Economics & Business Management
ISSN Print: 3079-5214
ISSN Online: 3079-5222
https://doi.org/10.63313/EBM.9049

Measuring Rural Revitalization Performance Across Chinese Provinces

Juan Liu[1]*. Lingfeng Deng[2]
[1]College of Science, Hunan Institute of Technology, Hengyang 421002, China
[2]School of Economic and Management, Hunan University of Science and Engineering, Yongzhou, 425199, China
Email: hnhylj@hnit.edu.cn

How to cite this paper: Liu, Juan, & Deng, Lingfeng. (2025). Measuring Rural Revitalization Performance Across Chinese Provinces. Economics & Business Management, 1(2), 181-188. ISSN Print: 3079-5214; ISSN Online: 3079-5222.
https://doi.org/10.63313/EBM.9049
Published: 2025-05-08

Abstract

Promoting the steady implementation of the Rural Revitalization Strategy is not only an inevitable requirement for the development of socialism with Chi-nese characteristics but also a fundamental strategy concerning the national economy and people's livelihood. Rural revitalization plays a crucial role in enhancing social and economic development, improving residents' well-being, and fostering sustainable progress in rural areas.

In this study, an indicator system based on the five-dimensional framework—prosperous industries, ecological livability, civilized, effective governance, and affluent living—is constructed and analyzed systematically. The research em-ploys data from twenty secondary indicators across thirty-one provinces from 2014 to 2022. The entropy weight method is utilized to calculate the compre-hensive rural revitalization index. The findings reveal that the comprehensive level of rural revitalization has been steadily improving across provinces; however, spatial disparities have slightly widened. A distinct "East-Middle-West" descending gradient is observed in the spatial distribution of rural revitalization. From the perspective of the five dimensions, the devel-opment of civilized remains relatively low in most provinces, necessitating further efforts to enhance rural cultural and ethical standards. In contrast, the dimension of effective governance has witnessed significant reductions in re-gional disparities, with most provinces achieving relatively high levels of pro-gress.

Keywords

Entropy Weight Method; Rural revitalization; Measure

1. Introduction

In recent years, China has vigorously advanced the development of the "three rural" sectors—namely, agriculture, rural areas, and farmers—achieving remarkable outcomes. However, persistent challenges remain, including imbalanced urban-rural development, sluggish growth in farmers' incomes, and difficulties in agricultural modernization, all of which have become increasingly pronounced over time. Against this backdrop, the report of the 19th National Congress of the Communist

Party of China in 2017 proposed the Rural Revitalization Strategy. This strategy is to be implemented comprehensively under the 20-character guiding principle: "thriving businesses, pleasant living environments, social etiquette and civility, effective governance, and prosperity." Furthermore, it established phased objectives for 2020, 2035, and 2050, providing a clear roadmap for its execution.

By 2020, China had achieved extraordinary success in poverty alleviation, resolving a challenge of global significance. Consequently, the No. 1 Central Document of 2021 emphasized shifting the focus from comprehensive poverty eradication to realizing rural revitalization. It further outlined critical tasks such as ensuring food security, accelerating agricultural and rural modernization, and strengthening rural infrastructure and governance.

2. Literature Review

Rural revitalization is a fundamental strategy proposed by China based on its long-term rural development practices and tailored to its specific national conditions, addressing the needs of the people in the new era. While there is no direct equivalent in international theoretical research, relevant studies on rural residents' quality of life and satisfaction evaluations can provide valuable insights.

In terms of indicator selection , P.J. Cloke introduced the Rurality Index, emphasizing the importance of studying disparities in villagers' living standards . Schuessler, K.F. constructed a quality-of-life evaluation system incorporating ecological environment, social interactions, and residential conditions .

From a methodological perspective, Shamaei Ali employed multiple regression analysis to examine the relationship between economic drivers and the quality of life in suburban villages in Zanjan City.(Shamaei et al., 2024). Similarly, Lei Wang et al. applied principal component analysis (PCA) to assess the impact of new urban development on rural areas (Lei et al., 2000).

These international studies, though not directly aligned with China’s rural revitalization framework, offer methodological and conceptual references for evaluating rural development. Future research could further adapt these approaches to China’s unique socioeconomic and policy context while maintaining a focus on localized governance and sustainable development.

2.1. System of Indicators

Through an extensive review of the literature, it has been observed that the majority of scholars, including Qiang Min and others, construct the indicator system for rural revitalization based on five dimensions: prosperous industry, ecological livability, civilized rural culture, effective governance, and affluent living (Qiang et al., 2023). These dimensions align with the 20-character guiding principle for rural revitalization strategy articulated in the report of the 19th National Congress of the Communist Party of China. However, some scholars, such as Chen Junliang et al., adopt an alternative framework consisting of four dimensions: industrial development, in-

frastructure, urban-rural governance, and people's livelihoods (chen et al., 2021). Despite these variations, the predominant approach in academic research remains grounded in the five-dimensional framework derived from the Party's strategic conceptualization of rural revitalization. This reflects a broader consensus in the literature that the 20-character principle serves as the foundational theoretical basis for constructing comprehensive and policy-relevant indicator systems for rural revitalization in China.

2.2. Measurements

In the comprehensive measurement of rural revitalization, scholars have employed diverse methodological approaches to examine regional disparities, spatial patterns, and temporal trends. Lu Fengying et al. developed an entropy weight method-based model to investigate regional differentiation in rural revitalization, while Mao Jinhuang et al. utilized the Analytic Hierarchy Process (AHP) for indicator weight assignment . Regarding spatial analysis, Wu Zhaojun et al. applied cold-hot spot analysis and geographical detectors to examine spatial agglomeration patterns and differentiation characteristics. Li Nan et al. employed natural breaks classification and Moran's I index to conduct spatial correlation studies , and Meng Yi et al. performed cluster analysis of rural revitalization using systematic clustering methods . For temporal trend analysis, Qu Xiaojuan et al. adopted kernel density estimation to study the evolutionary trajectory of rural revitalization over time . These methodological applications demonstrate the multidimensional analytical frameworks employed in contemporary rural revitalization research, encompassing quantitative measurement, spatial econometrics, and temporal dynamics.

3. Construction of the Rural Revitalization

This study establishes a comprehensive evaluation framework for rural revitalization through a hierarchical indicator system comprising five primary dimensions and twenty secondary indicators. The construction methodology incorporates conceptual analysis and abstraction techniques to ensure theoretical rigor and practical relevance.

Table 1. Rural Revitalization Index System

Primary Indicators	Secondary Indicators	Indicator Explanation	Attribute
Industrial Prosperity	Grain yield per unit area	Grain output/grain sown area	Positive
	Per capita primary industry output	Primary industry output/rural population	Positive
	Land productivity	Primary industry output/agricultural land area	Positive
	Agricultural mechanization level	Total agricultural machinery power/crop sown area	Positive
	Per capita electricity consumption	Rural electricity consumption/rural population	Positive
Ecological	Forest coverage rate	Forest area/total land area	Positive

Primary Indicators	Secondary Indicators	Indicator Explanation	Attribute
Livability	Village road hardening rate	Hardened road area/total village road area	Positive
	Water supply coverage	Rural population with access to clean water/total rural population	Positive
	Fertilizer use per unit area	Agricultural fertilizer usage/crop sown area	Negative
	Water supply coverage	Rural population with access to clean water/total rural population	Positive
	Fertilizer use per unit area	Agricultural fertilizer usage/crop sown area	Negative
Rural Civilization	Cultural stations per capita	Number of rural cultural stations/rural population	Positive
	Proportion of high school+ education	Rural population with high school+ education/total rural population	Positive
	Rural divorce rate	Number of rural divorces/rural population	Negative
	Education & culture expenditure share	Rural education & culture expenditure/total rural consumption expenditure	Positive
	Illiteracy rate	Illiterate rural population/total rural population	Negative
Effective Governance	Urban-rural income ratio	Urban income/rural income	Negative
	Proportion of rural minimum living standard recipients	Rural population receiving minimum living allowance/total rural population	Negative
	Rural Engel coefficient	Food & alcohol expenditure/total consumption expenditure	Negative
Prosperous Living	Per capita rural income	Total rural income/rural population	Positive
	Per capita rural consumption expenditure	Total rural consumption/rural population	Positive
	Automobile ownership per 100 households	Number of automobiles owned/rural population (per 100 households)	Positive

4. Comprehensive Measurement and Result Analysis of Rural Revitalization Based on Entropy Weight Method

4.1. Data preprocessing

During the compilation of raw data, we identified instances of clustered missing values across specific years. To address these gaps systematically, we employed two distinct imputation methods tailored to the nature of the missing data:

Linear Interpolation. This method was applied to indicators with intermittent missing values, such as the village road hardening rate and tap water penetration rate for 2018 and 2019. Using SPSS’s linear interpolation function, we estimated missing values based on adjacent data points, ensuring temporal continuity while minimizing artificial distortion.

Linear Prediction. For cases where earlier reference data were unavailable—such as missing automobile ownership per 100 rural households in 2014—linear in-

terpolation was infeasible. Instead, we implemented SPSS’ s linear prediction algorithm, which extrapolates trends from the earliest available data points while accounting for underlying growth patterns.

During preliminary data examination, significant anomalies were identified in rural electricity consumption figures for 2021-2022. For instance, Shanghai's rural electricity consumption remained consistently around 100 billion kWh from 2014 to 2020, but dropped abruptly to 1 billion kWh in 2020-2021 - a two-order-of-magnitude discrepancy. Furthermore, conflicting records were found between different statistical yearbooks for the same year (2020), reporting 108.71 and 1.02 billion kWh respectively.

4.2. Entropy Weight Method

The entropy weight method represents an objective weighting technique that determines indicator weights based on the inherent dispersion characteristics of the data itself. This approach eliminates subjective bias in weight assignment, thereby more accurately reflecting the original data structure and yielding more reliable composite measurements for rural revitalization assessment.

The evaluation index system for China's rural revitalization constructed in this study incorporates multiple indicators with heterogeneous measurement units and orders of magnitude. To ensure comparability across indicators, we implemented standardized processing to transform all variables into dimensionless units. Furthermore, given the inclusion of inverse indicators in our framework, a preliminary normalization procedure was required to convert these measures into positively-oriented metrics.

$$x_{ij}^{'} = \max(x_{ij}^{'}) - x_{ij} \tag{1}$$

$$X_{ij}^{'} = \left[\frac{X_{ij} - \min(X_{1j}, X_{2j}, \cdots, X_{nj})}{\max(X_{1j}, X_{2j}, \cdots, X_{nj}) - \min(X_{1j}, X_{2j}, \cdots, X_{nj})} \right] + 0.01 \tag{2}$$

Where $X_{ij}^{'}$ represents the standardized value of the j-th indicator for the i th province,and $X_{ij}^{'}$ denotes the original value of the j-th indicator for the i th province, with $i = 1, 2, 3, \cdots, n$, $j = 1, 2, 3, \cdots, m$.

Calculation of the proportion of the i-th province's j-th indicator:

$$P_{ij} = \frac{X_{ij}}{\sum_{i=1}^{n} X_{ij}^{'}} \tag{3}$$

Determination of the j-th indicator's entropy value:

$$e_j = \frac{-1}{\ln(n) \sum_{i=1}^{n} X_{ij}^{'}} \tag{4}$$

Computation of the j-th indicator's divergence coefficient:

$$g_i = 1 - e_i \tag{5}$$

where: $0 \le g_j \le 1$

The weight of the j-th evaluation indicator relative to all indicators is calculated as

$$w_j = \frac{g_j}{\sum_{j=1}^{m} g_j} \tag{6}$$

The composite rural revitalization index for each province is computed as:

$$s_i = \sum_{j=1}^{m} w_j X_{ij}^{'} \tag{7}$$

4.3. Analysis of results

This study employs Python to calculate the rural revitalization index using the entropy weight method based on original panel data. Below we present partial results of the comprehensive rural revitalization scores and subsystem scores for 2022.

Table 2. Rural Revitalization Composite Index 2022.

Region	Composite Score	Industrial Vitality	Ecological Livability	Rural Civilization	Governance Efficacy	Prosperous Living
Jiangsu	0.601	0.529	0.402	0.388	0.543	0.563
Zhejiang	0.538	0.308	0.642	0.380	0.571	0.718
Beijing	0.486	0.190	0.649	0.493	0.570	0.774
Fujian	0.479	0.311	0.696	0.445	0.508	0.418
Guangdong	0.464	0.282	0.609	0.386	0.449	0.547
Shanghai	0.441	0.236	0.451	0.400	0.520	0.773
Shandong	0.432	0.372	0.428	0.342	0.543	0.473
Hebei	0.424	0.279	0.507	0.422	0.509	0.481
Tianjin	0.421	0.277	0.425	0.364	0.552	0.626
Hainan	0.405	0.332	0.587	0.422	0.459	0.277
Tibet	0.401	0.257	0.335	0.701	0.398	0.389
Liaoning	0.383	0.265	0.504	0.386	0.502	0.393
Hunan	0.382	0.233	0.530	0.482	0.493	0.398
Henan	0.380	0.284	0.393	0.397	0.520	0.425
Jiangxi	0.373	0.222	0.279	0.731	0.411	0.335
Xinjiang	0.373	0.159	0.636	0.496	0.453	0.405
Hubei	0.373	0.254	0.472	0.383	0.504	0.413
Heilongjiang	0.369	0.186	0.613	0.448	0.449	0.340
Jilin	0.369	0.214	0.583	0.390	0.486	0.351
Chongqing	0.369	0.216	0.568	0.387	0.506	0.354
Guangxi	0.364	0.177	0.693	0.409	0.423	0.327
Inner Mongolia	0.354	0.201	0.407	0.480	0.336	0.394
Anhui	0.353	0.231	0.419	0.380	0.448	0.417
Shaanxi	0.335	0.155	0.557	0.459	0.441	0.293
Sichuan	0.331	0.149	0.529	0.438	0.404	0.339
Ningxia	0.320	0.169	0.406	0.416	0.362	0.367

Region	Composite Score	Industrial Vitality	Ecological Livability	Rural Civilization	Governance Efficacy	Prosperous Living
Yunnan	0.317	0.124	0.661	0.365	0.371	0.356
Guizhou	0.314	0.143	0.599	0.416	0.376	0.283
Qinghai	0.305	0.108	0.360	0.476	0.338	0.485
Shanxi	0.292	0.113	0.410	0.486	0.457	0.289
Gansu	0.279	0.125	0.373	0.469	0.317	0.287

As evidenced in Table 1, China's top-performing provinces in rural revitalization are predominantly located in the eastern region, including Jiangsu, Beijing, and Zhejiang. Jiangsu Province leads the nation with a remarkable score of 0.6. These eastern provinces benefit from superior economic conditions, well-developed rural infrastructure, and strong government policy support, which collectively contribute to their outstanding performance. In contrast, central and western provinces demonstrate comparatively weaker development, with average comprehensive rural revitalization scores below 0.4. Gansu Province ranks particularly low at 0.278.

5. Conclusions and recommendations

Most provinces continue to demonstrate relatively low performance levels, indicating an urgent need for enhanced construction efforts in this dimension. Significant progress has been made in narrowing regional gaps, with most provinces now achieving relatively high performance levels.

With the exception of a few provinces like Tibet and Xinjiang, most regions should strengthen rural civilization development to address this weak point among the five key dimensions. Actively improving rural residents' cultural literacy. Expanding rural cultural station networks. Fostering a positive rural cultural environment.

Targeted assistance should be provided to rural areas in central and western provinces through: Enhanced infrastructure development in underdeveloped regions. These measures will promote rural revitalization while reducing regional disparities. Prioritizing Primary Industry Development. Government initiatives should focus particularly on improving per capita primary industry output, as this indicator. Reflects comprehensive industrial development levels. Correlates strongly with farmer income growth. Contributes to rural social stability. Implementation strategies should include. Industrial structure optimization based on local characteristics. Agricultural modernization and technology investment.

Acknowledgements

Project of Hunan Social Science Review Committee (XSP25YBC062);Scientific Research Project of Hunan Provincial Department of Education (24B0752);Scientific Research Project of Hunan Institute of Science and Technology (23XKYZZ36);Hunan Institute of Technology College Students' Innovation and Entrepreneurship Training Program Project (S202411528027);

References

[1] Li Lingpu, Wang Li. Evaluation of Rural Revitalization Development Level in Gansu Province [J]. Gansu Science and Technology Horizontal, 2024, 53(01): 1-9.

[2] Qu Xiaojuan. Measurement, Dynamic Evolution and Spatial Convergence of China's Rural Revitalization Level [J]. Journal of Weinan Normal University, 2024, 39(02): 50-65.

[3] Luo Qiaoling, Li Wenbin, Zhang Jing. Construction and Analysis of Compre-hensive Development Level Evaluation Index System for Rural Revitalization: A Case Study of Changning County, Sichuan Province [J]. Food Science and Tech-nology and Economy, 2023, 48(06): 32-35.

[4] Qiang Min. Evaluation of Rural Revitalization Development Level at Provin-cial Level in China [J]. Journal of Hebei Normal University of Science & Technol-ogy (Social Sciences), 2023, 22(04): 43-50.

[5] Wu Zhaojun, Wu Dafang, Li Shengfa, Liang Yixuan, Gao Ziya, Huang Siyu, Huang Sikai. Spatiotemporal Characteristics and Influencing Factors of Rural Re-vitalization Level: A Case Study of Guangdong Province [J]. Bulletin of Soil and Water Conservation, 2023, 43(06): 369-379.

[6] Rong Jing, Qiu Guitong, Fang Yuhan. Comprehensive Evaluation of Rural Re-vitalization Development Level in Jiangsu Province [J]. Rural Economy and Sci-ence-Technology, 2023, 34(21): 121-126.

[7] Yang Xinhua, Zhu Ning, Han Junying. Regional Differences and Convergence of Rural Revitalization Development Level in China [J]. Journal of Fujian Agri-culture and Forestry University (Philosophy and Social Sciences), 2023, 26(06): 16-28.

[8] Chen Li, Chen Pingxing. Comprehensive Evaluation of Rural Revitalization Development Level in Yunnan Province Using Principal Component Analysis and Entropy Method [J]. China Business & Trade, 2023, (18): 161-164.

[9] Lu Fengying, Pang Zhiqiang, Deng Guangyao. Measurement of Regional Dif-ferences and Formation Mechanism of Rural Revitalization Development in Chi-na [J]. Inquiry into Economic Issues, 2022, (04): 19-36.

[10] Li Nan. Construction of Rural Revitalization Indicator System in China, Progress Evaluation and Path Research [D]. Southwestern University of Finance and Economics, 2022.

[11] Meng Yi, Xuan Bing. Measurement of Rural Revitalization Development and Path Selection in Guangdong Province [J]. Southern Rural Area, 2021, 37(02): 34-39+55.

[12] Chen Junliang, Shi Huanhuan, Lin Ying. Research on Rural Revitalization Level Evaluation System and Method: A Case Study of Six Provinces in East China [J]. East China Economic Management, 2021, 35(04): 91-99.

[13] Mao Jinfeng, Wang Lintao. Construction of Rural Revitalization Evaluation Index System: Empirical Research Based on Provincial Level [J]. Statistics and Decision, 2020, 36(19): 181-184.

[14] Schuessler, K. F., & Fisher, G. A. Quality of Life Research and Sociology [J]. Annual Review of Sociology, 1985(11): 129-149.

[15] Cloke, P. J. An Index of Rurality for England and Wales [J]. Regional Studies, 2007, 11(1): 31-46.

[16] Wang, L., Takahashi, T., & Kuki, Y. Effect of Newtown Development on Changes in Surrounding Rural Area [J]. Journal of Rural Planning Association, 2000, 19(Suppl): 19-24.

[17] Shamaei, A., & Jafarpour Ghalehteimouri, K. Evaluating the Impact of Zanjan City's Economic Drivers on the Quality of Life in Peri-urban Villages: A Case Study of Do Asb and Payin Kouh Villages [J]. Frontiers of Urban and Rural Plan-ning, 2024, 2(1): 1-15.