

Research on the Evaluation Index System of the Implementation Effect of Rural Revitalization Strategy

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Abstract

At present, the imbalance in China's economic development is still conspicuous, and in order to achieve high-quality development, the rural revitalization strategy must be vigorously promoted. Based on the actual development of China, this paper builds an evaluation system for rural revitalization and measures it using the entropy-weighted TOPSIS method. The empirical results show that China's rural revitalization level is low and the effect of rural revitalization needs to be strengthened; there are regional differences in the level of rural revitalization in China; each region performs differently in terms of the scores of rural revitalization, so should local conditions be taken into account when different provinces making policies. Therefore, different provinces should find their own shortcomings to solve the dilemma during the process of pursuing rural revitalization.

Keywords

China; Rural Revitalization; Entropy TOPSIS Method.

1. Introduction

Since China has entered a new era, the contradiction between the growing needs of people for a better life and the unbalanced and insufficient development is most prominent in the countryside of China. In order to build a moderately prosperous society and a comprehensive socialist modernization power, rural areas confront the most arduous task. Rural prosperity contributes to the development of the nation. It is of great importance to implement the rural revitalization strategy unswervingly. Rural revitalization is the basis for building agricultural modernization, the cornerstone of beautiful countryside construction, the inheritance of excellent Chinese traditional culture, the solid foundation of modern social governance pattern, and an important way to achieve common prosperity.

With the accelerated urbanization process, capital, manpower, land and other factors are gathering in the cities, and the vast number of rural villages are decaying, and the problems of hollowing out of the countryside and aging of the population have become noticeable. Resolving the "agriculture, the countryside and farmer-related issues" is the top priority for China, and the comprehensive realization of rural revitalization is the goal of the next 100 years. Accordingly, it is necessary to scientifically design an evaluation system for rural revitalization to measure the level of rural revitalization in different provinces, so as to recognize the problems and shortcomings of rural revitalization in different provinces and help them break through bottlenecks and achieve high-quality development.

2. Literature References

In recent years, Chinese scholars have conducted many studies on the evaluation of rural revitalization. Jia Jin and Li Xuefeng et al [1] used the entropy-weighted TOPSIS to build an evaluation system for rural revitalization based on the "20-word general requirements" of rural revitalization; Xu Lame et al [2] used the factor analysis model to measure the level of rural development in China and used Moran's I index to analyze its spatial correlation; Chen Junliang,

Lin Ying et al [3] evaluated the rural revitalization level of 40 cities in the Yangtze River Delta region of China based on factor analysis; Chen Junliang, Shi Huanhuan [4] measured the rural revitalization level of six provinces in East China using the entropy-weighted TOPSIS method, and the results showed that Jiangsu, Zhejiang, Shandong and Fujian performed better than that of Anhui and Jiangxi; Lv Chengchao, Cui Rui [5] analyzed the degree of regional differences and polarization differences of rural revitalization in China.

To sum up, the construction of the index system of rural revitalization mainly focuses on the general requirements, which is ‘prosperous industry, ecological livability, civilized countryside, effective governance and rich living’, and the selection of secondary and tertiary indicators varies with the actual development of different regions. Based on the fundamental connotation of rural revitalization, this paper constructs the evaluation system of rural revitalization to objectively reflect the current situation of rural revitalization development in China and analyze the existing problems, so as to facilitate different regions to classify and execute policies to fully realize rural revitalization.

3. Research Program Design

3.1. Evaluation Method and Model Selection of Rural Revitalization

The Entropy TOPSIS method is used to measure the level of rural revitalization in this paper. The entropy-weighted TOPSIS method integrates the entropy-weighted method and TOPSIS method, which is more objective compared to the traditional TOPSIS method. The entropy weight method, as an objective assignment method, can reduce the bias caused by subjective assignment; While the TOPSIS method, as a common multi-objective analysis method, is suitable for finding the best solution in the comparison of multiple solutions. The entropy TOPSIS method utilizes the entropy method to obtain the objective weights of evaluation indexes, and then uses the TOPSIS method to approximate the ideal solution to calculate the score and rank of evaluation objects.

Step 1: Construct the initial decision matrix A. Suppose there are m evaluation indicators to evaluate n objects, and a_{ij} is the j -th indicator of the i -th object, then the initial decision matrix is expressed as :

$$A = (a_{ij})_{n \times m} \tag{1}$$

Step 2: Normalize the original data to obtain the standard matrix $(b_{ij})_{n \times m}$, for the positive indicator, the formula is

$$b_{ij} = \frac{a_{ij} - \min(a_{ij})}{\max(a_{ij}) - \min(a_{ij})} \tag{2}$$

for the negative indicator, the formula is

$$b_{ij} = \frac{\max(a_{ij}) - a_{ij}}{\max(a_{ij}) - \min(a_{ij})} \tag{3}$$

Step 3: Since the entropy weight method involves logarithmic operations when calculating the weights, thus the matrix $(b_{ij})_{n \times m}$ is translated to the matrix $(c_{ij})_{n \times m}$, where

$$c_{ij} = b_{ij} + 0.1 \tag{4}$$

Step 4: Determine the indicator weights and get the weight matrix $(p_{ij})_{n \times m}$, where

$$p_{ij} = \frac{c_{ij}}{\sum_{i=1}^n c_{ij}} \tag{5}$$

Step 5: Determine the entropy value, the entropy value of the i indicator e_i is calculated by the formula

$$e_i = -\frac{1}{\ln n} \sum_{j=1}^n p_{ij} \ln p_{ij} \tag{6}$$

Step 6: Calculate the entropy weight, and the formula for the weight of the i indicator w_i is

$$w_i = \frac{1 - e_i}{m - \sum_{i=1}^m e_i} \tag{7}$$

Step 7: Determine the weighted normalization matrix $(r_{ij})_{n \times m}$, where $(r_{ij})_{n \times m} = (w_i c_{ij})_{n \times m}$ (8)

Step 8: Calculate the positive solution and the negative solution

$$r^+ = \max\{r_{i1}, r_{i2}, \dots, r_{im}\} \tag{9}$$

$$r^- = \min\{r_{i1}, r_{i2}, \dots, r_{im}\} \tag{10}$$

Step 9: Calculate the Euclidean distance of the i evaluation object from the positive solution and the negative solution.

$$d_i^+ = \sqrt{\sum_{j=1}^m (z_j^+ - z_{ij})^2} \tag{11}$$

$$d_i^- = \sqrt{\sum_{j=1}^m (z_j^- - z_{ij})^2} \tag{12}$$

Step 10: Calculate the score.

$$S_i = \frac{D_i^-}{D_i^- + D_i^+} \tag{13}$$

3.2. Construction of the Rural Revitalization Index System and Data Sources

The rural revitalization index system is based on the five dimensions of "prosperous industry, ecological livability, civilized countryside, effective governance, and affluent living". On this basis, 5 first-level indicators, 13 secondary indicators and 29 tertiary indicators are proposed based on the actual situation of China, and the final indicator system is shown in Table 1.

4. Empirical Analysis of the Level of Rural Revitalization of China

The results of the development level of rural revitalization in China are shown in Table 2, and the following three conclusions are obtained after analysis.

The development level of rural revitalization in China is low and uneven. The average value of the comprehensive index of rural revitalization of 31 provinces in China in 2020 is 0.3070, and the median value is 0.3138, with 16 provinces having scores above the average. Among the 31 provinces, the province with the highest comprehensive score for rural revitalization development is Jiangsu with 0.5218, and the province with the lowest comprehensive score is Liaoning province with 0.2125. The highest score is 2.46 times the lowest score, indicating that the unbalanced development of rural revitalization is prominent in China.

The development level of rural revitalization in China shows regional differences. The development level of rural revitalization among regions in China is ranked in descending order according to the scores of eastern region (0.3571), central region (0.3120), western region (0.2831) and northeastern region (0.2584).

Table 1. Index System of Rural Revitalization

first-level indicator	Secondary indicators	Tertiary indicators	Nature of Indicator
Industrial prosperity	Comprehensive agricultural benefits	Grain yield per unit area (t/ha)	+
		Total output value of agriculture, forestry, animal husbandry and fishery (yuan)	+
	Degree of agricultural modernization	Total power of agricultural machinery per unit area (kW/ha)	+
		Effective irrigated area of arable land (thousand hectares)	+
	Degree of agricultural industrialization	The proportion of the added value of the primary industry to the total regional output value (%)	+
	Ecological Livability	Natural Environment Protection	Fertilizer use per unit of arable land area (tons/ha)
Fertilizer use per unit of arable land area (tons/ha)			-
Greening coverage (%)			+
Optimization of living environment		Road area per capita (square meters)	+
		Sewage treatment rate (%)	+
		Park green space per capita (square meters)	+
		Water supply penetration rate (%)	+
		Gas penetration rate (%)	+
Countryside Civilization	Quality of rural education	Illiterate population as a proportion of population aged 15 and over (%)	-
		Percentage of full-time teachers in rural elementary school (%)	+
	Ideological and moral construction	Education, culture and entertainment consumption as a proportion of consumer spending (%)	+
	Cultural Facilities Construction	Radio and television coverage (%)	+
		Number of village clinic staff per thousand people(pcs)	+
		Number of cultural stations in townships per 10,000 people (pcs)	+
Effective governance	Governance efficiency	Agricultural labor productivity (yuan/person)	+
		Village committee members as a proportion of village population (%)	+
	Social Security	Percentage of rural minimum subsistence guarantee population (%)	-
		Average standard of minimum living security for rural residents (yuan)	-
Living well	Farmers' income level	Per capita disposable income of rural residents (yuan)	+
		Income ratio between urban and rural residents	-
	Farmers' quality of life	Number of computers per 100 households (units)	+
		Number of cars per 100 households (units)	+
	Farmers' consumption level	Engel's coefficient of rural residents (%)	-
		Per capita consumption expenditure of rural residents (yuan)	+

Among them, the eastern region occupies 6 provinces in the top 10 provinces of the country, and the western region occupies 7 provinces in the bottom 10 provinces of the country, which shows obvious regional differences.

The development level of rural revitalization of each region is correlated with its economic development level. From the results of the comprehensive score in Table 2, it can be seen that the comprehensive score of rural revitalization development level in economically developed regions is also higher, such as Jiangsu Province and Zhejiang Province; The comprehensive score of the level of rural revitalization development in regions with less economic development, such as Gansu Province and Qinghai Province, is relatively lower. This indicates that urban development has an obvious driving effect on rural revitalization, and the coordinated development of urban and rural areas should be included in the consideration of rural revitalization policy.

Table 2. Index Scores of Rural Revitalization by Provinces in 2020

Region	Province	Score	National Ranking	Region	Province	Score	National Ranking
Eastern Region	Jiang Su	0.522	1	Western Region	Tibet	0.436	4
	Fujian	0.513	2		Chong Qing	0.340	10
	Shandong	0.441	3		Guang Xi	0.315	15
	Guangdong	0.394	5		Shikawa	0.301	17
	Shanghai	0.378	7		Xinjiang	0.299	18
	Tianjin	0.362	8		Inner Mongolia	0.281	21
	Zhejiang	0.339	11		Qinghai	0.257	23
	Hebei	0.336	13		Ningxia	0.241	25
	Beijing	0.314	16		Yunnan	0.239	26
	Hainan	0.293	19		Shaanxi	0.237	27
Central Region	Anhui	0.378	6	Northeast Region	Gan Su	0.231	28
	Henan	0.354	9		Guizhou	0.219	30
	Hubei	0.339	12		Heilongjiang	0.332	14
	Hunan	0.291	20		Jilin	0.230	29
	Jiangxi	0.262	22		Liaoning	0.2125	31
	Shanxi	0.248	24				

5. Conclusion

This paper constructed an evaluation index system for rural revitalization of China, including 5 primary indicators, 13 secondary indicators and 29 tertiary indicators, and measured the development level of rural revitalization of China by using the entropy-weight TOPSIS method. The development level of rural revitalization in China is low and shows obvious regional differences. According to the results of the comprehensive rural revitalization score, 16 provinces have scored more than the average value, but the national level of rural revitalization development is low. The score of rural revitalization in the eastern region, central region, western region and northeastern region decreases in order.

In order to promote the full realization of rural revitalization in China, promote the integrated development of urban and rural areas, and achieve high-quality economic development, this paper makes the following recommendations.

The endogenous power should be continuously stimulated. Enhance the level of agricultural modernization, vigorously develop ecological agriculture and special agriculture, support the development of agricultural products processing industry, and promote the integrated development of different industries in rural areas. Establish the concept of green development, promote the establishment of horizontal ecological protection compensation mechanisms, and strengthen ecological environmental protection. Improve the institutional mechanism of rural governance, strengthen the autonomous function of village-level organizations, strengthen legal education and legal aid in rural areas, and resolve social conflicts in rural areas in accordance with the law. Improve the construction of rural infrastructure and promote the treatment of rural domestic garbage and sewage and toilet revolution.

The external driving force should be continuously strengthened. The governments should optimize the structure of rural industries, deepen the supply-side structural reform in rural areas, and promote the quality and efficiency of agriculture; In addition, finance should play the role of resource allocation to guide funds to invest in the "agriculture, the countryside and farmer-related" areas and increase investment in rural fixed assets.

The coordinated development of regional rural revitalization should be promoted. There are obvious regional differences in the current level of rural revitalization in China. Governments should deeply analyze the dynamic mechanism of regional rural revitalization and build the implementation path of rural revitalization according to local conditions.

Acknowledgments

Social and Economic Statistics Research Project of Shanxi Province in 2021 (KY[2021]025).

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