of each variable is divided by the mean of the variable, the mean value of each variable is 1, and the standard deviation is the variation coefficient of the original variable. The formula is:

$$X_i = \frac{x_i}{\overline{X}}. \quad (1)$$

In the formula: X_i is dimensionless processing data, X_i is the first index of the variable and the Xianx is the mean of the variable. F_1, F_2 for the information technology and tourism service industry, the comprehensive score of innovation, f_1, f_2, f_3 as the public factor score, from the calculation of SPSS.

$$F_1 = 0.54946 f_1 + 0.27915 f_2. \quad (2)$$

$$F_2 = 0.4233 f_1 + 0.17813 f_2 + 0.1416 f_3. \quad (3)$$

2.2 Model setting

First, using OLS to estimate the regression equation of panel data, calculate the regression variance, and then use the ADF to test the stability of residual error. Assuming that the residual order is stationary, it is shown that there is a cointegration relationship between the sequences, and the short term dynamic model-error model can be used to correct the long term static problems. The error correction model is a kind of economic econometric model which manifests itself as a special form, taking the error terms as the balance error instead of the explanatory table. To measure the long-term relationship between information technology and tourism innovation, the following long-term equilibrium models are constructed:

$$XXJS_{j,it} = a_{j0} + a_{j1} LYCX_{j,it} + c_{j,it}. \quad (4)$$

$$LYCX_{j,it} = b_{j0} + b_{j1} XXJS_{j,it} + d_{j,it}. \quad (5)$$

In the formula: XXJS and LYCX respectively represent information technology, tourism service industry innovation, j=1, express China, i=1, 2 ... 31, 31 provinces and autonomous regions, t=2004-2015, a_{j0}, b_{j0} as a constant term, a_{j1}, b_{j1} for the long-term elastic coefficient; $c_{j,it}$, $d_{j,it}$, it's a random error.

By means of (4) and (5), the equation of residuals can be obtained as an effect of non-equilibrium state, and if long-term equilibrium is meaningful, then the equilibrium error must be stable.

$$c_{j.it} = XXJS_{j,it} - a_{j0} - a_{j1} LYCX_{j,it}. \quad (6)$$

$$d_{j.it} = LYCX_{j,it} - b_{j0} - b_{j1} XXJS_{j,it}. \quad (7)$$

By means of the above formula, it is shown that the equation of residual term presents an unbalanced state, assuming that long-term equilibrium is meaningful and that the equilibrium error must be stable. Constructing error correction model to examine the short-term relationship between information technology and Tourism service innovation and long-term equilibrium relationship:

$$D(XXJS_{j,it}) = \alpha_{j0} + \alpha_{j1} D(LYCX_{j,it}) + \alpha_{j2} ECM_{j.it-1} + \rho_{jt}. \quad (8)$$

$$D(LYCX_{j,it}) = \beta_{j0} + \beta_{j1} D(XXJS_{j,it}) + \beta_{j2} ECM_{j.it-1} + \theta_{jt}. \quad (9)$$

Formula: D is the first order difference operation, α_{j0}, β_{j0} is the constant coefficient, α_{j1}, β_{j1} is the short-term elasticity coefficient, α_{j2}, β_{j2} is the error term coefficient, also is called the fluctuation coefficient, reflects the variable short-term fluctuation to deviate the long-term equilibrium degree, its absolute value is bigger, then the adjustment speed is θ_{jt}、ρ_{jt} are random perturbation items that obey normal distribution.

3. Empirical research results analysis

3.1 Comprehensive Evaluation Results

Tourism service industry innovation and the spatial distribution of information technology reveals that the level of information technology and the innovation level of tourism service industry show a certain positive correlation, that is, the high level of information technology in the city, its tourism service industry innovation level is relatively high, and most of them are located in Zhujiang Delta, Yangtze River Delta region, Beijing-Tianjin-Tangshan region, with strong competitiveness, and the lower level of information technology in the city, its tourism also has a lower innovation levels, mainly northwest, southwest, south, such as Tibet, Qinghai, Guizhou, Anhui and other provinces and cities.

3.2 Cointegration Test and error correction model

In order to avoid pseudo regression, the unit root test of information technology and Tourism service innovation was carried out firstly, and the critical value under the significant level of the ADF test was less than 5%, which belonged to the 0 order stationary sequence, which could be tested by cointegration.

Through the estimation of the Long-run equilibrium model, it is concluded that in the impact of information technology on the Innovation of Tourism Service Industry (model 5), the estimated coefficient reaches 0.45, and the level of information technology is increased by 1%, OLS the innovation level of tourism service industry will rise by about 0.45%, and in the impact of tourism service innovation on Information Technology (Model 4), the estimated coefficient reaches 0.94502, which shows that the innovation of tourism service industry has a great influence on information technology than information technology on tourism innovation.

The cointegration test reveals that the significant horizontal value of the P value of the residual sequence is less than 5%, rejecting the original hypothesis, accepting the conclusion that there is no unit root, that is, all the residual sequences can be determined to be stable. Therefore, it is found that there exists (0, 0) Order cointegration Relationship between the information technology and the tourism service industry innovation, that is, there exists long-term stable equilibrium relationship between them.

Because of the short period of data in this study, the effect of the long term equilibrium relationship is not obvious, and the error correction model is better integrated into the short-term information, which more comprehensively reflects the short-term and long-term relationship of the variable. Therefore, under the condition of long-term relationship, it is necessary to conduct short term relationship test in order to further enhance the understanding of the relationship between innovation and information technology in tourism services.

In the model (8), the ECM item coefficient is-0.118311, which shows that the error correction term can converge the short-term deviation to the long equilibrium state, and confirms the long-term equilibrium effect of the tourism service innovation on the information technology. The results also show that the innovation of tourism service industry is the short-term cause of information technology, which plays a positive role, and the short-term equilibrium coefficient is less than the long-run equilibrium estimation coefficient, which reveals that information technology may not only be affected by the innovation of tourism service industry in the long run, but also the role of other factors.

In the model (9), in the short term, the change of the level of information technology will cause the change of the same direction of tourism service innovation, and the ECM coefficient is positive, and there is a clear dynamic adjustment mechanism, which indicates that the error correction item makes a positive correction to the innovation of tourism service industry, so that the short-term deviation is adjusted to the The ECM factor in China is positive and the estimated coefficient is 0. 093629, the positive correction mechanism is revealed, which indicates that information technology is promoting the innovation of tourism service industry, which makes short-term deviation converge to long-term equilibrium direction.
The causality relationship between information technology and Tourism service innovation needs to be tested by Granger causality model. At 5% of the significant level, lag 1 to 7 period, the results show that the information technology has no significant impact on the innovation of tourism service industry during the 1-3 period, and there is no causal relationship between the innovation of tourism service industry and the information technology. During the 4-7 period, information technology is the Granger cause of the Innovation of tourism service industry, and the Innovation of tourism service industry is also the Granger reason of information technology, the test shows that there are mutual Granger reasons, and further verifies the relationship between information technology and tourism service industry innovation.

4. Conclusion and discussion

By exploring the intrinsic relationship between information technology and Tourism service innovation, this paper draws the following conclusions:First, the innovation of information technology and Tourism service industry presents the core-periphery spatial distribution model centering on the Pearl River Delta, Yangtze River Delta, Beijing-Tianjin-Tangshan, and the overall level of information technology and Tourism service innovation in the periphery of northwest, Southwest and South China is lower. Second, there is a long-term equilibrium and two-way Granger causality between information technology and Tourism service innovation. Third, both in the short and long term, the direction of the interaction between tourism services innovation and information technology is positive. In the short term, the impact of information technology on tourism service innovation is greater, and in the long run, the impact of tourism service innovation on information technology is greater.In this paper, the interaction between information technology and Tourism service innovation ignores the non-linear relationship of Granger causality test, so further empirical analysis is needed in both directions.

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