

SPATIAL CORRELATION NETWORK OF CHINA'S ENERGY CONSUMPTION

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Ключевые слова: пространственная корреляционная сетевая модель; корреляционная связь; производство энергии; потребление энергии; энергоёмкость; валовой региональный продукт.

Keywords: spatial correlation network; correlation relationship; energy production; energy consumption; energy intensity; gross regional product.

Аннотация. В данной статье анализируется пространственная корреляционная сетевая модель энергопотребления. Корреляционные отношения энергопотребления в Китае можно представить в виде сетевой модели. Пространственная корреляционная сетевая модель показала, что увеличение числа взаимосвязей между провинциями будет способствовать снижению энергоёмкости и энергопотребления и увеличению валового регионального продукта.

Abstract. This paper studies the spatial correlation network of energy consumption and its effect. The correlation relationships of energy consumption in China show a typical network pattern. As for the spatial correlation network, an increasing number of correlation relationship among provinces would do good to reduce energy intensity and energy consumption and increase gross regional product.

Energy is an important material basis for human existence and social development. It is related to the national economy and the people's livelihood. In the pursuit of rapid economic development, energy consumption is increasing in all countries and regions. The energy pressure continues and increases. However, regional energy consumption does not exist independently. There could be complex correlation among the energy consumption in various regions. And spatial correlation network of energy consumption in certain regions gradually takes

shape. Various regions play different roles and occupy different positions in the spatial correlation network of energy consumption. The study on the impact of specific indicators related to the spatial correlation network of energy consumption on energy consumption, gross regional production and energy intensity in each region will guide us to effectively overcome the pressure on resources and to sustain a rapid growth and development of the regional economy [1, P. 332].

This paper studies the spatial correlation network of energy consumption among 30 provinces in China and analyses the characteristics of energy consumption in each province. According to a modified gravity model the correlation relationship of energy consumption between provinces is determined. The visualized relationship matrix is shown in the Figure 1. It can be seen that the spatial correlation of energy consumption in China shows as a typical network. And there exist differences in the positions occupied by each province in the spatial correlation network, which is also verified by the centrality of the spatial correlation network of energy consumption obtained based on the relationship matrix.

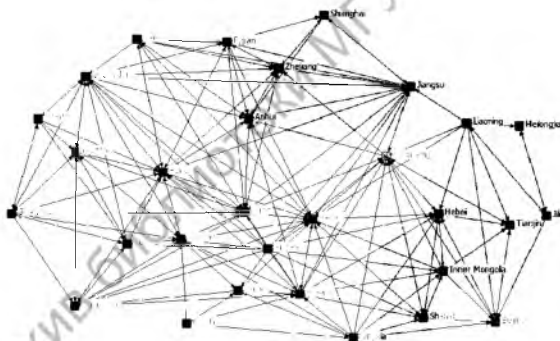


Figure 1. The special correlation network

Based on the spatial correlation network, the correlation between the centrality of each province and their energy intensity, energy consumption, and gross regional product is analyzed. The result is shown in the figure 2.

From the figure, we can learn that there is a significant correlation between the point centrality, betweenness centrality and closeness centrality of the spatial correlation network and the energy consumption, gross regional product and energy intensity of each province. According to the results of the correlation analysis, the degree of centrality of each province is correlated with the energy consumption, gross regional product, and energy intensity of the corresponding province. The total energy consumption is inversely pro-

portional to the point centrality of the spatial correlation network and directly proportional to the betweenness centrality and closeness centrality. The gross regional product is inversely proportional to the point centrality of the spatial correlation network and directly proportional to the betweenness centrality and closeness centrality. The energy intensity is inversely proportional to the point centrality of the spatial correlation network and directly proportional to the betweenness centrality and closeness centrality [3, P. 235].

Correlation	Eigenvalue	Wilks Statistic	F	Num D.F.	Denom D.F.	Sig.
0.656	0.757	0.458	2.459	9.000	58.560	0.019
Standardized Canonical Correlation Coefficients						
Set 1 Variables	Total Energy Consumption					-0.534
	Gross regional product					-0.597
	Energy intensity					-0.369
Set 2 Variables	Point centrality					0.951
	Betweenness centrality					-0.377
	Closeness centrality					-1.584

Figure 2. Canonical Correlations

Therefore, we could adjust the centrality of each province in the spatial correlation network for reducing the energy intensity of individual provinces or the country as a whole. For provinces with a low point degree centrality and a high energy intensity, their centrality in the spatial correlation network would be increased with an increasing number of correlation relationships. And then there would be a decrease about their energy intensity. We can also promote the reduction of national energy intensity by adjusting the betweenness centrality and closeness centrality of the spatial correlation network. An adjustment of centrality would conduct a more balanced and less hierarchical structure of spatial correlation network of energy consumption. Finally, the goal of decreasing the energy intensity in the whole country could be achieved [4, P. 9].

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