



Research on the Performance Evaluation of Ecological Livestock Farming Cooperatives—A Case Study of Eight Livestock Cooperatives in Guizhou

Zhitao Wan*

School of Management, Guizhou University of Commerce, Guiyang, Guizhou, 550014, China

*Corresponding author's email: 68366141@qq.com

Abstract. Considering the development of livestock farming cooperatives, this study establishes a performance evaluation system for ecological cooperatives, covering economic, social, ecological, and sustainable development performance. Using this evaluation system, the performance levels of eight livestock farming cooperatives in Guizhou Province were assessed. The results indicate that the proposed evaluation system demonstrates high feasibility. Analysis of the results reveals that the overall performance of livestock farming cooperatives is relatively low, with economic performance scoring the lowest, followed by social performance, sustainable development performance, and ecological performance. Therefore, it is recommended to enhance multifaceted support, improve cooperative quality, standardize profit distribution systems, strengthen product branding, and emphasize talent development to achieve high-level development of ecological livestock farming in Guizhou Province.

Keywords: Ecological Livestock Farming; Specialized Farmer Cooperatives; Performance Evaluation; Analytic Hierarchy Process

1 Introduction

Over years of development, livestock farmer cooperatives in Guizhou Province have facilitated the transition from traditional to ecological livestock farming. However, critical questions remain regarding the development capacity of livestock farmer cooperatives and the means to enhance their operational quality to ensure sustainable development. To address these questions, this study conducted a survey of eight livestock farming cooperatives in Guizhou Province. By applying a constructed performance evaluation system, the development levels of these cooperatives were assessed, uncovering existing issues in their growth. Based on the evaluation results, recommendations are proposed to further promote the development of livestock farming cooperatives in Guizhou Province.

2 Literature Review

Many scholars have conducted research on the performance of cooperatives. Some researchers suggest that cooperatives should focus on non-financial performance indicators because these represent intangible aspects of cooperatives and demonstrate that the organization is owned by its members^[1]. Examples include ecological performance^[2] and innovation capability^[3]. Moreover, performance evaluation systems should not only emphasize the current performance of cooperatives but also consider their capacity for sustainable development^[4].

Existing studies on cooperative performance evaluation systems often neglect the variations in production and service characteristics among different types of farmers' cooperatives. This oversight may lead to biased performance conclusions. performance evaluation systems should be developed based on the production or service characteristics of cooperatives to accurately measure their performance^[5]. Therefore, constructing a performance evaluation system tailored to the characteristics of the livestock industry would enable a more scientific and precise assessment of the performance levels of livestock cooperatives.

3 The Construction of the Performance Evaluation System for Ecological Livestock Farming Specialized Farmer Cooperatives

3.1 The Indicator Design

Based on an analysis of existing literature and considering the characteristics of production and operations in animal husbandry, this study designs a performance evaluation system for ecological animal husbandry farmers' professional cooperatives. Adhering to the principles of scientific rigor, systematic structure, and operational feasibility, the system encompasses 23 indicators across four key dimensions: economic performance, social performance, ecological performance, and sustainable development performance (Table 1).

3.2 Determination of Weights

This study uses the Analytical Hierarchy Process (AHP) to assign weights to performance evaluation indicators for livestock cooperatives in Guizhou Province. A panel of six experts, including two agricultural experts from universities, two officials from livestock management departments, and two heads of livestock cooperatives, were invited to score the judgment matrix using the Delphi method. The scoring results were then used for assigning and validating the indicator weights, as shown in Table 1.

Table 1. Performance Evaluation System and Weights for Ecological Animal Husbandry Cooperatives

Target Level	Criterion Level			Indicator Level		
	Primary Indicator	Weight	Secondary Indicator	Weight	Specific Indicators	
Performance Evaluation System for Ecological Animal Husbandry Cooperatives (A)	Economic Performance (B1)	0.3757	Economic Scale (C1)	0.0939	Number of members (D1)	0.0148
					Total member contributions (D2)	0.0234
					Total annual output value of the cooperative (D3)	0.0558
					Annual surplus of the cooperative (D4)	0.0876
					Average annual profit returns per member (D5)	0.139
			Operational Efficiency (C2)	0.2818	Demonstration cooperative grade (D6)	0.0552
					Number of local employees hired (D7)	0.0228
					Number of non-member households supported (D8)	0.0597
					Total value of uniformly sold agricultural products (D9)	0.0521
					Number of government awards received by the cooperative (D10)	0.0141
	Social Performance (B2)	0.2019	Promotion of Rural Social Development (C4)	0.0673	Number of livestock skill training sessions conducted by the cooperative (D11)	0.037
					Certification for pollution-free agricultural products (D12)	0.0162
					Proportion of waste resource utilization (D13)	0.04
					Proportion of pollution-free livestock product production and sales (D14)	0.04
					Proportion of environmentally friendly feed inputs (D15)	0.04
	Ecological Performance (B3)	0.24	Environmental Protection (C5)	0.12	Net land productivity (D16)	0.06
					Level of land intensification (D17)	0.06
					Presence of stable partnerships with enterprises (D18)	0.0236
					Support from research institutions (D19)	0.0103
					Support from government projects (D20)	0.027
	Sustainable Development Performance (B4)	0.1824	Core Competitiveness (C8)	0.1216	Education level of the cooperative director (D21)	0.0304
					Number of highly skilled personnel (D22)	0.0304
					Product brand recognition (D23)	0.0608

Notes: 1. Waste resource utilization rate measures the ratio of manure being recycled into usable resources; 2. Net land productivity reflects the product value per unit land area within a specific time, calculated as: $\text{Net Land Productivity} = (\text{Product Value}) / (\text{Land Area} \times \text{Time})$; 3. Land intensification level measures direct material and technological input costs per unit land area within a specific time, calculated as: $\text{Land Intensification Level} = (\text{Input Cost}) / (\text{Land Area} \times \text{Time})$;

4 Application of the Performance Evaluation System for Ecological Animal Husbandry Cooperatives

This study conducted on-site and telephone surveys of eight cooperatives in Fenggang County, Weining County, and Qingzhen City.

Since the original data have inconsistent measurement units, the data could not be directly compared. Therefore, this study first processed the raw data using dimensionless methods. Next, the weights of each determined indicator were multiplied by their respective standardized indices, and the weighted values were aggregated to calculate the comprehensive performance scores of each livestock cooperative. The specific data are shown in Table 2.

Table 2. Performance Evaluation Values of 8 Sample Farmers' Professional Cooperatives

Cooperative Code	Economic Performance	Social Performance	Ecological Performance	Sustainable Development Performance	Comprehensive Performance	Rank
A	23.7983	13.4128	15.5600	12.0300	64.8011	8
B	22.8838	13.7824	18.1738	12.1660	67.0060	7
C	31.6252	15.5313	17.3393	14.1900	78.6858	2
D	23.9671	14.1686	19.5732	14.7980	72.5069	4
E	25.4097	15.5239	19.8399	15.4820	76.2555	3
F	24.4507	16.7266	18.3196	12.1660	71.6628	5
G	31.6471	16.5088	21.7853	14.8740	84.8152	1
H	22.9852	12.1193	19.6027	13.1100	67.8173	6

5 Empirical Results Analysis

5.1 Economic Performance

The average economic performance score of the eight sample cooperatives is 25.8459, with a score rate of 68.79%. At the secondary indicator level, the score rate for economic scale is 70.22%, while that for operational efficiency is 68.32%, both of which are relatively low. At the indicator level, the average annual profit return per member scored the lowest at 66.63%, followed by the annual output value (67.72%) and surplus (67.84%). This reflects the overall small scale of the sample cooperatives, low profitability, and insufficient annual profit returns for members. The primary reasons include limited self-owned capital, poor access to financing channels, difficulty achieving economies of scale, and restricted profitability.

5.2 Social Performance

The average social performance score of the sample cooperatives is 14.7217, with a score rate of 72.92%. At the secondary indicator level, the score rate for promoting the rural economy is 69.73%, indicating that the sample cooperatives have limited impact

on rural economic development. At the indicator level, the lowest score rate is for the number of times cooperatives received government commendations, at 66.25%, followed by the score rate for the total value of agricultural products sold through unified channels, at 67.85%. This is primarily due to the loose connection of interests between cooperatives and their members, as members do not sell their agricultural products through the cooperative. The score rate for the number of non-member farmers supported by the cooperatives is 69.93%, reflecting insufficient capacity to drive non-members. However, the score rate for promoting rural social development is relatively high at 79.29%, which can be attributed to regular technical training sessions conducted by the cooperatives, effectively enhancing members' livestock farming skills.

5.3 Ecological Performance

The average ecological performance score of the sample cooperatives is 18.7742, with a score rate of 78.23%. Analyzing the lower-level indicators of ecological performance, the score rates for environmental protection and resource utilization are quite similar, at 78.88% and 77.58%, respectively. A further breakdown of the indicators reveals that the score rate for the production and sales ratio of non-polluting livestock and poultry products is the lowest, at 70%. This suggests that the cooperative managers lack strong brand and quality awareness. For instance, one manager stated that sales were doing very well, and there was no need to apply for non-polluting agricultural product certification. The score rate for the resource utilization of manure is 86%, which is closely linked to the efforts of Guizhou Province in actively promoting pollution prevention and reduction projects in animal husbandry and improving the basic infrastructure of livestock farms.

5.4 Sustainable Development Performance

The average score for sustainable development performance is 13.602, with a score rate of 74.57%. At the secondary indicator level, the score rate for social resource support is 78.72%, which is higher than the core competitiveness score rate of 72.50%. At the indicator level, government project support has the highest score rate of 85%, reflecting the policy and financial support provided by the government during the development of cooperatives. The lowest score rate, at 70%, is for support from research institutions, the number of high-quality talents in cooperatives, and product recognition. This indicates that the sample cooperatives face challenges such as insufficient investment in research, a shortage of high-quality talent, and low product recognition in their development process.

6 Conclusion

The study demonstrates that the overall ecological performance of the cooperatives in Guizhou Province is below average. In the ecological livestock rating index system, the ecological performance score is 78.23%, the highest among the assessed indicators.

Social performance and sustainable development performance levels are comparable, with scores of 73.32% and 74.57%, respectively. The economic performance score is 68.79%, the lowest among the performance categories.

7 Recommendations

7.1 Perspective of Cooperatives

Boosting Financing: Develop innovative financial services, attract social capital, and secure government funding to address financial challenges. **Improving Management:** Refine profit distribution, attract skilled talent, and standardize operations to increase member income. **Scaling and Branding:** Integrate resources for larger-scale operations, obtain green certifications, and build unique brands to enhance market competitiveness. **Leveraging Technology:** Collaborate with research institutions to adopt new technologies, improve efficiency, and reduce ecological costs.

7.2 Perspective of Members

Skill Improvement: Provide training to enhance members' production and management skills. **Building Trust:** Increase financial transparency to foster trust and engagement. **Diversifying Income:** Support secondary industries like processing and tourism to boost income. **Sharing Benefits:** Add value to products and ensure fair profit distribution to strengthen collaboration.

References

1. BI Q, WANG Y, 2018. Research on the Choice of the Patterns for Performance Evaluation of Agricultural Environment Management of New Agricultural Business Entities: Based on the Empirical Analysis of 37 Districts and Counties in Chongqing[J]. *Ecological Economy*, 34(2): 221-226+231.
2. IMAZ O, EIZAGIRRE A, 2020. Responsible Innovation for Sustainable Development Goals in Business: An Agenda for Cooperative Firms[J]. *Sustainability*, 12(17): 6948. DOI:10.3390/sul2176948.
3. KYAZZE L M, NSEREKO I, NKOTE I, 2020. Cooperative practices and non-financial performance of savings and credit cooperative societies[J]. *International Journal of Ethics and Systems*, 36(3): 411-425. DOI:10.1108/IJOES-06-2020-0087.
4. SHAFI M, 2021. Sustainable development of micro firms: examining the effects of cooperation on handicraft firm's performance through innovation capability[J]. *International Journal of Emerging Markets*, 16(8): 1634-1653. DOI:10.1108/IJOEM-11-2019-0989.
5. ZHANG C, KONG X, 2019. Influence of Organizational Embeddedness on the Performance of Farmers' Cooperatives: Empirical Analysis Based on Multiple Cases[J]. *Finance and Trade Research*, 30(2): 64-73. DOI:10.19337/j.cnki.34-1093/f.2019.02.006.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

