International Journal of Multidisciplinary Research and Publications
ISSN (Online): 2581-6187

A Study on the Rural Revitalization Model Driven by the Integration of Green Ecological Industries for Sustainable Development-- Based on the Practices of Farmers' Cooperatives in Xuancheng City, Anhui Province

Le Yuan, Shichun Rui*
School of Management Science and Engineering, Anhui University of Finance and Economics, Anhui, 233030, China
*Corresponding Author: rsc0552@126.com

Abstract**—***This paper conducts an investigative study on the current state of various types and scales of farmers' cooperatives in Xuancheng City, Anhui Province. It analyzes their roles and shortcomings in cultivating green ecological industries, integrating resource, ecological, and cultural advantages into product advantages, and promoting industrial integration. On this basis, methods such as the AHP-SWOT model and cluster analysis are employed to construct an evaluation framework, quantifying the impact of green ecological industry integration on local economic and social development as well as environmental protection. Combining first-hand data obtained from field research with existing internet-based big data, this study employs Logistic regression and K-means clustering methods to categorize rural revitalization models into four types: the Poverty Alleviation and Well-off Model, the Talent Revitalization and Development Model, the Eco-Brand and Ecological Industry Model, and the E-commerce and Specialized Technology Model. The research findings ultimately provide insights for farmers' cooperatives, as market entities, to better integrate modern agricultural technologies with internet information technologies based on their own characteristics, in order to promote the integration of green industries such as agricultural production and sales, as well as the planning and promotion of related cultural and tourism products. It also offers valuable recommendations for the government in advancing sustainable rural revitalization*.

Keywords**—** *Green ecological industry; Sustainable development; Rural revitalization; AHP-SWOT method*.

I. INTRODUCTION

The report of the 20th National Congress of the Communist Party of China emphasized that, in the comprehensive effort to build a modern socialist country, the most challenging and demanding tasks still lie in the countryside. As a key strategic initiative for achieving Chinese-style modernization, rural revitalization is a comprehensive plan formulated by the Party Central Committee based on China's national conditions and stage of development. It is a practical necessity for narrowing the urban-rural gap and accelerating the realization of common prosperity, as well as an essential choice for addressing shortcomings in agricultural and rural modernization and for building a modern socialist country in all respects.

As a new form of rural collective economy, farmers' cooperatives play a significant role in accelerating the development of a modern rural industrial system and promoting rural revitalization. At present, there are approximately 2.25 million farmers' cooperatives across the country, with nearly 4,000 located in Xuancheng City. Against this backdrop, conducting an investigative study on the current state of various types and scales of farmers' cooperatives in Xuancheng City, Anhui Province holds strong practical significance. The study analyzes their roles and shortcomings in developing green ecological industries, transforming resource, ecological, and cultural advantages into product advantages, and achieving industrial integration.

At present, there is extensive research on rural development and revitalization in China. Scholar Meng Xiansheng believes that exploring new development paths for rural revitalization requires a coordinated approach to rural economic, cultural, social, and ecological development. Huang Zuhui argues that rural revitalization should be approached from an integration perspective, with an accurate understanding of the nature of China's rural areas and their evolving trends. There is a wealth of literature on rural revitalization and industrial integration; however, from the perspective of practical application and the deepening of reforms related to agriculture, rural areas, and farmers (the 'three rural' issues), existing research still has the following shortcomings: 1) The research lacks multidimensional perspectives. Existing research primarily focuses on rural development from the perspective of regional economic growth, lacking systematic studies that integrate rural revitalization with the development of green ecological industries; 2) There are limitations in the scope of existing research. Existing research tends to focus on general issues of industrial integration, but lacks in-depth study on the endogenous mechanisms of rural industrial integration and its connection to rural revitalization; 3) The research methods lack comprehensiveness. Existing studies rarely integrate multidisciplinary analytical methods, such as statistics and management, in their research.

Le Yuan and Shichun Rui, "A Study on the Rural Revitalization Model Driven by the Integration of Green Ecological Industries for Sustainable Development-- Based on the Practices of Farmers' Cooperatives in Xuancheng City, Anhui Province," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 7, Issue 11, pp. 438-442, 2025.

International research on the integration of green ecological industries to promote rural revitalization mainly follows two directions. One is the sharing of experiences from developed countries, such as the United States, Canada, and France, which often adopt strategies like extending industrial chains, utilizing cooperatives, and optimizing agricultural industries. Japan has achieved integration of the primary, secondary, and tertiary industries through its 'sixth industrialization' approach, while South Korea has implemented the 'Rural Integrated Industry Cultivation and Support Act' and conducted the 'New Village Movement.' On the other hand, scholars from some underdeveloped countries have explored the low utilization of green ecological industries and rural poverty issues, with studies from countries like Ghana and Bangladesh.

In summary, the integration of green ecological industries to promote rural revitalization is a development direction with broad prospects. From the perspective of domestic and international research and development status, this model has a solid theoretical and practical foundation and holds great potential for widespread application.

II. AHP-SWOT BASED EVALUATION INDEX SYSTEM FOR GREEN ECOLOGICAL INDUSTRIES

2.1 SWOT Analysis Concept of the Green Ecological Industry

SWOT analysis (Situational Analysis Method) is based on analyzing the unique attributes of a subject through investigation. In this study, the SWOT analysis method is used to systematically analyze the green ecological industry in Xuancheng by examining its unique characteristics, including internal strengths, internal weaknesses, external opportunities, and external threats.

Construction of the Judgment Matrix:

To ensure the accuracy and scientific validity of the study, this paper uses the ratio of selection rates within each SWOT group as the values in the judgment matrix, and the average selection rate ratios within the groups as the elements of the judgment matrix between SWOT groups.

$$Judgment\ Matrix\ A = \begin{Bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{Bmatrix},$$

where $a_{ij} = 1/a_{ji}$。

Through questionnaire surveys, factors within and between SWOT groups were compared in pairs, resulting in 15 secondary indicators and 5 judgment matrices. SPSS and Yaahp were then used for decision-making calculations to determine the weights of factors within and between SWOT groups. The weight values and rankings of each factor in the judgment matrices were obtained (see Tables 1 to 5).

As shown in Table 1, T (external threats) has the highest weight at 44.404%, indicating that the development of the green ecological industry faces significant external threats. O (external opportunities) ranks second with a weight of 25.899%, suggesting that policy support, technological advancements, and innovation-driven development have created favorable opportunities. The weights of S (internal strengths) and W (internal weaknesses) are relatively close, indicating that internal strengths can compensate for considerable internal weaknesses. Among the SWOT factors, internal strengths have the lowest weight in the development of the green ecological industry in Xuancheng, Anhui Province.

TABLE 1. Weights and rankings of factors in the inter-group SWOT judgment matrix

Inter-SWOT groups	S	W	O	T	Weights	Rankings
S	1	0.455	0.444	0.371	11.721%	4
W	2.197	1	0.468	0.391	17.976%	3
O	2.253	2.137	1	0.401	25.899%	2
T	2.699	2.56	2.496	1	44.404%	1

TABLE 2. Weights and rankings of the judgment matrix within the internal strengths group.

Within-S	S1	S2	S3	S4	S5	Weights	Rankings
S1	1	0.54	0.375	0.448	0.463	9.730%	5
S2	1.853	1	0.319	0.38	0.393	11.385%	4
S3	2.665	3.139	1	0.547	0.565	21.875%	3
S4	2.232	2.629	1.828	1	0.474	24.481%	2
S5	2.159	2.544	1.769	2.112	1	32.529%	1

As shown in Table 2, S5 (public willingness) has a weight of 32.529%, ranking first within the group, indicating that public willingness is the greatest support for the development of the green ecological industry in Xuancheng, Anhui Province. S4 (extent of publicity) and S3 (specialized farming with industrialization, technological advancement, and structural features) both have weights around 20%, ranking second and third within the group, respectively. S2 (specialized planting with industrialization, technological advancement, and structural features) and S1 (public foundation) have weights around 10%, with S1 (public foundation) having the smallest weight and ranking fifth.

As shown in Table 3, in the judgment matrix of internal weaknesses, W4 (limited resources) has the highest weight at 49.42%, indicating that limited resources are the biggest disadvantage in the green ecological industry in Xuancheng. W3 (green consumption concepts and green consumption habits) has a weight of 25.279%, ranking second in terms of weight. W2 (balance between environmental protection and industrial development) has a weight of 19.19%, ranking third. W1 (technological upgrading and innovation capabilities) has a weight of 9.111%, ranking fourth, indicating that the development of the green ecological industry in Xuancheng is less affected by weaknesses in technological upgrading and innovation capabilities.

TABLE 3. Weights and rankings of the judgment matrix within the internal weaknesses group

Within-W	W1	W2	W3	W4	Weights	Rankings
W1	1	0.356	0.347	0.28	9.111%	4
W2	2.806	1	0.377	0.304	16.190%	3
W3	2.879	2.65	1	0.312	25.279%	2
W4	3.573	3.289	3.206	1	49.420%	1

As shown in Table 4, in the judgment matrix of external opportunities, O3 (innovation-driven) and O1 (policy support) both have weights around 39%, ranking first and second in terms of weight, respectively. O2 (technological support) has the smallest weight at 20.966%. This indicates that the development of the green ecological industry in Xuancheng is

Le Yuan and Shichun Rui, "A Study on the Rural Revitalization Model Driven by the Integration of Green Ecological Industries for Sustainable Development-- Based on the Practices of Farmers' Cooperatives in Xuancheng City, Anhui Province," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 7, Issue 11, pp. 438-442, 2025.

relatively equally influenced by innovation-driven development, policy support, and technological support.

TABLE 4. Weights and rankings of the judgment matrix within the external opportunities group

Within-O	O1	O2	O3	Weights	Rankings
O1	1	1.863	0.977	39.061%	2
O2	0.537	1	0.524	20.966%	3
O3	1.023	1.907	1	39.973%	1

TABLE 5. Weights and rankings of the judgment matrix within the external threats group

Within-T	**T1**	**T2**	**T3**	**Weights**	**Rankings**
T1	1	0.222	0.148	7.727%	3
T2	4.513	1	0.282	25.849%	2
T3	6.741	3.543	1	66.424%	1

As shown in Table 5, T3 (significant market risk) has the highest weight at 66.424%, accounting for nearly 4/6, indicating that the development of the green ecological industry is heavily affected by market influences. T2 (high energy consumption) has a weight of 25.849%, ranking second, while T1 (lack of classic cases) has the smallest weight at 7.727%.

2.2 AHP Hierarchical Index Combined Weight Calculation and Ranking

Based on the combined weights and rankings of the indicators in the evaluation of the green ecological industry development in Xuancheng, Anhui Province, the following conclusions can be drawn: First, the development of Xuancheng's green ecological industry is significantly affected by external threats, with two secondary indicators ranking first and second. However, since the two secondary indicators under external opportunities rank just below T2 and T3, external opportunities can help mitigate these threats. Second, the internal strengths of the city's green ecological industry have relatively weak influence on industrial development, as their rankings are relatively low. Therefore, it is necessary to enhance the positive impact of internal strengths on the green ecological industry. Finally, the industry is more affected by external factors, so leveraging external opportunities can facilitate high-quality development.

TABLE 6. Results of hierarchical indicator combined weight calculation and ranking

Primary indicators	Inter-group weights	Secondary indicators	Within-group weights	Combined weights	Rankings
Internal strengths	0.1172	S1	0.0973	0.0114	15
		S2	0.1139	0.0133	14
		S3	0.2188	0.0256	12
		S4	0.2448	0.0287	11
		S5	0.3253	0.0381	8
Internal weaknesses	0.1798	W1	0.0911	0.0164	13
		W2	0.1619	0.0291	10
		W3	0.2528	0.0454	7
		W4	0.4942	0.0888	5
External opportunities	0.2590	O1	0.3906	0.1012	4
		O2	0.2097	0.0543	6
		O3	0.3997	0.1035	3
External threats	0.4440	T1	0.0773	0.0343	9
		T2	0.2585	0.1148	2
		T3	0.6642	0.2949	1

2.3 Constructing a Coordinate System for the Green Ecological Industry

The overall weight of each SWOT group is equal to the sum of the combined weights of its factors. The calculation results are as follows:

TABLE 7. SWOT comprehensive weight calculation results

Indicators	**Combined weights**	**Indicators**	**Combined weights**
Internal strengths	0.1171	External opportunities	0.259
Internal weaknesses	0.1797	External threats	0.444

Based on the comprehensive weight calculation results of the internal strengths group (S), internal weaknesses group (W), external opportunities group (O), and external threats group (T), the strengths (S) are taken as the positive half of the X-axis, weaknesses (W) as the negative half of the X-axis, opportunities (O) as the positive half of the Y-axis, and threats (T) as the negative half of the Y-axis. A rectangular coordinate system is established, with the four factors' comprehensive weights placed on the axes in sequence as follows: S(0.1171, 0), W(-0.1797, 0), O(0, 0.2590), and T(0, -0.444). The four points are then connected to construct the strategic quadrilateral for the development of the green ecological industry in Xuancheng, as shown in Figure 1.

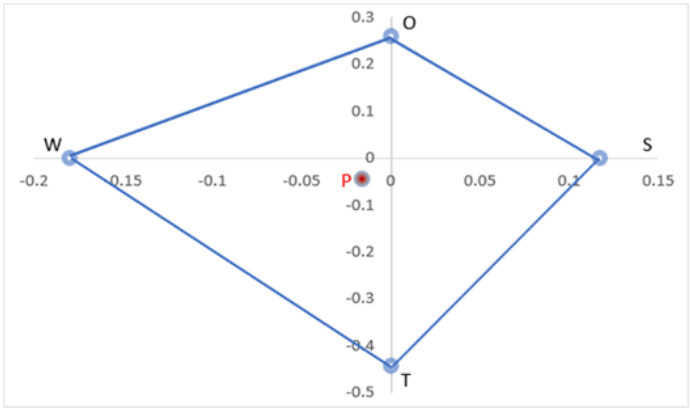

Figure 1. Strategic Quadrilateral Diagram for the Development of the Green Ecological Industry

Le Yuan and Shichun Rui, "A Study on the Rural Revitalization Model Driven by the Integration of Green Ecological Industries for Sustainable Development-- Based on the Practices of Farmers' Cooperatives in Xuancheng City, Anhui Province," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 7, Issue 11, pp. 438-442, 2025.

In the SWOT coordinate system, the result of the interaction between internal strengths, internal weaknesses, external opportunities, and external threats is the determination of the centroid P of the quadrilateral. The quadrant where point P is located represents the priority development strategy. The calculation is as follows:

$$P(X,Y) = (\frac{\sum x_i}{4}, \frac{\sum y_i}{4}) = (-0.01565, -0.04625)$$

By calculating the centroid P of the quadrilateral (-0.01565, -0.04625), it is located in the third quadrant, the stable strategy zone. Therefore, the current stage of green ecological industry development in Xuancheng is primarily focused on a stable strategy.

Finally, the area of each triangle in the quadrants is calculated to determine the order of development strategy selection. The calculation results are as follows: S1 = 0.0152, S2 = 0.0233, S3 = 0.0399, S4 = 0.0260. Since the areas of the four triangular regions are ordered as S3 > S4 > S2 > S1, the development strategy selection order for the green ecological industry in Xuancheng is: stable strategy, diversification strategy, turnaround strategy, and growth strategy.

III. Multidimensional Indicator Analysis Of Cluster Analysis

Indicator analysis based on k-means clustering

Through the designed questionnaire survey, cluster analysis was conducted on 12 participating variables. There were significant differences between the two-cluster and four-cluster solutions (both with significance levels of 0.000 < 0.05). However, when the number of clusters was set to two, some significance values exceeded 0.05, indicating that this clustering solution is not reasonable. When the number of clusters is set to four, all groups differ from one another. Therefore, it is clear that the groups involved in promoting the development of farmers' cooperatives and the integration of green industries can be categorized into four distinct types.

The F-value is the ratio of the mean square between groups to the mean square within groups and is used to test whether the differences between groups are significant. In ANOVA, when the F-value is large and the corresponding significance level (e.g., p-value) is less than the set significance threshold (usually 0.05), the null hypothesis that 'the means of all groups are equal' is rejected, indicating that there are significant differences between groups. Therefore, a cluster number of 4 is considered ideal. (See Table 8)

TABLE 8. ANOVA

Indicators	Mean square	Mean square 2	F	significance
Increase fiscal and financial support	30.052	0.059	505.699	0
Strengthen technical training and talent support	4.094	0.139	29.423	0
Promote industrial integration and large-scale operations	3.913	0.071	54.913	0
Strengthen policy guidance and regulation	27.927	0.037	764.989	0
Improve the market system and brand development	0.517	0.033	15.477	0
Promote the integrated development of primary, secondary, and tertiary industries in rural areas	26.149	0.09	289.163	0
Provide government support and subsidies	30.283	0.055	553.412	0
Strengthen technical guidance and training	0.356	0.034	10.351	0
Introduce relevant policies to encourage industry development	2.674	0.083	32.08	0
Build market platforms to promote product sales	3.662	0.227	16.158	0
Purchase green products and services	11.933	0.136	87.93	0
Restrict the development of high energy-consuming and high-pollution industries	30.683	0.067	456.669	0

Based on the clustering table, dividing the 12 samples into four categories better reflects the different sustainable rural revitalization models that are suited to the various measures taken to promote the development of farmers' cooperatives and the integration of green industries.

Category 1: Increase fiscal and financial support, strengthen policy guidance and regulation.

The government plays a certain role, and this measure is more suitable for supporting the development model of poverty alleviation and the pursuit of a moderately prosperous society. The '5+' model, which explores the combination of 'Party branch + cooperative + base + e-commerce + poor households,' helps lift poor households out of poverty and enables farmers to become prosperous.

Category 2: Strengthen technical training and talent support, promote the integration and large-scale operations of the green ecological industry, and drive the integrated development of primary, secondary, and tertiary industries in rural areas.

These measures emphasize the coordinated integration of talent and technology, promoting the close connection between agricultural production, agricultural product processing, sales, and other links, forming a complete industrial chain. By strengthening collaboration and cooperation between industries, resource sharing and complementary advantages can be achieved.

Category 3: Provide government support and subsidies, purchase green products and services.

These measures are more suitable for establishing ecological brands and specialty industries, creating a distinctive local brand. Land is transferred through the 'land transfer + equity participation' method, with farmers' cooperatives as the core, to build high-standard green ecological product production bases.

Category 4: Build market platforms to promote product sales, and restrict the development of high energy-consuming and high-pollution industries.

These measures aim to promote the sale of green ecological products by building a brand-new platform, while also suppressing the development of high energy-consuming and high-pollution industries. The integration of the green ecological industry with rural e-commerce enables green

Le Yuan and Shichun Rui, "A Study on the Rural Revitalization Model Driven by the Integration of Green Ecological Industries for Sustainable Development-- Based on the Practices of Farmers' Cooperatives in Xuancheng City, Anhui Province," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 7, Issue 11, pp. 438-442, 2025.

ecological products to truly form a unified and complete large market nationwide.

IV. Summary

(1) Currently, the construction of the green ecological industry based on rural cooperatives has achieved initial development.

Through literature review and field research, it has been found that the development of farmers' cooperatives has gradually matured. As market entities, cooperatives have promoted the modernization of green ecological industry development, provided services to farmers, increased their income, and improved the marketization level of rural areas. The historic transformation of promoting rural revitalization is continuously advancing.

(2) Government-level measures

Although the green ecological industry has made significant progress, the emergence of various new issues urgently needs to be addressed. The government can further play an irreplaceable role in promoting the integration and large-scale operation of the green ecological industry, improving the market system and brand development, and strengthening technical training and talent support.

a) Build green ecological agricultural science and technology parks, attract research and development institutions and enterprises to settle in, and promote technological innovation in green ecological agriculture. Promote the use of advanced information technologies, such as the Internet of Things and big data analysis, to improve the intelligence level of green ecological agricultural production. Promote the deep integration of green ecological agriculture with industries such as tourism, processing, and culture, and expand the green ecological agriculture industry chain. Develop new business forms such as leisure agriculture and rural tourism.

b) Introduce relevant policies to clearly support the 'green ecological industry cluster development' model, encourage enterprises, cooperatives, farmers, and others to participate, and form close industrial chain cooperation. Provide fiscal subsidies, tax incentives, financial support, and other policy measures to reduce the costs and risks of 'green ecological industry cluster development,' and stimulate the enthusiasm of all parties. Learn from successful cases such as Lingchuan County, establish a 'green ecological industry cluster' mechanism, optimize and integrate projects, and enhance industry aggregation.

c) Strengthen financial support and subsidies, and actively purchase green products and services. Actively establish green ecological brands and specialty industries, creating distinctive local brand names. At the same time, transfer land through the 'land transfer + equity participation' method, with farmers' cooperatives as the core, to build high-standard green ecological agricultural product production bases. Local specialty brands have unique regional characteristics and cultural connotations, which can enhance the market competitiveness of products.

(3) National policy-level measures

Rural revitalization, as an important strategic project for achieving Chinese-style modernization, is a comprehensive plan made by the Central Committee of the Communist Party of China based on China's national conditions and development stage. Using rural cooperatives as market entities to promote the integration of modern green ecological industries and drive rural revitalization holds broad prospects and significant importance.

a) Increase financial and fiscal support at the national level, strengthen policy guidance and regulation. Establish long-term outlook expectations for the green ecological industry to boost the confidence of industry professionals.

b) Build a national market platform to promote the sale of green ecological products, and legally restrict the development of high energy-consuming and high-pollution industries. Integrate the green ecological industry with the rural e-commerce industry, allowing green ecological products to truly form a unified and complete large market nationwide.

Funding

Funding: This work was supported by China National College Student Innovation and Entrepreneurship Training Program (grant number: 202310378336).

References

[1] Ji Qing, Li Quan, Xiao Pan. Rural Revitalization Strategy from the Perspective of Economic Reform and Financial Development - Interpretation of the 2023 Central No. 1 Document from the ESG Perspective [J]. Agricultural Development and Finance, 2023(04):25-30.

[2] Ran Xinlei, Shi Yue. Research on the Rural Tourism Development Strategy of the Oroqen Ethnic Group in the Greater Khingan Mountains Region Based on SWOT-AHP [J]. Anhui Agricultural Sciences, 2024, 52(24):98-102.

[3] Chi Wenhu. Research on the Development Strategies of Ice and Snow Sports Tourism in Shandong Province [D]. Shandong University of Finance and Economics, 2023.DOI:10.27274/d.cnki.gsdjc.2023.001132.

[4] Li Lingyan, Zhao Jinyang. Evolutionary Game Simulation Analysis of Rural Ecological Environment Governance - From the Perspective of Normalized Collaborative Governance among Government, Enterprises, and Villagers [J]. Mathematical Practice and Understanding, 2023,53(07):89-101.

[5] Tian Lixiu, Jiang Jian. Research on the Efficiency of Financial Support for Rural Industrial Integration under the Rural Revitalization Strategy - Taking Yunnan as an example [J]. Journal of Yunnan Agricultural University (Social Sciences Edition), 2019,13(01):11-18.