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# Measurement and Analysis of Regional Disparities in Rural Revitalization in China

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**Abstract:**
Rural revitalization is an essential component of China's national rejuvenation. This paper focuses on the period from 2012 to 2021 and investigates various provinces in China to establish an indicator system that aligns with the current stage of rural revitalization in China. By utilizing the entropy method, Dagum's Gini coefficient, and the obstacle degree model, this study analyzes the development level of rural revitalization and the obstacles faced by different provinces in China. The research findings reveal an imbalance in regional development, with the eastern regions being more advanced while the western and northeastern regions lag behind, except for rural areas in the northeast. However, the disparities between the eastern, central, and western regions are gradually narrowing. The primary challenge faced by rural areas in China at the current stage lies in cultivating a healthy rural cultural civility. It is crucial to address the existing problems based on the practical circumstances to achieve comprehensive rural revitalization and sustainable, modern development.

*Keywords: Rural revitalization, Indicator system, Entropy method, Dagum's Gini coefficient, Obstacle degree*

## INTRODUCTION

In October 2022, the 20th National Congress of the Communist Party of China was held in Beijing, where it proposed the comprehensive promotion of rural revitalization during the "14th Five-Year Plan" period. The goal is to vigorously promote the prosperity of rural industries, the livable ecology, rural cultural civility, effective governance, and improved living conditions. Since the 19th National Congress of the Communist Party of China in 2017, the strategy of rural revitalization has greatly improved agriculture, rural areas, and the well-being of farmers. According to statistical data, the national grain production in 2021 reached 682.85 million tons, an increase of approximately 19.5% compared to 2011. The per capita disposable income of rural residents reached 18,931 yuan, about 2.7 times that of 2011. China has a large rural population, and rural areas encompass vast territories. In order to achieve the great rejuvenation of the Chinese nation and accomplish the "Two Centenary Goals," it is necessary to promote rural development, comprehensively advance rural revitalization, and achieve rural modernization at the current stage.

Rural revitalization is currently a prominent research topic in the academic field, primarily focusing on three research areas. Firstly, theoretical research on rural revitalization explores the development trajectory. Liu Zhaoshuai (2022) suggests that rural revitalization will facilitate agricultural modernization and accelerate the construction of a socialist modernized country with distinct Chinese characteristics. Huang Chengwei (2022) conducts theoretical research on the development direction of rural revitalization from ten perspectives, including the theoretical logic of the Communist Party of China's work on agriculture, rural areas, and farmers, the theoretical

background of rural revitalization strategies, and the new advancements in the theory of the three rural issues in the contemporary era, providing a theoretical foundation for the development of rural revitalization. Secondly, research is conducted on the integration of inclusive finance, common prosperity, and rural revitalization. Ren Haijun (2021) employs the DEA model and panel Tobit model to study the measurement of inclusive finance. The results indicate that the overall level of comprehensive efficiency in digital inclusive finance is relatively low in western regions. During the research period, the total factor productivity of digital inclusive finance did not improve production efficiency primarily due to constraints in technological progress. Liao Chengzhong (2022), guided by the principle of common prosperity, concludes that the high-quality promotion of comprehensive rural revitalization necessitates paths such as market collaboration, digital collaboration, organizational collaboration, and institutional collaboration. Thirdly, research is conducted on the overall or partial assessment of rural revitalization. Xu Xue (2022), utilizing Dagum's Gini coefficient and Kernel density estimation, discovers that the overall level of rural revitalization in China is relatively low. Additionally, there are notable regional disparities in the level of rural revitalization, with some provinces exhibiting higher levels, although the differences between regions are decreasing. Zhang Hong (2021), based on measurements of rural revitalization in Shaanxi Province, concludes that the comprehensive level of high-quality rural development in Shaanxi Province is relatively balanced, but there is room for improvement. In terms of specific regions, the central Shaanxi plain performs the best, followed by the northern part of Shaanxi, while the southern part lags behind. Wang Zhizhang (2020) demonstrates that preliminary interaction has been achieved between poverty alleviation and rural revitalization in western regions, but the linkage mechanism needs to be optimized based on actual conditions. Wang Qing (2022), utilizing Dagum's Gini coefficient and Kernel density estimation as research methods, concludes that enhancing the level of rural revitalization in central and western regions can effectively narrow regional disparities, thereby promoting the coordinated development of rural revitalization.

The existing research literature holds great significance and value for reference. From the existing literature, it is evident that experts and scholars have conducted extensive research on regional aspects, and the research on overall rural revitalization in China has gradually increased in recent years. However, overall research on the development of rural revitalization in China remains relatively limited. Moreover, there is a lack of literature specifically focused on measuring the overall level of rural revitalization in China, as well as the study of obstacles influencing its development. Therefore, this paper takes all 30 provinces in China as the research objects and establishes a suitable indicator system for rural revitalization in the current stage of Chinese rural areas. By utilizing Dagum's Gini coefficient and the obstacle degree model, this study analyzes the development level of rural revitalization in China from 2012 to 2021 and examines the obstacles affecting its development. The findings have valuable implications for the comprehensive revitalization of rural areas in China.

## RESEARCH DESIGN

### Establishment of an Indicator System

The rural revitalization strategy encompasses five aspects: thriving industries, livable ecology, rural cultural civility, effective governance, and improved living conditions. These aspects provide practical development requirements for promoting the construction of new rural areas in China. Therefore, this paper constructs an indicator system based on these five aspects. Thriving industries represent the level of rural industrial development. Drawing on the research of Wang Qing (2022), Lu Fengying (2022), and Zhang Wang (2022), this study selects four tertiary indicators

to assess this aspect. Livable ecology mainly refers to the ecological environment of rural areas, including the natural environment and living environment. Taking inspiration from the studies of Xu Xue (2022), Lu Fengying (2022), Ma Changfa (2022), and Lv Chengchao (2021), three tertiary indicators are adopted to assess the natural environment and living environment. Rural cultural civility reflects the degree of cultural development in rural areas and are an important aspect of modern civilization construction. Based on the research of Luo Chunna (2020), Zhang Lin (2022), and Zhang Qi (2022), five tertiary indicators are utilized to measure the progress in this dimension. Effective governance is an important aspect of rural revitalization and embodies the leadership capabilities in rural areas. Referring to the studies of Zhang Wang (2022), Niu Wenhao (2021), Liu Yanan (2022), and Yang Shengqiang (2022), four tertiary indicators are employed. Improved living conditions represent the primary objective of rural revitalization and are primarily manifested in income, expenditure, and livelihood security. With reference to the research conducted by Lü Chengchao, Yang Suchang, Yang Awei, and Wu Jiuxing, this article employs six tertiary indicators to assess the progress made in this dimension.

**Table 1: The Indicator System for Rural Revitalization Level**

| Primary Indicator | Secondary Indicator | Tertiary Indicator | Indicator Attribute | Weight |
|---|---|---|---|---|
| Thriving industries | Agricultural production capacity | Agricultural machinery power per unit area (kW/hectare) | Positive | 0.044 |
| | | Proportion of effective irrigated area (%) | Positive | 0.016 |
| | Agricultural production level | Per capita output value of agriculture, forestry, animal husbandry, and fisheries (RMB) | Positive | 0.034 |
| | | Proportion of added value of the primary industry (%) | Positive | 0.036 |
| Livable ecology | Natural environment level | Intensity of chemical fertilizer application (kg/ha) | Negative | 0.003 |
| | | Intensity of pesticide application (kg/ha) | Negative | 0.008 |
| | | Green coverage rate (%) | Positive | 0.035 |
| | Living environment level | Toilet coverage rate (%) | Positive | 0.018 |
| | | Sewage treatment rate (%) | Positive | 0.133 |
| | | Tap water coverage rate (%) | Positive | 0.014 |
| Rural cultural civility | Culture and entertainment expenditures | Proportion of rural residents' expenditure on education, culture and entertainment (%) | Positive | 0.026 |
| | Education quality | Proportion of full-time teachers in rural compulsory education schools with bachelor degree or above (%) | Positive | 0.021 |
| | Public culture construction | Number of rural cultural stations (units) | Positive | 0.059 |
| | Social security | Number of pension institutions (houses) | Positive | 0.084 |
| | | Average village clinic staff per 1,000 rural population (persons) | Positive | 0.078 |

| | | | | |
|---|---|---|---|---|
| Effective governance | Comprehensive governance level | Proportion of village committee members with bachelor degree or above (%) | Positive | 0.116 |
| | | Proportion of village committees in total autonomous organizations (%) | Positive | 0.009 |
| | | The percentage of "dual roles of director and secretary" | Positive | 0.061 |
| | Effectiveness of rural governance | Proportion of rural residents with minimum subsistence allowances (%) | Negative | 0.012 |
| Improved living conditions | Income level | Per capita disposable income of rural residents (RMB) | Positive | 0.039 |
| | | Income gap ratio between urban and rural residents | Negative | 0.013 |
| | Consumption level | Engel coefficient (%) | Negative | 0.001 |
| | | Per capita consumption expenditure of rural residents (RMB) | Positive | 0.039 |
| | Livelihood level | Housing area per capita (square meter/person) | Positive | 0.037 |
| | | Per capita road area (square meter/person) | Positive | 0.064 |

**Data Description**

The research period of this study spans from 2012 to 2021, and the research subjects are 30 provinces in China (excluding Tibet, which has severe data shortages). The following points provide an explanation of the data: For individual years with missing data, this study uses interpolation methods to fill in the missing values. All data in this study are sourced from various publications, including "China Statistical Yearbook," "China Rural Statistical Yearbook," "China Civil Affairs Statistical Yearbook," "China Urban and Rural Construction Statistical Yearbook," "China Tertiary Industry Statistical Yearbook," as well as the statistical yearbooks of each province and the EPS database.

## RESEARCH METHODS

**Entropy Method**

Due to the differences in the dimensional scale and magnitude of the data, this study first standardizes the data and then uses the entropy method to calculate the development indexes and comprehensive indexes of various subsystems in rural revitalization.

Standardization process. The formulas are as follows:

$$\text{Positive Indicators: } x'_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} \quad (1)$$

$$\text{Negative Indicators: } x'_{ij} = \frac{\max(x_j) - x_{ij}}{\max(x_j) - \min(x_j)} \quad (2)$$

In Formula 1 and Formula 2: $\min(x_j)$ represents the minimum value of the j-th indicator; $\max(x_j)$ represents the maximum value of the j-th indicator. $x'_{ij}$ represents the standardized data of each indicator after standardization.

Entropy weighting method is used to calculate the entropy value. The specific formula is as follows: Calculate the information entropy of the j-th indicator

$$e_j = -K\sum_{i=1}^{m} y_{ij}\ln y_{ij} \quad (3)$$

In (3), K is a constant, and $K = \frac{1}{\ln m}$

Calculating the entropy weight

$$W_j = \frac{1-e_j}{\sum_{i=1}^{m}(1-e_j)} \quad (4)$$

Calculating the comprehensive scores for each province. The formula is as follows:

$$U_i = \sum_{j=1}^{m} W_j * x'_{ij} \quad (5)$$

**Dagum Gini Coefficient Decomposition Model**

First, calculate the overall Gini coefficient:

$$G = \frac{1}{2n^2\mu}\sum_{j=1}^{k}\sum_{h=1}^{k}\sum_{h=1}^{n_i}\sum_{r=1}^{n_j}\left|y_{ih} - y_{jr}\right| \quad (6)$$

In Formula 6, the overall region is divided into four regions: Eastern, Central, Western, and Northeastern regions, denoted as $k = 4$. $y_{ih}$ and $y_{jr}$ respectively represent the composite index of rural revitalization level for any province within $i(j)$ region (where the values of j and h take values from 1 to k). G represents the overall Gini coefficient. $\mu$ represents the average value of the composite index of rural revitalization, $n$ indicating the number of provinces, while $n_i$ and $n_j$ respectively represent the number of regions within the group.

The Gini coefficient is composed of three components: the contribution $G_w$ of within-region disparities, the net contribution $G_{nb}$ of between-region disparities, and the inter-group hypervariable density $G_t$. The net contribution $G_{nb}$ of between-region disparities and the inter-group hypervariable density combined reflect the overall absorption of inequality between regions, i.e., $G_{gb} = G_{nb} + G_t$. These three components satisfy the following relationship: $G = G_w + G_{nb} + G_t$. The Gini coefficient $G_{ii}$ within each region and the contribution $G_w$ of within-region disparities,

**Gini coefficient $G_{ii}$ within regions:**

$$G_{ii} = \frac{1}{2n_i^2\mu_i}\left(\sum_{h=1}^{n_i}\sum_{r=1}^{n_i}\left|y_{ih} - y_{jr}\right|\right) \quad (7)$$

Contribution $G_w$ of within regions disparities:

$$G_w = \sum_{i=1}^{k} G_{iij}\gamma_i s_i \quad (8)$$

In (8),

$$\gamma_j = \frac{n_i}{n}, S_j = \frac{\gamma_i \mu_i}{\mu}$$

Gini coefficient $G_{ij}$ between regions：

$$G_{ij} = \frac{1}{n_i n_j (\mu_i + \mu_j)} \left( \sum_{i=1}^{n_i} \sum_{r=1}^{n_j} |y_{ji} - y_{hr}| \right) \quad (9)$$

Net contribution $G_{nb}$ of disparity between regions：

$$G_{nb} = \sum_{i=2}^{k} \sum_{j=1}^{i-1} (\gamma_j s_i + \gamma_i s_j) G_{ij} D_{ij} \quad (10)$$

In Formula 10,

$$D_{ij} = (d_{ij} - p_{ij}) / (d_{ij} + p_{ij}),$$

where i and j represent the relative disparity between two groups of rural revitalization levels, $d_{ij}$ represents the interpolation of the composite index of rural revitalization level between regions i and j. When $\mu_i > \mu_j$ , the $d_{ij}$ equation and $p_{ij}$ equation are as follows:

$$d_{ij} = \int_0^{\infty} \int_0^{y} (y - x) f_i(x) dx f_i(y) dy \quad (11)$$

$$p_{ij} = \int_0^{\infty} \int_0^{y} (y - x) f_i(x) dx f_i(y) dy \quad (12)$$

Inter-group hypervariable density $G_t$:

$$G_t = \sum_{i=2}^{k} \sum_{j=1}^{i-1} (\gamma_j s_i + \gamma_i s_j) G_{ij} (1 - D_{ij}) \quad (13)$$

**Obstacle Degree Model**

Determining factor contribution and indicator deviation:

$$W_j = F * I \quad (14)$$

$$V_j = 1 - x'_{ij} \quad (15)$$

In Formula 14, F represents the weight of the primary indicator, and I represent the weight of the tertiary indicator.

Determining the obstacle degree $h_j$ of the jth evaluation indicator to rural revitalization:

$$h_j = \frac{w_j \times V_j}{\sum_{j=1}^{m} W_j \times V_j} \quad (16)$$

## ANALYSIS OF EMPIRICAL RESULTS

### Analysis of Rural Revitalization Composite Index

**Table 2: Composite Index of Rural Revitalization in Chinese Provinces**

| | Provinces and Cities | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Eastern Provinces | Beijing | 0.335 | 0.344 | 0.390 | 0.388 | 0.414 | 0.345 | 0.388 | 0.432 | 0.432 | 0.454 |
| | Tianjin | 0.264 | 0.261 | 0.259 | 0.270 | 0.260 | 0.261 | 0.347 | 0.398 | 0.410 | 0.419 |
| | Hebei | 0.243 | 0.254 | 0.247 | 0.253 | 0.254 | 0.242 | 0.255 | 0.289 | 0.304 | 0.317 |
| | Shanghai | 0.397 | 0.421 | 0.444 | 0.448 | 0.443 | 0.441 | 0.451 | 0.495 | 0.491 | 0.500 |
| | Jiangsu | 0.325 | 0.349 | 0.344 | 0.375 | 0.393 | 0.393 | 0.421 | 0.463 | 0.475 | 0.477 |
| | Zhejiang | 0.378 | 0.393 | 0.417 | 0.426 | 0.416 | 0.423 | 0.406 | 0.410 | 0.429 | 0.466 |
| | Fujian | 0.235 | 0.250 | 0.264 | 0.274 | 0.287 | 0.308 | 0.326 | 0.382 | 0.421 | 0.428 |
| | Shandong | 0.380 | 0.383 | 0.384 | 0.382 | 0.383 | 0.367 | 0.387 | 0.392 | 0.415 | 0.423 |
| | Guangdong | 0.262 | 0.268 | 0.261 | 0.284 | 0.294 | 0.294 | 0.372 | 0.384 | 0.428 | 0.446 |
| | Hainan | 0.213 | 0.222 | 0.233 | 0.260 | 0.265 | 0.281 | 0.284 | 0.291 | 0.280 | 0.294 |
| | Average | 0.303 | 0.315 | 0.324 | 0.336 | 0.350 | 0.357 | 0.364 | 0.394 | 0.413 | 0.423 |
| Central Provinces | Shanxi | 0.237 | 0.247 | 0.251 | 0.264 | 0.264 | 0.238 | 0.247 | 0.249 | 0.264 | 0.268 |
| | Anhui | 0.251 | 0.261 | 0.254 | 0.230 | 0.249 | 0.265 | 0.325 | 0.376 | 0.405 | 0.426 |
| | Jiangxi | 0.236 | 0.250 | 0.229 | 0.246 | 0.254 | 0.256 | 0.295 | 0.342 | 0.358 | 0.385 |
| | Henan | 0.326 | 0.332 | 0.344 | 0.344 | 0.313 | 0.300 | 0.317 | 0.346 | 0.392 | 0.412 |
| | Hubei | 0.263 | 0.272 | 0.273 | 0.309 | 0.312 | 0.332 | 0.359 | 0.409 | 0.418 | 0.422 |
| | Hunan | 0.297 | 0.303 | 0.307 | 0.302 | 0.321 | 0.317 | 0.337 | 0.355 | 0.399 | 0.411 |
| | Average | 0.268 | 0.277 | 0.276 | 0.283 | 0.286 | 0.285 | 0.313 | 0.346 | 0.379 | 0.388 |
| Western Provinces | Inner Mongolia | 0.165 | 0.173 | 0.175 | 0.202 | 0.208 | 0.223 | 0.250 | 0.254 | 0.264 | 0.286 |
| | Guangxi | 0.194 | 0.204 | 0.214 | 0.206 | 0.217 | 0.221 | 0.252 | 0.252 | 0.271 | 0.283 |
| | chongqing | 0.201 | 0.211 | 0.196 | 0.216 | 0.218 | 0.243 | 0.297 | 0.333 | 0.357 | 0.371 |
| | Sichuan | 0.293 | 0.304 | 0.305 | 0.307 | 0.309 | 0.302 | 0.342 | 0.343 | 0.352 | 0.356 |
| | Guizhou | 0.156 | 0.167 | 0.173 | 0.180 | 0.207 | 0.211 | 0.266 | 0.277 | 0.301 | 0.333 |
| | Yunnan | 0.187 | 0.189 | 0.189 | 0.214 | 0.211 | 0.218 | 0.255 | 0.266 | 0.294 | 0.329 |
| | Shaanxi | 0.156 | 0.163 | 0.167 | 0.181 | 0.184 | 0.186 | 0.202 | 0.213 | 0.280 | 0.287 |
| | Gansu | 0.165 | 0.170 | 0.173 | 0.187 | 0.196 | 0.186 | 0.204 | 0.228 | 0.241 | 0.305 |
| | Qinghai | 0.148 | 0.158 | 0.165 | 0.181 | 0.185 | 0.197 | 0.195 | 0.211 | 0.229 | 0.250 |
| | Ningxia | 0.186 | 0.189 | 0.195 | 0.227 | 0.246 | 0.237 | 0.255 | 0.262 | 0.295 | 0.306 |
| | Xinjiang | 0.236 | 0.254 | 0.262 | 0.280 | 0.274 | 0.284 | 0.277 | 0.306 | 0.328 | 0.355 |
| | Aerage | 0.199 | 0.198 | 0.201 | 0.220 | 0.233 | 0.228 | 0.254 | 0.269 | 0.293 | 0.313 |
| northeastern provinces | Liaoning | 0.236 | 0.228 | 0.241 | 0.246 | 0.247 | 0.237 | 0.239 | 0.239 | 0.247 | 0.261 |
| | Jilin | 0.197 | 0.207 | 0.202 | 0.227 | 0.205 | 0.215 | 0.238 | 0.248 | 0.254 | 0.283 |
| | Heilongjiang | 0.212 | 0.219 | 0.230 | 0.245 | 0.243 | 0.233 | 0.233 | 0.238 | 0.262 | 0.287 |
| | Average | 0.215 | 0.218 | 0.224 | 0.240 | 0.231 | 0.228 | 0.237 | 0.242 | 0.255 | 0.277 |

According to Table 2, it can be observed that from a national perspective, the overall level of rural revitalization has been continuously increasing, especially after 2017 when the rural revitalization policy was announced. The rural areas across the country have been experiencing an upward trend in development.

From the perspective of the four major regions, the current situation reveals the following: the rural areas in the eastern region outperform those in the central region, which in turn outperform the rural areas in the western and northeastern regions. The development of the eastern region has increased from 0.303 in 2012 to 0.423 in 2021, with a growth rate of 39.6% and an average annual growth rate of 3.77%. Furthermore, from 2018 to 2021, there was a growth rate of 16.2%, with an average annual growth rate of 5.13%. This indicates a significant acceleration in growth after the release of the rural revitalization policy. The central region experienced a growth rate of

44.8% from 2012 to 2021, with an average annual growth rate of 4.2%. In the period from 2018 to 2021, the growth rate was 23.9%, with an average annual growth rate of 7.42%. The western region witnessed a growth rate of 57.3% from 2012 to 2021, with an average annual growth rate of 51.6%. From 2018 to 2021, the annual growth rate was 7.2%. The northeastern region saw a growth rate of 28.8% from 2012 to 2021, with an average annual growth rate of 2.86%. The average annual growth rate from 2018 to 2021 was 5.34%. All regions have exhibited faster development speeds after 2018. The western region, with the highest average annual growth rate, is likely due to the following reasons:

- first, the current stage of development in the western rural areas is relatively lagging, resulting in a higher growth rate compared to other regions;
- second, the support of strategies such as the Western Development and rural revitalization has contributed to the rapid development of rural areas in the western region.

From the provincial perspective, Beijing, Shanghai, Jiangsu, and Zhejiang have consistently been at the forefront of rural revitalization development. In 2021, their composite indices all exceeded 4.5.

In the eastern region, Hebei and Hainan provinces are lagging behind in terms of development. Anhui, Jiangxi, Henan, Hubei, and Hunan, located in the central region, have relatively balanced development in rural areas, with composite indices around 0.4. Shanxi's rural areas are relatively underdeveloped. The rural areas in Chongqing, Sichuan, and Ningxia are in a prioritized position within the western region. Compared to rural areas in other provinces across the country, their development is relatively moderate. The remaining western provinces are relatively underdeveloped, with composite indices below 0.35 in 2021. In the northeastern region, rural areas in Liaoning have experienced relatively stable development, while Jilin and Heilongjiang have shown faster development. However, their overall composite indices still lag behind those of most rural areas.

**Analysis of Dagum Gini Coefficient Results**

**Table 3: Dagum Gini Coefficient Results**

| | Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Overall Gini coefficient | 0.147 | 0.154 | 0.160 | 0.148 | 0.147 | 0.132 | 0.128 | 0.136 | 0.131 | 0.115 |
| Within-region Gini coefficient | Eastern region | 0.120 | 0.120 | 0.129 | 0.117 | 0.125 | 0.112 | 0.071 | 0.086 | 0.081 | 0.079 |
| | Central region | 0.066 | 0.060 | 0.077 | 0.078 | 0.057 | 0.067 | 0.062 | 0.073 | 0.081 | 0.065 |
| | Western region | 0.112 | 0.109 | 0.102 | 0.108 | 0.086 | 0.085 | 0.089 | 0.092 | 0.788 | 0.064 |
| | Northeast China | 0.040 | 0.021 | 0.039 | 0.018 | 0.040 | 0.021 | 0.006 | 0.009 | 0.013 | 0.021 |
| Between-region Gini coefficient | East-Central | 0.113 | 0.112 | 0.129 | 0.128 | 0.132 | 0.116 | 0.105 | 0.102 | 0.096 | 0.087 |
| | East-West | 0.220 | 0.237 | 0.245 | 0.223 | 0.227 | 0.197 | 0.196 | 0.195 | 0.180 | 0.157 |
| | East-Northeast | 0.173 | 0.182 | 0.183 | 0.168 | 0.203 | 0.190 | 0.227 | 0.239 | 0.238 | 0.208 |

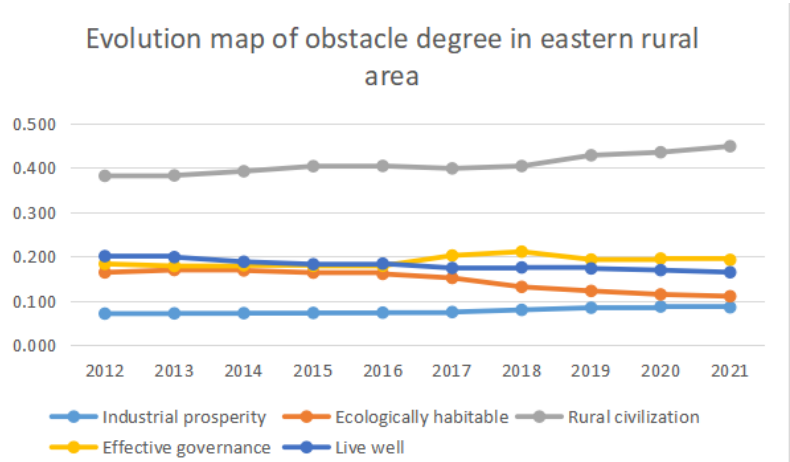
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Central-West | 0.162 | 0.179 | 0.174 | 0.154 | 0.135 | 0.125 | 0.121 | 0.142 | 0.145 | 0.126 |
| | Central-Northeast | 0.110 | 0.120 | 0.107 | 0.089 | 0.104 | 0.110 | 0.139 | 0.178 | 0.196 | 0.172 |
| | West-Northeast | 0.098 | 0.101 | 0.106 | 0.101 | 0.077 | 0.064 | 0.076 | 0.079 | 0.083 | 0.072 |
| Contribution values of each component | Within-region disparity contribution | 0.031 | 0.031 | 0.032 | 0.031 | 0.029 | 0.027 | 0.022 | 0.025 | 0.023 | 0.021 |
| | Between-region disparity contribution | 0.099 | 0.108 | 0.112 | 0.099 | 0.106 | 0.092 | 0.098 | 0.100 | 0.094 | 0.082 |
| | Hypervariable density | 0.017 | 0.015 | 0.016 | 0.018 | 0.011 | 0.013 | 0.008 | 0.011 | 0.014 | 0.013 |

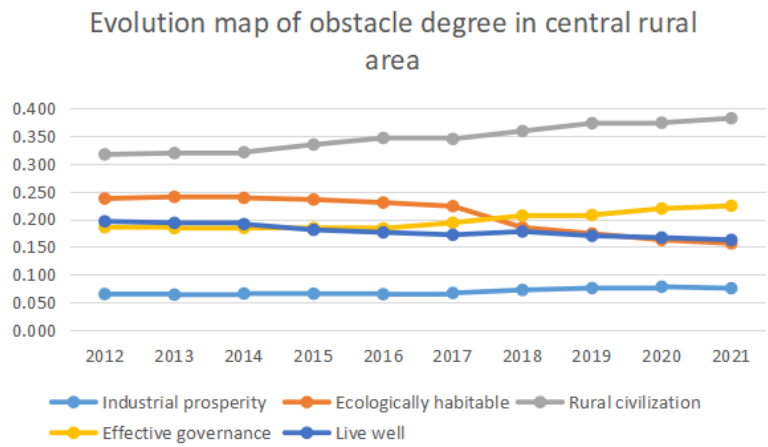
According to Table 3, the overall Gini coefficient shows an upward trend from 2012 to 2014, followed by a decrease from 0.16 in 2014 to 0.115 in 2021, representing a decrease of 21.768%. The decline is particularly pronounced in the years 2019-2021, indicating that the rural regional disparities in China have been gradually narrowing since 2014, and the pace of reduction has accelerated with the implementation of the rural revitalization strategy. During the study period, except for the central region, the Gini coefficients within the other three regions exhibit a fluctuating downward trend. Although there are occasional increases in certain years, overall, there is a decreasing trend, indicating a gradual reduction in internal disparities within these three rural regions. The Gini coefficient within the central region fluctuates in a wave-like pattern, with a significant decrease observed in the years 2019-2021. This may be attributed to the fact that the actual effects of the rural revitalization strategy vary slightly among different areas in the central region.

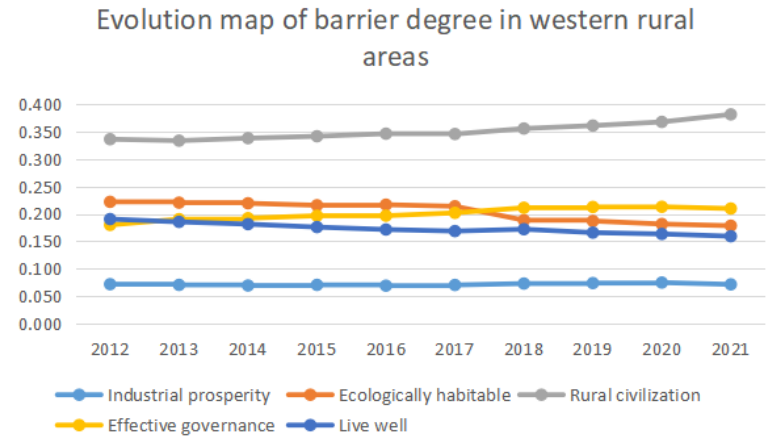
The Gini coefficient between regions represents the degree of disparity in rural revitalization levels between two regions. The development of the eastern and central regions, as well as the western and northeastern rural areas, shows relatively close proximity. Except for the northeastern rural region, the degree of regional disparities is gradually decreasing in the eastern, central, and western rural regions. The most significant reduction in disparities is observed between the eastern and western rural regions.

On the other hand, the disparities between the northeastern rural region and the other three regions are gradually increasing. This may be attributed to the slower development pace in the northeastern rural region and slight variations in development speeds, resulting in a more pronounced gap compared to the other three regions. The contribution values of different components represent the contribution of the main factors causing regional disparities. During the study period, the within-region disparity contribution, between-region disparity contribution, and hypervariable density contribution all showed a decreasing trend. In terms of proportions, the within-region disparity contribution rate was 21.302% in 2012 and decreased to 18.103% in 2021. The between-region disparity contribution rate was 67.5% in 2012 and increased to 70.69% in 2021. The hypervariable density contribution rate was 11.199% in 2012 and remained at 11.207% in 2021. The changes in these three components during the study period showed slight fluctuations. Currently, the main source of differences lies in the between-region disparities, specifically the disparities among the eastern, central, western, and northeastern regions, which are the main factors contributing to the uneven level of rural revitalization in China.

## Analysis of Obstacle Degrees



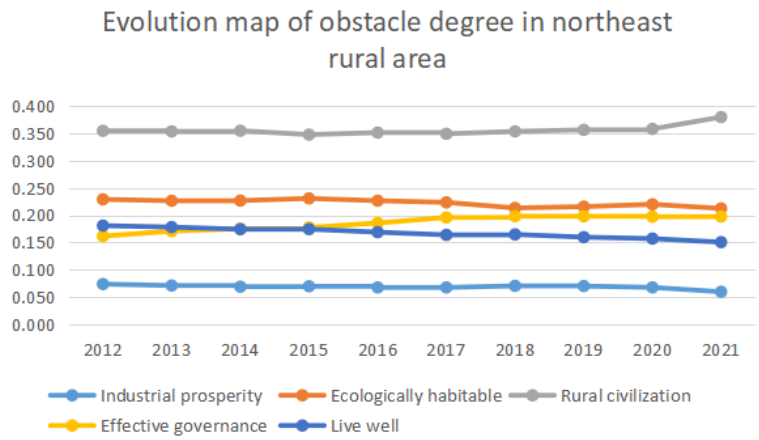



**Figure 1: Analysis of Obstacle Degrees in Different Regions**

Based on Figure 1, it can be observed that the common obstacle factor for rural areas nationwide is rural cultural civility, with the highest obstacle degree index. In the eastern rural areas, the obstacle degrees of the criteria layers, from highest to lowest, are rural cultural civility, effective governance, improved living conditions, livable ecology, and thriving industries. The obstacle degree for rural cultural civility increased from 0.382 in 2012 to 0.449 in 2021, indicating that the issue of rural culture and civility has not been effectively resolved. In 2021, among all the obstacle degrees, only rural cultural civility exceeded 20% and remained at a moderately high obstacle degree. In the central rural areas in 2021, the obstacle degrees, from highest to lowest, were rural cultural civility, effective governance, improved living conditions, livable ecology, and thriving industries. Significant improvements were observed in the criteria layers of improved living conditions and livable ecology within the research period. In 2021, both rural cultural civility and effective governance exceeded 20% in terms of obstacle degrees. In the western rural areas in 2021, the obstacle degrees, from highest to lowest, were rural cultural civility, effective governance, livable ecology, improved living conditions, and thriving industries. Except for rural cultural civility, the obstacle degrees of the other four criteria layers in the western rural areas either decreased or showed no significant changes from 2012 to 2021. With the exception of thriving industries, obstacle degrees for rural cultural civility, effective governance, livable ecology, and improved living conditions all exceeded 15%. In the northeastern rural areas in 2021, the obstacle degrees, from highest to lowest, were rural cultural civility, livable ecology, effective governance, improved living conditions, and thriving industries. During the period from 2012 to 2021, there were improvements in thriving industries and improved living conditions. However, obstacle degrees for rural cultural civility and effective governance showed an increasing trend.

## CONCLUSIONS AND RECOMMENDATIONS

This study focuses on the period from 2012 to 2021 and examines 30 provinces across China as the research subjects. By considering factors such as data availability, representativeness of indicators, and rationality, a composite index system for rural revitalization is established. The entropy method, Dagum's Gini decomposition, and the obstacle degree model are employed to analyze the development level of rural revitalization and obstacle degrees affecting it in different regions of China over the past decade. The following conclusions can be drawn:

- The development of rural areas in China exhibits an imbalance, with the eastern regions showing good development status, while the western and northeastern regions lag behind, which is consistent with the findings of existing literature. The main contradiction in China's current stage lies in the uneven development among different regions. It is necessary to

pay more attention to the development of rural areas in the western and northeastern regions and address their weaknesses in order to achieve comprehensive rural revitalization.

- The overall gap in rural revitalization in China is continuously narrowing, and the disparities among different regions are also decreasing. However, regional disparities still remain the primary contradiction causing differences in the level of rural revitalization. Therefore, it is necessary to focus on the development of underdeveloped regions, particularly the rural areas in the northeast and western regions.
- In rural areas across China, there are issues related to rural cultural civility, while other minor issues vary across different regions. At this stage, it is crucial to address the problems related to rural cultural civility, which represents the most significant shortcomings, in order to promote better rural development. In the central rural areas, attention should also be given to rural governance issues. In the western and northeastern rural areas, apart from addressing rural cultural civility, it is important to draw lessons from relevant domestic and international experiences and focus on the development of other aspects. By considering their own specific circumstances, efforts should be made to develop rural economies and achieve sustainable and modern rural development.

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