The Structural Characteristics of Tourism Economic Network in Xinjiang Province

Qian Cao[1] & Xiaoxia Tian[1]

[1] School of Tourism Management, Xinjiang University, Urumqi, Xinjiang, China

Correspondence: Xiaoxia Tian, School of Tourism Management, Xinjiang University, No.14 Shengli Road, Tianshan District, Urumqi, Xinjiang, China. Tel: 86-139-9988-3569. E-mail: 1311947734@qq.com

Abstract

The database of tourism economic network in the fifteen regions of Xinjiang is constructed based on the gravity model. By using social network analysis methods to analyze the Xinjiang tourism economy network centricity nodes, network density and core-edge structure, and study its effect. The results show that economic network of tourism in Xinjiang is becoming complicated and unbalanced. Finally, the factors affecting the regional discrepancy of the network are discussed, which is mainly related to the condition of tourism resources, regional economic development level and transportation infrastructure.

Keywords: tourism economy, social network analysis, Xinjiang province

1. Introduction

When anthropologists study the complex interpersonal relationship, they found that the traditional role status of structural functionalism has been unable to explain the actual behavior of interpersonal interaction, so it is necessary to explore new theories, which is the source of social network research (Xu, 2010). Barnes firstly used the concept of "social network" to research cross relatives and class relationship in a Norway fishing village. The Social Network Analysis is based on sociometry, mathematics, social psychology, graph theory, etc. it's a kind of analysis method formed by anthropology, sociology, economics and other disciplines, which has become one of the important research methods in the new economic sociology (Mark, 1973). Social Network Analysis focus on network topology structure, and pay attention to all kinds of tangible and intangible things between actors, such as information, resources, and so on. There are many foreign literatures in this field. Shih (Shih, 2006) used the social network analysis method for the network structure analysis of Nantou area of Taiwan self driving tourist destination. Lee (Lee and Choi, 2013) used social network analysis method to research the integration of rural tourism management. The domestic research starts relatively late, and the results are relatively few. Chen (Chen and Huang, 2006), Yang (Yang, Gu, and Wang, 2007), Yang (Yang, Zhang, and Ye, 2010; Yang et al, 2011; Yang, Zhang, and Wu, 2009), and Wu (Wu and Pan, 2010; Wu et al, 2012) used the social network analysis method to study the relationship between network of tourist flow and space structure optimization of tourism system, tourism flows spatial network, cross-border tourism region and tourism transportation network. Liu (Liu et al, 2010) and Wang (Wang and Li, 2011; Wang, 2012) studied the role position of provincial tourism in the tourist flow network, the management decision and strategy of tourist destination respectively.

Tourism spatial structure is an important research field of tourism geography, and geographers pay close attention to it for a long time. Studying on tourism spatial structure was began in the 1960s, including researches in the theoretical level, such as core-periphery theory, spatial-integration theory and point-axis structure theory. There is also empirical research, mainly related to the spatial behavior of tourists (including tourist flow, the research of tourist spatial behavior, tourist spatial perception, etc) and the study on the spatial structure of tourism destination (including the space distribution and layout of tourism resources and product, destination spatial structure and evolution, cooperation, optimization, etc) (Chen, Lu, and Zheng, 2011). Based on the social network analysis, Han (Han et al, 2011; Han et al, 2011) carried on an exploration about the structure characteristics, changes and optimization strategy of city spatial economic relationship network in Wanjiang City. Combined with social network analysis theory, Shang (Shang and Wang, 2010) regarded the regional tourism as research object, to construct evaluation index model and index system of tourism spatial structure.

Xinjiang is located in the northwest of China, 1/6 of the total land area, and tourism resources is very rich.

Xinjiang has a unique topography, natural landscape and many ethnic groups. It is the key to the ancient silk roads and Asia-Europe continental bridge. In addition, it also has a long history and culture, which constitutes a different Xinjiang. These rich and unique tourism resources have great attraction for tourists at home and abroad. The central economic work symposium in Xinjiang and the implementation of the new plan brings an important opportunity to the development of tourism industry in Xinjiang. As a new green industry, the tourism industry is driving great effect on other related industries. Therefore, it has a far-reaching significance for Xinjiang industrial structure adjustment and ecological protection to positively develop tourist economy. At present, the tourism industry has made many delightful achievements in the backbone industry of travel agency, hotel industry, catering industry and transportation. Luan (Luan, 2010) based on the fifteen regions, spatial disparities of tourism economic potential Xinjiang were discovered by using forty-three indexes. The methods such as factor analysis and cluster analysis were used in the research. Han (Han and Ma, 2009) based on tourism resources analysis, divided fifteen regions of Xinjiang according to tourism resource hierarchy, conducting coupling analysis with the level of regional tourism economy, tourism economic growth respectively. Mayila (Mayila, 2011) utilized Grey Theory Interrelate analytic method to analyze the interrelatedness of Xinjiang tourism with its national economy of three industries. Wang (Wang, Fang and Deng, 2013) use geographic concentration index and taylor index to conduct the general characteristics of tourism economic development and changes on quantitative and qualitative analysis in fifteen regions of Xinjiang province. Time ranges from 2001 to 2010, these mainly analyses the time and space differences of Xinjiang tourism economic development and the reasons for the evolution law (Wang, Fang and Deng, 2013). Jin Wu (Wu and Gong, 2012) constructed 11 evaluation indexes and used principal component analysis (PCA) and ordinary least squares (OLS) method. This paper takes the cross section data of 15 cities of Xinjiang in 2011 as samples to do empirical analysis on factors influencing Xinjiang tourism economy. However, there are few studies on Xinjiang province by using social network analysis. Therefore, in this paper, we use social network analysis method to research the spatial structure characteristics and influence factors of tourism economic network in Xinjiang Province, to provide theoretical guidance and new analysis perspective for the sustainable and harmonious development of tourism in Xinjiang.

2. Data Sources and Research Methods

2.1 Data Sources

This paper regards fifteen municipalities of Xinjiang Province as the research object, selects the total income and total number of Tourism in each prefecture in 2012, and the shortest transportation distance of highway between the various prefectures as the main data index. The data of the shortest highway transportation distance comes from Baidu map. Other data comes from "statistical yearbook of Xinjiang" and "Xinjiang tourism statistics bulletin". In addition, the total tourism income is obtained by domestic tourism income and inbound tourism income, the total number of Tourism can be obtained by the total number of domestic tourism and the total number of inbound tourism.

2.2 Research Method

This paper constructs the tourism economic relationship strength matrix by using the modified gravity model based on the empirical research of Wang (Wang, Wu, and Wang, 2006). The tourism economic network structure characteristics and variation characteristics of Xinjiang province are discussed by network density, centrality and core-periphery models.

2.2.1 Tourism Economic Relation Intensity Model

The tourism economic relationship strength reflects the quantitative relation of tourism economic relationship between cities. It reflects the tourism economy radiation ability of central cities to the surrounding cities. The models are as follows:

$$R_{ij}=K_{ij}(P_i*G_i)^{1/2}(P_j*G_j)^{1/2}/D_{ij}^2, \quad [k_{ij}=G_i/(G_i+G_j)] \tag{1}$$

Where R_{ij} is the tourism economy strength value of region i to region j, P_i and P_j are the total number of tourism in region i and region j respectively (thousands of people), G_i and G_j are the total income of tourism in region i and region j respectively (billion), D_{ij} is the shortest highway traffic distance between region i and region j (kilometer), K_{ij} is the contribution rate of region i to R_{ij}.

2.2.2 Evaluation Index of the Tourism Economic Network

The evaluation indexes of tourism economy network structure mainly include the node structure index and network structure index. The node structure indexes include two secondary indexes, central and structure holes,

respectively reflecting what the position and the regional advantages node are in the tourism economy network structure. Network structure indexes include some secondary indexes, such as the integral network scale, density, network central potential, diameter and core-periphery model. Combined with the characteristics of the selected data, we use the UCINET6.212 software in this paper, analysis the density, centrality and core-periphery structure of tourism economic relation network in the fifteen regions of Xinjiang province, in order to understand the structure characteristics and variation characteristics of tourism economy network in Xinjiang province from the macroscopic level.

1) Network density. It's a ratio between the actual existence relation summation and the most possible existence relation summation theoretically, which is used to measure the extent of connection for each node in the network.

2) Centrality. Centrality index includes node centrality and network center potential. Node centrality is used to recognize the important node in network and to measure the position of nodes in the network. Network center potential is used to measure the degree of the whole network centralization, the integration degree and consistency of the whole network (Liu, 2004). The above can be completed through the related module of Network-Centrality in UCINET software.

3) Core-periphery model. We can use the core-periphery model to determine the position of node in the whole network, calculate the degree of the core node, and quantitative analysis the node location. In this paper, we dispose the original data symmetrically by using the UCINET software. The processed data can reflect the original structure to a certain extent and establish continuous core-periphery model to analyze the tourism economy network core region, half edge region and the edge region in Xinjiang province. The above can be achieved through the Network-Core/Periphery-Continual module.

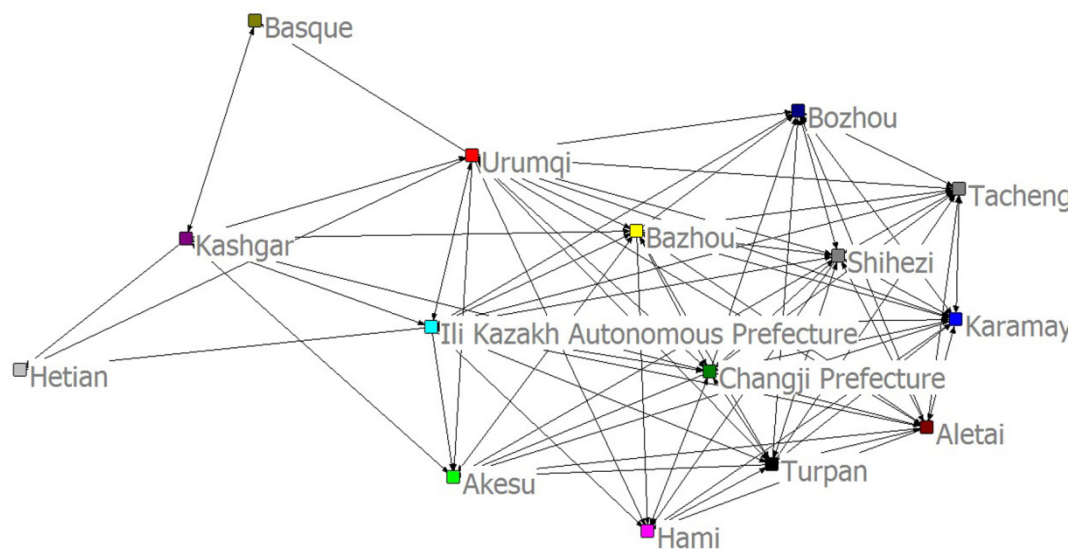## 3. Interpretation of Result

3.1 Network Density Analysis

Figure 1. The whole network of Xinjiang tourism economy (In 2012)

Currently, density estimation for complex assignment graphs has not reached a consensus. As the particularity of the data itself, we have carried on a certain procession to the data when calculate the intercity tourism economic relation intensity value matrix by using "formula 1" (Hou, Liu and Yue, 2009). After repeated experiments, we choose 0.0026 as the network segmentation value, so the tourism economy network density in Xinjiang province is the ratio between the actual existence tourism economy relationship and the tourism economy relationship in theory. Moreover, we can get the tourism economic network structure map of Xinjiang province by using the software NetDraw (Figure 1).

According to the UCINET6.212 software, the whole tourism economic network density is 0.55. It indicates that when the splitting value is 0.0026, the ratio between actually existence whole network economic relationship and

tourism economy relationship is 0.55. In other words, when the whole network connection degree accounted more than 50% of the total network links, the overall characteristics of the network can be explained by it. The network structure graph directly reflects the characteristics of tourism economic network in Xinjiang province (Figure 1). The tourism economy relationship in the northern Xinjiang is closer than the Southern Xinjiang, and the whole network structure is imbalance. The reason may be that northern Xinjiang possesses high grade, high quality tourism resources, good infrastructure and geographical position. The network in Bazhou, Shihezi, Changji, Turpan and Urumqi are concentrated, the contact strength is obviously greater than other regions.

3.2 Centrality Analysis

The centrality of node degree is used to recognize the important node in the network and measure the position of nodes in the network. The node's degree can be divided into two categories: absolutely centrality and relatively centrality. The former only means to the degree of a node, and the latter is the standardization form. To put it simply, if a node directly connect with others, we always explain that this node have higher degree centrality. Relatively centrality means the standardization measure of an absolutely part centrality. It can conduct a compare among centrality of the same type center. However, there is only a table in this thesis. Therefore, absolutely centrality is able to reflect the network center of tourism economy in Xinjiang Province. (Table 1)

Table 1. The network center of tourism economy in Xinjiang Province

city	absolute center degree	relative center degree
Urumqi	14.000	100.000
Ili Kazakh Autonomous Prefecture	13.000	92.857
Changji Prefecture	12.000	85.714
Bazhou	12.000	85.714
Shihezi	11.000	78.571
Turpan	11.000	78.571
Aletai	11.000	78.571
Karamay	11.000	78.571
Akesu	9.000	64.286
Tacheng	9.000	64.286
Bozhou	9.000	64.286
Hami	8.000	57.143
Kashgar	7.000	50.000
Hetian	3.000	21.429
Basque	2.000	14.286

From the point of absolute center degree, Urumqi is in the core position, also can be said "the core point", it has multiple direct contact with other areas point. Ili Kazakh Autonomous Prefecture is also in the key position, that direct contact with other areas and only slightly inferior to Urumqi. Changji Prefecture, Bazhou; Shihezi, Turpan, Aletai, Kaeamay; Akesu, Tacheng, Bozhou; three groups have the same absolutely centrality, which means the number of directly contact are the same, too. Kashgar, Hetian and Kazakh Autonomous Prefecture are in the position of last three. We can draw a conclusion with network density (Table 1) that the lower the network connection degree is, the lower the centrality is.

3.3 Core-Periphery Analysis

Table 2. Xinjiang province tourism economic network core-periphery analysis structure

Analysis model	core	half edge	edge
core-periphery model	Urumqi, Turpan, Karamay, Shihezi, Changji Prefecture, Ili Kazakh Autonomous Prefecture, Bazhou, Aletai	Tacheng, Bozhou, Kashgar	Akesu, Hetian, Basque, Hami

Based on the data analysis, we find that the tourism economic network in Xinjiang province exists obviously core-periphery structure (Table 2). Urumqi and Turpan are in the core position of the network, forms the mainstay of tourism economic development of xinjiang, and have obvious radiation effect on peripheral area. Tacheng, Bozhou and Kashgar are in the half edge area. Its development is not only radiation driven by the core area, also certain radiation and diffusion on the edge area. Akesu, Hetian, Basque and Hami are located in the edge area of network, its development is radiation driven by the core area and half edge area, because it is far away from the core area, and the regional economic development level is not high.

4. Influence Factors

The competitiveness of regional tourism economic has closely related to tourism resources, the level of economic development, transport infrastructure, location conditions and tourism policies. These factors influence product portfolio of tourism district and the spatial organization of tourist routes, determine its spatial position and function in the whole network.

Firstly, it is the ability of tourism development. The status of sightseeing district in tourism economy network has a high correlation with its tourism development capability, especially in the tourism reception capacity, and it is more significant. Tourism resources are the basis for the development of tourism economy, but the tourism reception capacity can exhibit the tourist economy reception and transfer function of sightseeing district, and it has a significant influence on function of sightseeing district. Xinjiang products have been developing from the traditional tourism products to the modern tourism products, and the industrial integration and industrial correlation are significant. The influence of the traditional tourist resources to the city tourism development is relatively weak.

Secondly, it is the level of economic development. The GDP, per capita GDP and fixed asset investment of regional economic development level have significant affect on the function of sightseeing district in the tourism economic network. Industrial structure optimization gradually, the city economic level is improving, and the infrastructure is constantly improving. The rapid development of industrial tourism, agricultural tourism, tourism and rural tourism of all over Xinjiang embodies the fusion of tourism industry with the first industry and the secondary industry. Complete modern service sector, tourism related industries has high density, and development very fast, so it is easy to combine with tourism industry and form the tourism industry cluster, such as the Turpan Grape Valley, Tianshan Mountains in Urumqi, with tourism as the leading industry, improving their economic capability by Industry multiplier effect. Formal or informal exchanges and cooperation between enterprises provides a new environment for the development of tourism industry. The holding of Asia-Europe Expo has an important role in promoting city tourism industry economy and brand building. In additional, the government competence, and the promotion of tourism industry organization also directly affect the development of the tourism industry.

Thirdly, it is transportation condition. Highway, railway and aviation are the main transportation in Xinjiang. At present, 16 airports have been built and put into use in Xinjiang, which has the most airports in China, such as Kashi Airport, Korla Airport, Akesu Airport, and so on. Now, the airports have formed a three-dimensional traffic network which is closely linked and allocated reasonably. Traffic accessibility and commuting rate is higher than before, the space mobility of tourist flow has been improved.

Fourthly, it is the condition of city development. Inner city traffic index has strongly related to each index of tourism network. The traffic inside city is convenient, and to achieve a seamless docking with the external traffic.

They constitute Xinjiang comprehensive transportation system together, greatly enhance the flow of passengers in the inner city, and improve the organization operability of travel route. Afforestation of city is the foundation of city tourism development, and it is also the ecological security to the sustainable development of city economic society system. Good ecological landscape can create a good tourism environment, expand the tourist environmental capacity. It also conducive to the construction of tourism products, tourist experience, tourist revisit rate and the possibility of tourists word-of-mouth communication, and then realize the sustainable development of tourism.

5. Conclusion

In this paper, we research the Xinjiang tourism economic network structure characteristics and its variation characteristics from the macroscopic, which is based on the network method of relational view. It is helpful for clearing the status of cities in Xinjiang province in the tourism economy network and finding the overall structural characteristics of tourism economy network in Xinjiang province. As a result, it provides a theoretical basis for the sustainable and harmonious development of tourism in Xinjiang.

1) Through the construction of tourism economic relation intensity model of Xinjiang province, we establish the evaluation index system of network structure characteristics, and analyze the overall network structure characteristics by using the index from the social network method, such as network density, centrality and core-periphery models. We can find that economic network density in Xinjiang is not low, but imbalance phenomenon exists at the same time. Cities develop the contact channels of Tourism and cooperation way diversification, meanwhile, the connection in northern Xinjiang area is closer, but it is relatively loose in southern area, especially in Kashi, Kergez Autonomous Prefecture of Kizilsu and Hetian.

2) There is an analysis of the influencing factor of Xinjiang tourism economy network from four aspects, that is, tourism development ability, the level of economic development, traffic conditions and city development. Traditional tourism resources are the foundation of tourism economic development. The tourism reception capacity has become an important factor to promote the development of tourism. The high speed economic development, the continuous improvement of infrastructure and other hardware as well as capital, information and other software, so that they play a strong role in promoting the self organization evolution of tourism. The traffic condition is the network connected guarantee in high grade sightseeing district and low grade sightseeing district. City economy determines that the development level of city facilities, traffic conditions have different functions in the development of tourism.

3) Deficiency. This article is mainly about the analysis and description of the macro level in Xinjiang province, and the index of social network analysis is relatively simple, without any further analysis, so there are some limitations. We mainly consider the influence factors from the aspect of supply, lack of analysis on the influence factors of tourism demand. In the subsequent study, we should expand the scope of the study, and try to explore the influencing factors from the view of the relationship between the influencing factors relational network and tourism economic network, and then we can understand the tourism economic network more scientific.

Acknowledgements

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