Research on Comprehensive Evaluation of Rural Governance Modernization under the Background of Rural Revitalization

-- Take the "Three Provinces and One City" in the Yangtze River Delta as an Example

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Abstract

Promoting the modernization of rural governance is the organizational guarantee of rural revitalization. Based on the data related to the modernization of rural governance in the "three provinces and one city" in the Yangtze River Delta from 2010 to 2019, this article uses the entropy weight method to comprehensively evaluate the modernization of rural governance in the "three provinces and one city" in the Yangtze River Delta from five aspects of "industrial prosperity", "ecological livability", "village civilization", "effective governance" and "life affluent". It finds that: The comprehensive score of the modernization of rural governance in the Yangtze River Delta increased year by year. The modernization level of rural governance in Shanghai is much higher than that in other regions. Jiangsu and Zhejiang are close to each other. Anhui has a big gap with the other three regions. At the same time, the overall score of Shanghai and other places is high, but the individual score of ecological livability is low.

Keywords

Rural Revitalization; Rural Governance; Modernization of Rural Governance.

1. Introduction

Promoting the modernization of national governance proposed by the Third Central Committee of the Eighteenth Central Committee of the Communist Party of China and implementing the rural revitalization strategy proposed by the 19th National Congress of the Communist Party of China is a major strategic deployment made by the party and the state in the new era in response to China's current situation [1] ,The modernization of rural governance is an important part of the above two.The "14th Five-Year Plan" released in March 2021 proposes to further improve the comprehensive development level of the Yangtze River Delta[2], and the strategic position of the Yangtze River Delta has been further clarified.However, the current rural governance modernization still suffers from the inadequate understanding of the economic situation, policies and regulations by the grassroots managers, the quality of villagers need to be further improved, the serious pollution of the rural environment, and the deterioration of the living environment, which affect the modernization of rural governance.

As an academic term, the concept of " rural governance " does not have a long history.In the 1990s, the term "governance" emerged in many fields such as economics, public management, sociology, and political science.According to the definition of "Our Global Partners" published by the Global Governance Council in 1995, different from "ruling", governance is the sum of many ways in which various public or private individuals or institutions manage their common affairs.

In recent years, the modernization of rural governance has received more and more attention from scholars. The current research mainly focuses on the following three aspects. The first is to analyze the meaning, subject and content of rural governance and modernization of rural governance.For example: Li Bingbing and Wang Shuguang (2014) proposed that rural governance is the management of rural social and public affairs to maintain the orderly operation of the village [7],Li Sanhui (2021) believes that the modernization of rural governance includes the modernization of rural governance system and the modernization of rural governance capabilities as its two basic connotations[8];

Wiskerke (2003) proposed to take environmental cooperatives as the main body of the rural governance model [9],Kong Fanjin (2017) pointed out that villagers are the main body of rural governance, and they should cultivate new types of villagers with culture and quality, who not only understand technology but should also be able to manage[10];Dai Yuqin (2015) proposed that the modernization of rural governance should scientifically regulate the operating elements and operating principles of the three main powers in the current rural political field. The three powers include township administrative power, village party branch political power, and village committee social autonomy power. [11].The second is to analyze and explore the historical evolution, current dilemma and realization path of rural governance modernization, Such as: Ding Zhigang and Wang Jie (2019) systematically combed the historical evolution of China's rural governance over the past 70 years, and deeply analyzed the logical thinking of China's rural governance [12];Wu Chunjie (2019) pointed out that in the process of rural governance modernization, there are problems such as cultural tradition constraints, institutional environmental constraints, weak awareness of democracy and the rule of law, and insufficient system supply [13],Lu Dewen (2019) pointed out that the modernization of rural governance faces challenges such as the involutes and depoliticization of rural governance[14]; Ning Huazong (2021) believes that the overall direction of the modernization of the rural governance structure is to establish a "one core and multiple" composite network structure that organically combines the "one core leadership" and the "multiple action centers". Specifically, it is promoted through the path of "Strong County-Strong Town-Building Society"[15], Chu Minghao and Liu Jianping (2021) pointed out that in the process of bridging the gaps in township governance by the first-line governance of townships, the township governance system was activated. At the same time, the interaction between the first-line governance and the township system achieved a balance between institutionalization and effectiveness, stability and flexibility. A feasible path for the modernization of rural governance [16]. The third is to evaluate the quality of rural governance modernization. Zhang Lin and Jiang Nan (2021) analyzed the rural modernization system in Heilongjiang as the research object and found that the rural modernization system has been significantly improved. However, due to the emergence of new problems such as rural population outflow and insufficient financial support, rural modernization has developed slow down,Chen Junliang et al. (2021) used factor analysis and the TOPSIS method to measure the level of rural development in the Yangtze River Delta.

In summary, the current research literature on rural governance modernization mainly focuses on theoretical analysis of connotation, historical evolution, and existing problems. A comprehensive evaluation is mainly conducted from the perspective of rural revitalization and agricultural and rural modernization.There are few literatures on the evaluation index system and quality evaluation of rural governance modernization, while the quality evaluation of rural governance modernization in the Yangtze River Delta region is rare.Therefore, this article will conduct a quantitative study on the modernization of rural governance in the "three provinces and one city" of the Yangtze River Delta from five aspects: "industrial prosperity", "ecological livability", "village civilization", "effective governance" and " life affluent ".It provides a reference for improving the modernization ability of rural governance in the Yangtze River Delta and promoting rural revitalization.

2. Selection of the Evaluation Index System for the Quality of Rural Governance Modernization

The modernization of rural governance is an important part of the modernization of national governance [3] and an important goal of rural revitalization [4]. On the basis of combing the existing literature, this article establishes 29 indicators from the five dimensions of "industrial prosperity", "ecological livability", "village civilization", "effective governance" and "life affluent", which constitute the village comprehensive evaluation index system for governance modernization, specific indicators are shown in Table 1.

3. The Quality Measurement Method of Rural Governance Modernization

Due to the analytical hierarchy process (AHP) and expert scoring method, the index weights determined by methods are highly subjective. In order to ensure scientific and effective index weighting, this article uses the entropy weight method to determine the weight of each index. For a certain index, the smaller the index information entropy value, the higher the degree of variation, and the greater the amount of information contained in the index [5], the more important the index, and the greater its corresponding weight. Then combined with the standardized results, the comprehensive scores of rural governance modernization in each region are obtained. The specific steps for calculating weights and comprehensive scores using the entropy method are as follows:

Firstly, use formula (1) to calculate the proportion of the j-th index in the i-th area in the index:

$$\text{b}(i,j) = \frac{s(i,j)}{\sum\limits_{i=1}^{m} s(i,j)} \qquad (i=1,2,3...m; \, j=1,2,3...n) \tag{1}$$

Secondly, use formula (2) to analyze the index entropy value h_j of the j-th term:

$$h_j = -\frac{1}{\ln(n)} \sum\limits_{i=1}^{m} b(i,j) * \ln(b(i,j)) \qquad (i=1,2,3...m) \tag{2}$$

Then use formula (3) to calculate the weight w_j of the j-th index:

$$w_j = \frac{1-h_j}{\sum\limits_{j=1}^{n}(1-h_j)} \qquad (j=1,2,3...n) \tag{3}$$

Finally, use formula (4) to calculate the final comprehensive score value Z for each region:

$$Z = \sum\limits_{j=1}^{n} w_j * s(i,j) \qquad (i=1,2,3...m; \, j=1,2,3...n) \tag{4}$$

Table 1. Comprehensive Evaluation Index System of Rural Governance Modernization

Criterion Layer	First Level Indicators	Secondary Indicators	Unit	Direction	Weights
Industrial Prosperity	Agricultural Production Conditions	Cultivated Land Area Per Capita	person/hectare	positive	0.0389
		Total Power of Agricultural Mechanization Per Hectare of Arable Land	kilowatts/hectare	positive	0.0216
		Agricultural Informationization Degree	%	positive	0.0133
		Effective Irrigation Rate of Rural Sown Land	%	positive	0.0205
	Agricultural Production Capacity	Per Capita Grain Output Per Unit Area	kg/(hectare·person)	positive	0.1282
		Primary Industry Output Value Per Unit Area Per Capita	yuan/(hectare·person)	positive	0.0844
Ecological Livability	Ecological Environment	Forest Cover Rate	%	positive	0.0679
		Pesticide Usage Per Hectare	kilograms/ha	reverse	0.0129
	Living Environment	The Penetration Rate of Rural Sanitary Toilets	%	positive	0.0178
		Biogas Consumption Per Person in Rural Areas	cubic meter/person	positive	0.0271
		Solar Energy Usage Per Person in Rural Areas	square meters / person	positive	0.0186
		Road Hardening Rate	%	positive	0.0133
Village Civilization	Public Cultural Development	Comprehensive Population Coverage Rate of Rural TV Programs	%	positive	0.0093
		Number of Cultural Stations in Townships Per Unit Area	per ten thousand hectares	positive	0.0515
	Cultural Education Construction	Number Of Primary and Secondary Schools Borne by Each Teacher	people	reverse	0.0137
		Proportion of Villagers' Expenditure on Education, Entertainment and Culture	%	positive	0.0206
Effective Governance	Human Capital Level	Number of Personnel in Each Management Agency of Village and Town Construction	people	positive	0.0703
		Proportion of Full-Time Personnel in Construction Management Personnel of Villages and Towns	%	positive	0.0201
	Governance Effect Level	Income Ratio of Urban and Rural Residents	-	reverse	0.013
		Consumption Ratio of Urban and Rural Residents	-	reverse	0.0164
		Proportion of All Administrative Villages That Have Carried Out Village Renovation	%	positive	0.0234
		Proportion of Top 100 Counties in All Counties	%	positive	0.0644
Life Affluent	Villagers' Income Level	Engel Coefficient of Rural Households	%	reverse	0.0214
		Per Capita Security Expenditure of Rural Residents with Minimum Living Security	yuan / person	positive	0.0319
	Villager's Quality of Life	Housing Area Per Capita	square meters per person	positive	0.0451
		Number of Villages with Clinics in Administrative Villages	%	positive	0.0296
		Village Clinic Staff Per 1000 Agricultural Population	people	positive	0.0762
		Number of Computers Per 100 Rural Households	set	positive	0.0185
		Number of Mobile Phones Per 100 Rural Households	unit	positive	0.0101

4. Empirical Analysis of the Quality of Rural Governance Modernization

4.1. Data Source and Processing

In 2019, the "Outline of the Yangtze River Delta Regional Integrated Development Plan" (hereinafter referred to as the "Planning Outline") was issued by the State Council . The "Planning Outline" elevates the Yangtze River Delta region to a national strategic level, and stipulates that the Yangtze River Delta is the scope of "three provinces and one city" in Shanghai, Jiangsu, Zhejiang and Anhui[6].Therefore, this article collects the rural governance modernization data of the "three provinces and one city" in the Yangtze River Delta in the past ten years for a comprehensive evaluation and analysis of rural governance modernization .The relevant data on agricultural production conditions are extracted from the 2011-2020 "China Statistical Yearbook", "China Rural Statistical Yearbook" and EPS "Macroeconomic Database". The relevant data on agricultural production conditions, living environment, public cultural development, cultural and educational construction, human capital level, governance effect level, villagers' income level and villagers' quality of life are derived from the EPS "China Three Rural Database" and "Urban and Rural Construction Database". The data on the ecological environment comes from the EPS "China Environmental Database". In 2018 and 2019, the cultivated land area, Internet penetration rate, and the penetration rate of rural sanitary toilets are missing. This article uses the linear trend estimation method of adjacent points to fill in the missing values. Part of the data is obtained by processing the original data.

Because the units and orders of magnitude of each index are different, it is impossible to directly calculate the comprehensive score. Therefore, this article conducts dimensionless processing on the original data. For the benefit index, the larger the index value, the better the index benefit. Therefore, formula (5) is used for dimensionless processing.

$$s(i, j) = \frac{S(i, j) - m(S(i, j))}{M(S(i, j)) - m(S(i, j))} \tag{5}$$

For cost-based indicators, the smaller the indicator value, the better the benefit. Therefore, use formula (6) to process the data dimensionless.

$$s(i, j) = \frac{M(S(i, j)) - S(i, j)}{M(S(i, j)) - m(S(i, j))} \tag{6}$$

$S(i, j)$ represents the j-th index value in the i-th area, $M(S(i, j))$ represents the j-th index maximum value, and $m(S(i, j))$ represents the j-th index minimum value.

4.2. Modernization of Rural Governance

Firstly, this article uses the entropy method to calculate the weights of various indicators based on standardized data. The calculation results are shown in Table 1. The top 5 indicators are: per capita grain output per unit area (0.1282), primary industry output value per unit area per capita (0.0844) , the number of village clinic staff per 1000 agricultural population (0.0762), the number of personnel in each management agency of village and town construction (0.0703), and forest coverage rate (0.0679).Among them, the indicators of agricultural production capacity in the dimension of industrial prosperity all belong to the top 5 indicators, indicating that the improvement of agricultural production capacity plays an important role in the improvement of the modernization of rural governance. Secondly, this article uses standardized data and indicator weights to obtain comprehensive scores for rural governance modernization of the "three provinces and one city" in the Yangtze River Delta from 2010 to 2019.Then, under

the condition that the time degree is 0.3, the non-linear programming of the minimum variance method is used to obtain the time weight, and the comprehensive score of each year is weighted twice to obtain the comprehensive index and ranking of rural governance modernization in each region, as shown in Table 2.

Table 2. Comprehensive Scores and Rankings of Rural Governance Modernization in the "Three Provinces and One City" in The Yangtze River Delta from 2010 to 2019

City \ Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Composite Index	Rank
Shanghai	0.5365	0.5487	0.5597	0.5829	0.5683	0.5694	0.5718	0.5648	0.5542	0.6108	0.5744	1
Jiangsu	0.2883	0.3163	0.3445	0.3662	0.4028	0.4059	0.4111	0.4265	0.4461	0.4728	0.422	2
Zhejiang	0.3511	0.3644	0.3854	0.4009	0.3947	0.401	0.3896	0.4101	0.4371	0.4403	0.4128	3
Anhui	0.1496	0.1594	0.187	0.2012	0.2294	0.2349	0.2505	0.2763	0.3088	0.3371	0.2698	4

From an overall point of view, the comprehensive score of rural governance modernization in the Yangtze River Delta from 2010 to 2019 has shown an upward trend year by year, but there are obvious differences in regions: Shanghai's comprehensive score of rural governance modernization reached 0.5744, which was much higher than other regions and ranked first; Jiangsu and Zhejiang score relatively close, Jiangsu is 0.0092 higher than Zhejiang; Anhui has the lowest comprehensive index of rural governance modernization, only reaching 46.971% of Shanghai.

Table 3. Comprehensive Index and Ranking of Each Dimension of "Three Provinces and One City"

	industrial prosperity	Rank	ecological livability	Rank	village civilization	Rank	effective governance	Rank	life affluent	Rank
Shanghai	0.1889	1	0.07	3	0.0653	1	0.1187	2	0.1315	1
Jiangsu	0.0803	2	0.0798	2	0.0299	4	0.1284	1	0.1036	2
Zhejiang	0.0735	3	0.1214	1	0.0303	2	0.0947	3	0.0929	3
Anhui	0.0705	4	0.0551	4	0.0302	3	0.0434	4	0.0705	4

Seen from different dimensions, in terms of industrial prosperity, Shanghai's industrial prosperity index is 0.1889, ranking first. However, the cultivated land area per capita and the total power of agricultural machinery per hectare of arable land are lower than other regions. Although Anhui's industrial prosperity index is the lowest, only 0.0705, the cultivated land area per capita and the total power of agricultural machinery per hectare ranked first, indicating that Anhui's agricultural production conditions have greater advantages. Jiangsu's industrial prosperity index is 0.0802 and Zhejiang's is 0.0735. Although Zhejiang's industrial prosperity index ranks third, the per capita grain output per unit area is lower than that of the other three regions, indicating that Zhejiang's grain production efficiency is low and needs to be further improved.

In terms of ecological livability, Zhejiang's ecological livability index is 0.1214, which ranks first, followed by Jiangsu and Shanghai with 0.0798 and 0.0700 respectively. Anhui's ecological livability index is the lowest at only 0. 0551. Anhui's ecological environment index ranks second, but the living environment index ranks fourth, indicating that although Anhui's ecological environment is good, the living environment needs to be further improved. Although Zhejiang has the highest ecological livability index, the pesticide usage per hectare is the highest among the four regions, indicating that Zhejiang needs to further strengthen the greening of agriculture and reduce non-point source pollution.

In terms of village civilization, Shanghai's village civilization index is 0.0653, followed by Zhejiang and Anhui. Jiangsu's village civilization index is the lowest at 0. 0299.Although

Shanghai's village civilization index is the highest, and the individual indicators basically remain the first, the proportion of villagers' expenditure on education, entertainment and culture is the lowest among the four regions. It shows that villagers' emphasis on education needs to be further improved. Most of the individual index scores of Jiangsu's village civilization index rank in the forefront, but the number of cultural stations in townships per unit area is only 6.7%, which leads to a low comprehensive index of village civilization. Therefore, Jiangsu should increase the construction of public culture to promote the development of rural customs and civilization.

In terms of effective governance, Jiangsu has the highest effective governance index, reaching 0.1284, followed by Shanghai and Zhejiang with 0.1186 and 0.0947 respectively, and Anhui with 0.0434. In particular, Jiangsu has performed outstandingly in the proportion of all administrative villages that have carried out village renovation and proportion of top 100 counties in all counties that have carried out village renovation. Although the Shanghai effective governance index ranks second, the proportion of the top 100 counties in all counties lags behind other regions and needs to be further improved.

In terms of life affluent, Shanghai's life affluent index ranked first at 0.1314, followed by Jiangsu and Zhejiang at 0.1036 and 0.0929, respectively. Anhui's life affluent index was the lowest at 0.0705. Shanghai is much higher than other regions in terms of per capita security expenditure of rural residents with minimum living security and village clinic staff per 1000 agricultural population. Zhejiang has the lowest number of village clinic staff per 1000 agricultural population, indicating that Zhejiang should pay attention to medical problems in rural areas. Although Anhui ranks last in the life affluent index, the number of villages with clinics in administrative villages is the highest, which shows that Anhui attaches great importance to rural medical care.

5. Suggestions

In terms of industrial prosperity, the development of rural industries requires scientific planning and guidance to ensure the prosperity and sustainable development of rural industries; at the same time, it promotes the innovation, development and application of industrial technologies, and combines advanced technologies such as big data, cloud computing, and the Internet with rural industries, so as to break the disadvantages of traditional industries and achieve industrial integration.

In terms of ecological livability, pollution prevention and emission reduction should be carried out from the production source, and pollutants should be treated well to reduce the damage to air, water, land, trees and other natural resources. Secondly, continuously explore, develop and promote rural green agricultural energy-saving technology, to produce green, environmentally friendly, safe products. At the same time, it is necessary to promote the concept of green consumption, reduce resource consumption in rural life, and develop a green lifestyle that saves energy, reduces emissions, and consumes moderately.

In terms of village civilization, the essence of modernization is human modernization. In rural governance, we must pay attention to the spiritual and ideological issues behind human behavior. By increasing investment in the construction of public cultural industries and strengthening vocational skills education, it will promote the growth of people's knowledge and increase labor capacity and labor productivity.

In terms of governance effectiveness, governance is not a one-way management, let alone a top-down rule, but common governance of multiple subjects. Villagers are not only witnesses, but also participants and decision-makers. The transformation of rural governance methods is realized by increasing the transparency of grassroots autonomous information and creating a co-governance structure with the participation of multiple subjects.

In terms of living affluent, people's demand for a better life in the new era is increasing. Rural

governance should ensure that villagers' income is increased and the gap with cities should be reduced. At the same time, the shortcomings in people's livelihoods such as housing and medical care should be made up quickly, to improve the living standards of villagers.

Acknowledgments

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