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# Measuring and Analyzing the Level of Rural Revitalization in China

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**Abstract:** Implementing the rural revitalization strategy is an inevitable requirement to address the primary contradictions in Chinese society, achieve the "Two Centenary Goals," and ensure shared prosperity for all. Scientifically evaluating the effectiveness of the rural revitalization strategy holds significant importance for its successful implementation. This paper combines the essence of rural revitalization and, based on the general requirements of the strategy, constructs an evaluation index system for rural revitalization in five dimensions: "prosperous industries, livable ecology, civilized rural customs, effective governance, and improved livelihoods." The entropy weight method is used to measure the level of rural revitalization in 31 provinces in China from 2011 to 2021. The research findings indicate that the development level of rural revitalization in China is relatively low, but it has been steadily increasing. The eastern regions have a significantly higher level of rural revitalization compared to other regions, exhibiting a development pattern of East > Central > Northeast > West.

**Keywords:** Rural Revitalization; Index System; Regional Disparities.

## 1. Introduction

With the progress of China's urbanization process, a large number of rural labor forces and capital continuously flow into cities, leading to the phenomenon of rural hollowing-out and the deterioration of the rural production and living environment. General Secretary Xi Jinping emphasized that rural revitalization is an inevitable requirement for achieving the great rejuvenation of the Chinese nation and is an important task after poverty alleviation. He called on the entire party and society to work together towards this goal. It is necessary to establish an index system to objectively evaluate the effectiveness of rural revitalization. This will allow for the measurement of the actual level of rural revitalization in each province and provide empirical evidence and path choices for promoting common prosperity through rural revitalization by analyzing the temporal and spatial characteristics of rural revitalization at the national level, four major regions, and various provinces.

Under the current context, research related to rural revitalization has become a hot topic in the academic community. Scholars' researches mainly focus on the following two aspects: First, the theoretical origin and connotation of rural revitalization. Some scholars believe that only by organically combining agricultural and rural development with the new urbanization strategy can the implementation of rural revitalization be ensured, leading to comprehensive development and social stability. Efforts are also needed to guide and cultivate various talents to flow into rural areas, promote the transformation and upgrading of agricultural production methods, and achieve sustainable development of agriculture and rural areas and comprehensive social progress. Second, the measurement of rural revitalization level. Currently, the construction of the rural revitalization index system mostly follows the "Twenty Characters" policy, which includes dimensions such as prosperous industries, livable ecology, civilized rural customs, effective governance, and improved livelihoods. The evaluation methods chosen often combine entropy weight method with other techniques, such as combining entropy weight method with analytic hierarchy process (AHP), TOPSIS method, or factor analysis. However, some studies have also employed singular approaches using only factor analysis, entropy value method, or TOPSIS method.

## 2. Research Design

### 2.1. Construction of the Index System

Prosperous Industries: Prosperous industries are the foundation of rural economic development and the core and basis of rural revitalization. Currently, China's rural industries are undergoing a crucial transformation from traditional agriculture to modern agriculture, and achieving high-quality agricultural development is the essence of the new stage of agricultural modernization. The "Plan" explicitly states that in the process of implementing the rural revitalization strategy, the focus should be on promoting prosperous industries, building a modern rural industrial system, integrating advantageous resources, and promoting the integrated development of the primary, secondary, and tertiary industries in rural areas. Therefore, this paper uses the five sub-indices in Table 1 to represent the level of prosperous industries.

Livability Ecology: Livable ecology is the key to rural ecological civilization construction, and achieving livable ecology requires both protecting the ecological environment and improving the quality of living environment. Rural areas are an important battleground for China's ecological civilization construction, and achieving ecologically livable rural areas is a crucial measure and key task for building a beautiful China and promoting rural revitalization. Ecologically livable rural areas emphasize promoting green agricultural development, continuously improving the living environment in rural areas, and strengthening rural ecological protection and restoration. Specifically, it is necessary to promote the development of green agricultural production methods, improve the rural living environment, and enhance the level of rural pollution control. Therefore, this paper uses indicators such as the coverage rate of sanitary toilets, the coverage rate of rural water supply, and the rate of harmless treatment of household waste to reflect the livable living

environment, while using indicators such as rural greening rate and forest coverage rate to reflect the livable ecological environment.

Civilized Rural Customs: Civilized rural customs are an important guarantee for modern civilization construction and an integral part of China's 5,000 years of historical culture. The construction of modern civilization requires rural ideological and moral construction as a guiding force, giving full play to the core role of inheriting and developing excellent traditional Chinese culture, using the construction of a rural public cultural service system as a carrier, and building rural culture with modern characteristics. Spreading civilization requires the use of modern information tools to deeply instill outstanding cultural content, improve the cultural literacy of rural residents, and cultivate honest and upright rural customs. Moreover, strengthening the inheritance and protection of traditional culture allows rural culture to keep pace with the times and better meet the needs of modernization. Therefore, this paper uses indicators such as the education level of farmers, the coverage rate of cultural stations, and cultural dissemination to characterize civilized rural customs.

Effective Governance: Effective governance is an important guarantee for rural political construction. To achieve the goal of rural revitalization, it is essential to strengthen the construction of rural grassroots organizations, give full play to the comprehensive leadership role of rural grassroots party organizations, gradually build a rural governance system that combines rule of law, rule of virtue, and self-governance, and enhance the participation and rationality, sustainability, and effectiveness of governance behavior of villagers. This will result in harmonious and orderly rural society and ensure the well-being of rural residents. In the process of promoting rural revitalization, attention should be given to rural governance, strengthen grassroots construction, and improve grassroots governance capabilities. It is essential to strengthen villager's self-governance, give play to the role of villagers as the main body, and encourage them to actively participate in village construction and management. It is also necessary to strengthen the construction of village-level cadres and improve their political quality and work capabilities, further raising the level of rural governance. Therefore, this paper selects indicators such as medical level, urban-rural living gap, and village committee coverage to represent effective governance.

**Table 1.** Rural Revitalization Evaluation Index System

| Goal | Primary Indicator | Secondary Indicator | Indicator Measurement Formula |
|---|---|---|---|
| Rural Revitalization | Prosperous Industries | Per Capita Mechanical Power | Agricultural Mechanical Power / Number of Employees in Primary Industry (kW/person) |
| | | Per Capita Grain Output | Grain Output / Rural Population (tons/person) |
| | | ln Effective Irrigated Area | Logarithm of Effective Irrigated Area (thousand hectares) |
| | Livable Ecology | Forest Coverage Rate | Rural Forest Coverage Rate (%) |
| | | ln Number of Public Toilets | Logarithm of Number of Public Toilets (units) |
| | | ln Comprehensive Water Supply Capacity | Logarithm of Comprehensive Water Supply Capacity (cubic meters/day) |
| | Civilized Rural Customs | ln Local Financial Education Expenditure | Logarithm of Local Financial Education Expenditure (100 million yuan) |
| | | Education Level of Farmers | Illiterate Population / Population Aged 15 and Above (%) |
| | | Cultural Dissemination | Comprehensive Population Coverage of TV Programs (%) |
| | Effective Governance | Rural Resident Expenditure | Rural Per Capita Consumption Expenditure / Urban Per Capita Consumption Expenditure |
| | | Urban-Rural Income Gap | Urban Per Capita Disposable Income / Rural Per Capita Disposable Income |
| | | ln Rural Population | Logarithm of Rural Population (tens of thousands) |
| | Improved Livelihoods | ln Per Capita Disposable Income | Logarithm of Rural Per Capita Disposable Income (yuan) |
| | | Number of Elderly Care Service Institutions | Number of Elderly Care Service Institutions / Rural Population (institutions / ten thousand people) |
| | | ln Per Capita Food Consumption Expenditure | Logarithm of Rural Per Capita Food Consumption Expenditure (yuan) |

Improved Livelihoods: Improved livelihoods are the fundamental goal of social construction, and the core of rural revitalization is to improve the living standards of farmers. To achieve this goal, it is necessary to continuously increase farmers' income and expand their sources of income. It also requires improving rural living conditions and enhancing the quality of life, such as clothing, food, housing, and transportation. At the same time, it is necessary to promote

social fairness and justice, reduce the income gap between urban and rural residents, and provide farmers with more development opportunities and fair treatment. In addition, it is essential to address shortcomings in rural infrastructure and improve the effective supply of public services. This involves promoting the upgrading of rural infrastructure and public services, increasing the happiness and satisfaction of farmers, and gradually achieving common prosperity. Therefore, this paper uses indicators such as per capita net income of farmers, the poverty incidence rate in rural areas, and the urban-rural resident income ratio to reflect the level of farmers' income. Additionally, indicators such as per capita income of farmers, the number of elderly care service institutions, and per capita residential area are used to indicate improved livelihoods.

## 2.2. Rural Revitalization Evaluation Index System

Based on the elucidation of the essence of rural revitalization mentioned above, this paper constructs the rural revitalization evaluation index system, which includes 5 primary indicators and 15 secondary indicators, as shown in Table 1. The data used in this study are sourced from various regional government official websites, and for reducing error, logarithmic transformations have been applied to certain data.

## 2.3. Research Method

The entropy weight method considers the differences in information among indicators by calculating the entropy value of each indicator, thus determining the weights of the indicators and reflecting more accurately the influence of each indicator on decision-making results. Drawing from academic studies by Mao Jinhuang et al. (2020) and Chen Junliang et al. (2021), this paper adopts the entropy weight method to measure the development level of rural revitalization in China. The specific steps are as follows:

Step 1: Standardization Process:

$$\text{Positive indicators:}\ Y_{ij} = \frac{X_{ij} - \min(X_{ij})}{\max(X_{ij}) - \min(X_{ij})}$$
$$\text{Negative indicators:}\ Y_{ij} = \frac{\max(X_{ij}) - X_{ij}}{\max(X_{ij}) - \min(X_{ij})} \quad (1)$$

Step 2: Calculate the weight of the j-th indicator:

$$P_{ij} = \frac{Y_{ij}}{\sum_i^n Y_{ij}} \quad (2)$$

Step 3: Calculate the entropy value of the j-th indicator:

$$e_j = -1/\ln(n) \sum_i^n P_{ij} \ln(P_{ij}) \qquad 0 \le e_j \le 1 \quad (3)$$

Step 4: Calculate the weight of the j-th indicator:

$$w_j = \frac{1 - e_j}{\sum_j^m 1 - e_j} \quad (4)$$

Step 5: Calculate the comprehensive score:

$$I = \sum_j^m w_j Y_{ij} \quad (5)$$

# 3. Results and Analysis

The measurement results of rural revitalization development levels in the four major regions and 31 provinces of China from 2011 to 2021 are presented in Table 2 on the following page (due to space limitations, only the measurement results from 2014 to 2021 are shown in the text). By combining the time-series differentiation characteristics of rural revitalization levels in the four major regions (as shown in Figure 1), further analysis reveals the following:

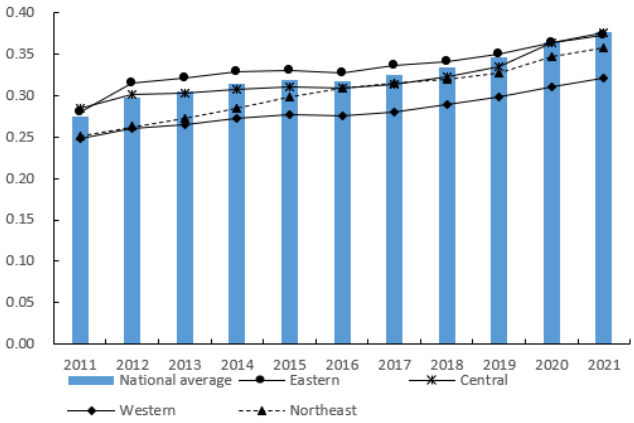



**Fig 1.** The time-series differentiation characteristics of rural revitalization levels in the four major regions

## 3.1. National Level

At the national level, the comprehensive index of rural revitalization in China ranges from 0.276 to 0.378, indicating a relatively low level of rural revitalization development. However, overall, there has been a consistent upward trend. During the period of 2018-2019, the comprehensive index of rural revitalization showed a significant growth, primarily driven by the year 2018 when the central government comprehensively deployed and planned the implementation of the rural revitalization strategy. This marked the official launch of the rural revitalization strategy, bringing new opportunities for the development of rural areas and promoting the prosperity of rural economies and the improvement of the quality of life for farmers. Consequently, it led to a rapid increase in the level of rural revitalization.

At the provincial level, from 2011 to 2021, the development level of rural revitalization in the 31 provinces showed a steady growth trend. Among them, provinces such as Inner Mongolia, Jiangxi, and Zhejiang ranked among the top three in terms of rural revitalization development. On the other hand, Tibet, Qinghai, and Gansu were the three provinces with the lowest rural revitalization development levels in China.

## 3.2. Four Major Regional Levels

From the perspective of the four major regions of the east, central, western and northeastern regions, there is an imbalance in the level of rural revitalisation development. Overall, the eastern region is relatively better in the development of rural revitalisation, followed by the central region, the northeastern region, and the western region has a relatively low level of rural revitalisation, and this regional disparity shows that the process of rural revitalisation development has obvious differences among regions. Comprehensively speaking, the level of rural revitalisation in the four major regions has shown a growth trend, especially in the Northeast, where the growth rate is the fastest and there is a catching-up effect, and in the Central Region, where the growth rate in the Western Region is also faster, which shows that although there are obvious regional differences in the level of rural revitalisation development in China, the differences between the regions have shown a narrowing trend. Among them, the score of the eastern region rises from 0.280 in 2021 to 0.373 in 2021, with a growth rate of about 33.21% and an average annual growth rate of about 3.02%, in which Zhejiang, Beijing, Tianjin and other provinces have made remarkable achievements in rural revitalisation, and the

level of rural revitalisation grows at a faster rate, and the provinces in the central, western and northeastern regions should learn from their successes and explore the road of rural revitalisation with characteristics. road of rural revitalisation with special characteristics and vigorously develop rural revitalisation.

**Table 2.** Rural Revitalization Development Level in 31 Provinces

| Region | Province | Year | | | | | | | | Mean | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | | |
| Eastern region | Beijing | 0.368 | 0.372 | 0.370 | 0.382 | 0.389 | 0.366 | 0.375 | 0.374 | 0.355 | 4 |
| | Tianjin | 0.347 | 0.345 | 0.331 | 0.345 | 0.328 | 0.365 | 0.402 | 0.422 | 0.347 | 6 |
| | Hebei | 0.322 | 0.332 | 0.302 | 0.317 | 0.333 | 0.346 | 0.374 | 0.392 | 0.330 | 11 |
| | Shanghai | 0.356 | 0.339 | 0.350 | 0.357 | 0.359 | 0.365 | 0.370 | 0.379 | 0.343 | 8 |
| | Jiangsu | 0.305 | 0.319 | 0.330 | 0.341 | 0.353 | 0.368 | 0.380 | 0.392 | 0.331 | 10 |
| | Zhejiang | 0.367 | 0.360 | 0.364 | 0.372 | 0.383 | 0.396 | 0.409 | 0.408 | 0.374 | 3 |
| | Fujian | 0.332 | 0.333 | 0.334 | 0.337 | 0.339 | 0.347 | 0.355 | 0.363 | 0.340 | 9 |
| | Shandong | 0.305 | 0.315 | 0.300 | 0.309 | 0.319 | 0.330 | 0.346 | 0.358 | 0.312 | 17 |
| | Guangdong | 0.309 | 0.311 | 0.313 | 0.316 | 0.322 | 0.327 | 0.333 | 0.338 | 0.317 | 16 |
| | Hainan | 0.288 | 0.285 | 0.282 | 0.287 | 0.290 | 0.292 | 0.299 | 0.302 | 0.287 | 22 |
| Eastern average | | 0.330 | 0.331 | 0.328 | 0.336 | 0.342 | 0.350 | 0.364 | 0.373 | 0.334 | |
| Central region | Shanxi | 0.257 | 0.265 | 0.232 | 0.228 | 0.233 | 0.237 | 0.252 | 0.267 | 0.244 | 28 |
| | Anhui | 0.285 | 0.299 | 0.306 | 0.311 | 0.321 | 0.336 | 0.397 | 0.412 | 0.321 | 13 |
| | Jiangxi | 0.360 | 0.360 | 0.364 | 0.366 | 0.375 | 0.389 | 0.408 | 0.421 | 0.375 | 2 |
| | Henan | 0.300 | 0.306 | 0.303 | 0.319 | 0.334 | 0.356 | 0.373 | 0.385 | 0.319 | 15 |
| | Hubei | 0.310 | 0.312 | 0.314 | 0.321 | 0.329 | 0.332 | 0.355 | 0.364 | 0.321 | 14 |
| | Hunan | 0.331 | 0.328 | 0.333 | 0.338 | 0.343 | 0.359 | 0.402 | 0.413 | 0.346 | 7 |
| Central average | | 0.307 | 0.312 | 0.309 | 0.314 | 0.323 | 0.335 | 0.364 | 0.377 | 0.321 | |
| Western region | Neimenggu | 0.409 | 0.434 | 0.439 | 0.457 | 0.493 | 0.519 | 0.541 | 0.570 | 0.448 | 1 |
| | Guangxi | 0.315 | 0.320 | 0.321 | 0.325 | 0.329 | 0.334 | 0.341 | 0.345 | 0.324 | 12 |
| | Chongqing | 0.285 | 0.281 | 0.288 | 0.296 | 0.307 | 0.322 | 0.330 | 0.355 | 0.311 | 18 |
| | Sichuan | 0.289 | 0.285 | 0.290 | 0.296 | 0.300 | 0.306 | 0.314 | 0.319 | 0.292 | 21 |
| | Guizhou | 0.266 | 0.269 | 0.274 | 0.279 | 0.284 | 0.292 | 0.301 | 0.305 | 0.274 | 24 |
| | Yunnan | 0.302 | 0.304 | 0.307 | 0.311 | 0.313 | 0.318 | 0.322 | 0.325 | 0.305 | 20 |
| | Xizang | 0.264 | 0.265 | 0.254 | 0.224 | 0.236 | 0.243 | 0.248 | 0.260 | 0.243 | 29 |
| | Shanxi | 0.279 | 0.282 | 0.279 | 0.282 | 0.285 | 0.292 | 0.304 | 0.310 | 0.284 | 23 |
| | Gansu | 0.207 | 0.210 | 0.202 | 0.207 | 0.212 | 0.215 | 0.226 | 0.233 | 0.212 | 30 |
| | Qinghai | 0.176 | 0.168 | 0.170 | 0.177 | 0.185 | 0.198 | 0.226 | 0.234 | 0.186 | 31 |
| | Ningxia | 0.234 | 0.249 | 0.226 | 0.245 | 0.261 | 0.275 | 0.294 | 0.306 | 0.247 | 27 |
| | Xinjiang | 0.256 | 0.268 | 0.254 | 0.259 | 0.261 | 0.275 | 0.287 | 0.300 | 0.260 | 25 |
| Western average | | 0.273 | 0.278 | 0.275 | 0.280 | 0.289 | 0.299 | 0.311 | 0.322 | 0.282 | |
| north-eastern region | Liaoning | 0.338 | 0.349 | 0.347 | 0.356 | 0.362 | 0.373 | 0.393 | 0.401 | 0.354 | 5 |
| | Jilin | 0.223 | 0.242 | 0.265 | 0.268 | 0.265 | 0.292 | 0.318 | 0.338 | 0.253 | 26 |
| | Heilongjiang | 0.292 | 0.304 | 0.316 | 0.322 | 0.331 | 0.319 | 0.330 | 0.335 | 0.306 | 19 |
| Northeast average | | 0.284 | 0.299 | 0.309 | 0.315 | 0.320 | 0.328 | 0.347 | 0.358 | 0.304 | |
| National average | | 0.314 | 0.319 | 0.317 | 0.326 | 0.334 | 0.347 | 0.365 | 0.378 | 0.325 | |

# 4. Conclusion and Recommendations

## 4.1. Conclusion

On the basis of previous research, this paper adopts entropy power method to measure the development level of rural revitalisation in 31 provinces in China from 2011-2021, and analyse the whole country, the four major regions, and the provinces and districts. The study gets the following conclusions: the development level of rural revitalisation in China is developing at a low level, but the overall trend has been rising, and the level of rural revitalisation in the eastern region is much higher than that in other regions, and the overall pattern of development shows that the east > the central > the northeast > the west.

## 4.2. Recommendations

According to the conclusion of the above study, due to the low level of rural revitalisation development and the existence of large regional differences, the development of rural revitalisation recommendations should be based on the following two points: one is to comprehensively improve the level of rural revitalisation; the other is to actively promote the coordinated development of regional rural revitalisation. Therefore, this paper puts forward the following suggestions:

First, in order to improve the development level of rural revitalisation, it is necessary to formulate a comprehensive development strategy, increase financial investment, promote the reform of the rural land system, promote the modernisation of agriculture, develop special industries and rural tourism, strengthen the construction of infrastructure, enhance education and skills training, and strengthen the coordination and implementation of policies. Improving rural infrastructure, enhancing agricultural productivity, fostering industrial development, providing quality public services, and upgrading the quality and capacity of farmers will promote the sustainable development of the cause of rural revitalisation.

Second, differentiated policy formulation, focusing on supporting less developed regions; promoting industrial transformation and upgrading, and developing special industries based on regional advantages; strengthening education and skills training, and improving farmers' quality and employability; promoting cross-regional cooperation and

exchanges, and fostering the sharing of resources and the learning of experiences; strengthening policy guidance and supervision, and ensuring the effectiveness of policies on the ground and in their implementation; incentivising innovation and entrepreneurship, and supporting the development of rural enterprises; and strengthening social participation and democratic governance, and forming multi-party joint efforts to promote rural revitalisation. Achieve balanced regional development in rural revitalisation and promote common prosperity in different regions.

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