Dynamic model of rural governance system with the social-ecological framework

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Abstract: This paper constructs a dynamic measurement system based on the rural governance system, and uses the nuclear principal component analysis method to analyze the data of 25 provinces/autonomous regions/municipalities in China, including 146 districts, cities and counties. The power of rural governance system was evaluated; based on the calculation results of the mathematical model, a systematic analysis was carried out, and the gap between the factor loadings and factor dynamics of 46 indicators was compared, and it was helpful for Chinese government to promote the modernization of rural governance and promote the construction and development of rural areas.Under the development concept of rural revitalization, the infrastructure of intelligent technology, the overall social evaluation of rural governance, governance capabilities, scientific and technological support capabilities increase the trust of the people's livelihood and interests of rural governance.Under the synergy of multi-factors dynamics, it is of great significance to use the government, social capital and villagers as the carrier to solve the dilemma of rural development, build a harmonious rural life and rural ecology, and let the villagers live a happier life.

Key words: government; governance system dynamics; nuclear principal component analysis; indicator system

From the perspective of governance, this paper analyzes the elements and predicaments of current rural governance, and builds a rural governance mechanism, so as to adjust the interest relationship between multiple subjects in rural governance and promote the construction of rural areas. The construction of countryside needs to increase the government's attention, promote the infrastructure construction in rural areas, increase the introduction and training of information technology talents, and closely combine the agricultural product logistics supply with the increase of production and income. This paper will construct a dynamic measurement system of China's rural governance system from the perspective of combining theory and practice.On the one hand, it is to test the reliability of the measurement index system and model; on the other hand, through empirical evidence, government of different scales and levels can better understand the driving force and conditions of their own governance systems, so as to avoid the blindness of government in rural construction, so as to provide the government provide guidance and reference for paths and driving factors to realize the modernization of rural governance.

1. Measurement method of rural governance system dynamics

1.1 Kernel Principal Component Analysis (KCPA) Method

As a complex and dynamic system engineering, rural governance has many random and fuzzy influencing factors in the internal and external environment, so the structure and parameters of its system dynamic evaluation and model are nonlinear, and the kernel principal component analysis method can better describe rural areas. The governance system is a dynamic, high-dimensional complex change process. Through the measurement and identification of various index factors, a dynamic simulation of the rural governance system can be made, and the system dynamic data information can be transformed into decision-making information, and a dynamic model of the rural governance system can be constructed. Therefore, the kernel principal component analysis method is chosen in this paper.

1.2 Data sources

Under the overall leadership of the State Council Leading Group Office of Poverty Alleviation and Development, in 2018, the School of Government Management/Rural Governance Research Center of Beijing Normal University organized more than 500 researchers to conduct on-the-spot monitoring and research in 25 provinces (autonomous regions and municipalities). According to the total number and distribution of poverty-stricken counties in various provinces (autonomous regions and municipalities), the project team randomly selected about 10% of the poverty-stricken counties in proportion to 146 counties in total. Among them, Northwest China are only selected from 1 county due to the limited geographical conditions. For each county, the project team selected 5 villages with different levels of poverty based on factors such as the incidence of poverty and the population not lifted out of poverty. For each village, the project team randomly selected about 50 farmers to conduct on-site household inspections, including 35 registered poor households and 15 non-poor households. Finally, after data cleaning, we obtained 23,307 pieces of on-site verification of the archived and registered poor household data, including the location of the administrative village, the number of poor people, production and living conditions, cooperative operation, village attributes and other poor village information, as well as the name of the household head and the number of family members. , labor force population, attributes of poor households, causes of poverty, poverty alleviation measures, income, traffic conditions, housing conditions and other information.

1.3 Construction of the Dynamic Measurement Model of Rural Governance System with social-ecological framework

According to Ostrom, social-ecological systems can be divided into different subsystems, and these subsystems can be further broken down into different levels. The key to analyzing social-ecological systems lies in how we analyze the complexity of multi-level ecosystems in different temporal and spatial scales. Many previous theories believed that the main reason for the tragedy of the commons was the lack of a clear definition of property rights, which led them to give the same policy advice for all issues related to the tragedy of the commons—that is, to solve the problem of property rights completely. Practice has proved that these policy recommendations often lead to failure, which is

what we often call the "panacea" tragedy. Ostrom emphasized that we must deal with complexities scientifically, rather than simply remove them from the system .

Then, a very important question is whether resource users are willing to spend time and energy to change the "tragedy of the commons"? Harding has shown earlier that without restrictions, users of public resources will forever be stuck in a state of excessive use of public resources, which is difficult to change. If this conclusion is supported by empirical evidence, the social-ecological system analysis framework established by Ostrom is unnecessary . In fact, scholars in many disciplines have found that many public resource users have designed and implemented low-cost management systems and successfully increased the sustainable development capacity of resource systems. Secondary variables have positive or negative effects on the possibility of resource users' self-governance.

2. Research results of the dynamics of rural governance system

2.1 Kernel principal component analysis results

Different factors affecting rural governance Xi have different dimensions, and the data needs to be standardized before comprehensive measurement can be made. The method of data standardization: X*=(X - E(X))D(X), where E(X) is the sample mean and D(X) is the sample variance. After the standardization of the sample data, 32 index data of 628 samples were obtained, and the matrix A was obtained. The selected kernel function was the Gaussian radial basis kernel function, and the kernel matrix K was obtained by using SPSS to calculate the inner product of the selected kernel function (as shown in the table below). 2), the eigenvalues of the kernel matrix are calculated by SPSS, the eigenvalues are sorted, and the cumulative variance contribution rate is calculated, see Table 1.

Table 1 Total variance, eigenvalue, contribution rate, and cumulative contribution rate explained by principal component variables (obs=2453)

Factor	Variance	Difference	Proportion	Cumulative
Factor1	4.952	1.025	0.108	0.108
Factor2	3.928	1.028	0.085	0.193
Factor3	2.900	0.058	0.063	0.256
Factor4	2.842	0.344	0.062	0.318
Factor5	2.498	0.143	0.054	0.372
Factor6	2.355	0.062	0.051	0.423
Factor7	2.293	0.433	0.050	0.473
Factor8	1.860	0.261	0.040	0.514
Factor9	1.599	0.389	0.035	0.548
Factor10	1.210	0.002	0.026	0.575
Factor11	1.208	.	0.026	0.601

Factor analysis/correlation Number of obs = 2,453
Method: principal-component factors Retained factors = 11
Rotation: orthogonal varimax (Kaiser off) Number of params = 451

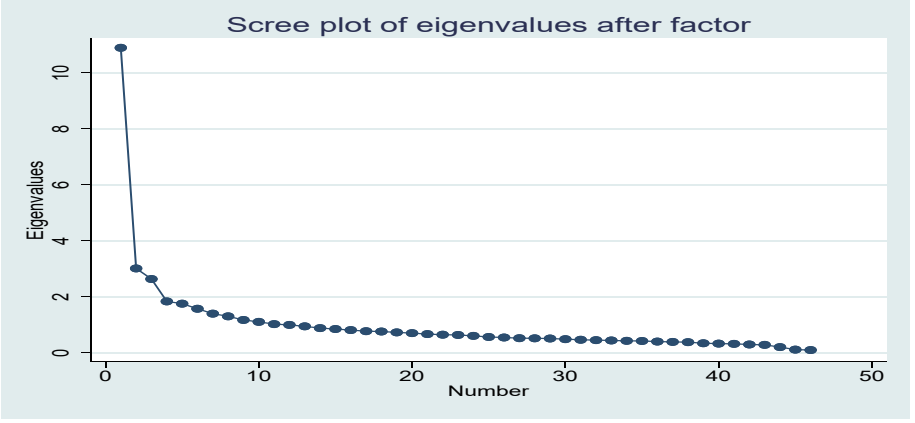

Figure 1 Distribution of factor loading scores

2.2 Significance analysis of the model

Based on the calculation of sample data, this paper constructs the main factor index system of rural governance system dynamics through the kernel principal component analysis method.

2.3 Measurement results and model analysis

Factor 1: According to the measurement results of the trust degree of goverment in rural governance, the highest factor score is 0.84, the lowest factor score is -0.22, and the average factor score is 0.197. It is necessary to improve the trust of rural banks, hospitals, courts, and public security departments. Therefore, rural development should focus on the integration of "Internet + rural functions" and build a rural model of public services. The rural functional system includes public security emergency response system, public service system, economic analysis system, and public opinion analysis system to improve the government work satisfaction of villagers.

Factor 2: From the measurement results of the public service level of rural governance, it can be seen that there are large differences in the level of public service of rural governance among government. The highest factor score is 0.773, the lowest factor score is -0.2, and the average factor score is 0.033. With the advancement of rural revitalization, rural transportation, rural environment, and rural public issues have become more and more prominent. Rural governance should firstly build a rural public service system, focusing on promoting the construction of " transportation", " health" and " education" projects.

Factor 3:From the evaluation results of the trust degree of society in rural governance,the highest factor score is 0.836, the lowest factor score is -0.25, and the average factor score is 0.114. It is necessary to improve the trust of group organizations such as workers, youth and women, the trust of charities, the trust of news media, and the trust of insurance companies. Emphasize the development of "Internet + characteristic industries", combine rural governance with its own industrial characteristics and location advantages, and promote the economic development of government, social progress, and industrial transformation and upgrading. "Internet + characteristic industry" mainly combines the Internet and Internet of Things technology with regional industrial development to improve the intelligence level of the industry.

Factor 4:From the evaluation results of infrastructure in rural governance, it can be seen that the highest factor score is 0.681, the lowest factor score is -0.21, and the average factor score is 0.118. It is necessary to improve the driving force of core factors such as district and county government trust and township government trust. For example, connecting medical insurance, public transportation, libraries and other networks to improve convenient and efficient public services for villagers. Solving the problems of agriculture, rural areas and rural areas is the core of it. How to strengthen the livability, business aptitude and harmonious development of rural areas, improve the benefits of rural management and services, and enhance villagers' awareness Happiness is the core of rural governance and development. At present, the prominent problems faced by most villages are the problems of rural transportation and people's livelihood.

3 Conclusion

The government is the administrative body that promotes rural governance, that is, on the basis of the innovative application of a new generation of information technology (Internet of Things, cloud computing, big data, etc.).The goal is to achieve the deep integration of government economy and rural resources. Under the development concept of rural revitalization, with the support of a new generation of information technology, how can the infrastructure of intelligent technology, the overall social evaluation of rural governance, governance capabilities, scientific and technological support capabilities, and the trust of the people's livelihood and interest departments in rural governance increase? Under the synergistic effect of factors, it is of great significance to use the government, social capital and villagers as the carrier to solve the dilemma of rural development, build a harmonious rural life and rural ecology, and let the villagers live a happier life.

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