

Synergetic Structure Types and Mechanisms of Multiple New Agricultural Business Entities under Village-Community Integration

Ruozhong Zhao*, Yuchuan Yang, Hao Feng

Nanjing Agricultural University, Nanjing, China

*Corresponding author: 14123124@stu.njau.edu.cn

Abstract

This paper examines the collaborative development of diverse new agricultural business entities in the context of urban-rural structural transformation. Drawing on collaborative governance theory, it develops an analytical framework based on four core dimensions: power structure, resource integration, responsibility allocation, and interest linkage. Through multi-case comparison within a unified institutional setting, three collaborative structure types are identified: authority-integrated, platform-empowered, and hierarchical-responsibility models, each associated with specific resource conditions and development stages. The study's main contribution lies in linking collaborative structure types with phases of rural development, highlighting their stage-specific and context-dependent nature. It reveals an evolutionary path from centralized mobilization to institutionalized division of labor and further to responsibility-based specialization. In addition, three key mechanisms-resource capitalization, interest embedding, and industrial extension-are identified to explain how multi-stakeholder collaboration is realized. Overall, the paper proposes a broadly applicable analytical framework that enriches theoretical understanding and offers practical insights for optimizing rural organizational models.

Keywords

Synergetic Governance; Synergetic Structure; New Agricultural Business Entities.

1. Introduction

Amid urban-rural structural transformation and agricultural modernization, traditional dispersed farming has become increasingly incompatible with large-scale and market-oriented development. As land transfers and capital inflows reshape the rural economy, diverse new agricultural operators have emerged, leading to differentiated organizational forms. In this context of multiple actors and complex interests, building stable and efficient coordination mechanisms has become a central challenge for rural industrial upgrading.

Existing studies tend to focus on single cooperation models or policy experiences, outlining specific practices but lacking a systematic structural framework. As a result, they struggle to explain variations in coordination models across different resource conditions and development stages. Limited attention to the interaction among power structures, resource integration, and interest linkages further constrains theoretical depth [1].

To fill these gaps, this paper applies collaborative governance theory and conceptualizes multi-stakeholder interaction as an open system. It proposes an analytical framework based on four core dimensions-power structure, resource integration, responsibility allocation, and interest linkage-forming a typological model. Through comparative case analysis, three collaborative structures are identified: authority-integrated, platform-empowered, and hierarchical-responsibility models, each aligned with specific development phases [2][3].

The findings suggest that collaborative optimization evolves from centralized integration to platform-based coordination and hierarchical division of labor. By constructing a generally applicable structural model and reinforcing typological comparison, this study provides a clearer analytical lens for understanding rural multi-stakeholder collaboration.

2. Theoretical Basis and Analytical Framework

2.1. Structural Differentiation and Synergy Demand of New Agricultural Operators

New agricultural operators refer to organizational forms formed in the process of agricultural modernization, based on household management, and engaged in agricultural production and operation through large-scale, specialized and market-oriented approaches. They mainly include family farms, large specialized households, farmers' cooperatives and agricultural enterprises. Compared with traditional small farmers, such operators have stronger capabilities in capital input, technology application and industrial chain integration, and can allocate resources and connect with the market on a larger scale, serving as an important driving force for the upgrading of agricultural production structure [4].

Against the background of urban-rural structural transformation and accelerated factor flow, agricultural operators have gradually shown a trend of scale expansion and type differentiation. On the one hand, land transfer and labor transfer have promoted the large-scale restructuring of agriculture, enabling some operators to form specialized production structures; on the other hand, capital inflow and improved marketization have strengthened the rational orientation of agricultural operation, driving the adjustment of planting structure and industrial layout.

In this process, operators present obvious differentiation. One type relies on endogenous resources and conducts operation based on household labor and contracted land; the other type engages in agricultural production through capital integration and large-scale land expansion. Different operators differ in risk-bearing capacity, market dependence and social embeddedness, leading to diversified behavioral strategies and development paths. While improving efficiency, competition among operators may also cause problems such as rising land prices, the tendency of non-grain cultivation and unbalanced resource allocation.

Under the pattern of coexistence of multiple operators, agricultural production faces challenges including resource fragmentation, differentiated interest demands and intensified market risks. A single operator can hardly complete industrial upgrading and risk response independently, and the coordination cost among multiple operators rises accordingly. Therefore, constructing an effective synergy mechanism to realize resource integration and interest linkage under the background of structural differentiation has become a practical demand for sustainable agricultural development. Thus, synergy among multiple operators is no longer an optional arrangement, but an inevitable requirement in the process of institutional transformation [5].

2.2. Synergetic Governance Theory

Synergetics originates from the study of the evolution laws of open systems, and its core lies in explaining how multiple functionally differentiated subsystems form an overall ordered structure through interaction. In complex systems, key variables (order parameters) can dominate other variables, thus promoting the evolution of the system from a disordered state to a stable structure. Synergy is not simple cooperation, but the amplification of overall effects through structural coordination [6].

In the field of social governance, synergetics is applied to explain the process of interaction and cooperation among multiple subjects around public affairs. Synergetic governance emphasizes that different subjects establish institutional connections in the division of powers and responsibilities and interest game, and achieve overall goals through rule arrangement and

resource integration. In this process, power structure, interest linkage mode and coordination mechanism constitute the key factors for system ordering.

As a typical open system, rural society is characterized by scattered resource factors, diverse interest subjects and complex development goals. Under the background of “village-community integration”, village-level organizations undertake both grassroots governance functions and collective economic operation, forming an organizational structure intertwined with political and economic functions. In this structure, village committees, cooperatives, enterprises and farmers constitute an interdependent action network, and their synergy mode directly affects the performance of agricultural development.

2.3. Construction of Analytical Framework: Types of Synergetic Structure

Based on the above theoretical basis, this paper constructs an analytical framework from the perspective of synergetic structure, focusing on the following four dimensions: First, the degree of power centralization of the action core; Second, the mode of power and responsibility distribution among subjects; Third, the path of resource integration; Fourth, the interest linkage mechanism.

According to the different combinations of the above dimensions, the synergetic structure of multiple operators under the background of village-community integration can be summarized into three types:

Authoritative integration structure: Taking village committees as the action core with high power concentration, synergy is realized through administrative mobilization and unified resource allocation.

Platform empowerment structure: Village committees mainly undertake the functions of platform construction and rule-making, and a relatively equal interactive relationship is formed among market subjects.

Hierarchical responsibility structure: A clear responsibility chain and division system are formed, and synergetic operation is realized through hierarchical governance and professional collaboration.

As shown in the Figure 1, different structural types correspond to different development stages and resource conditions, with significant differences in governance logic and operation effects. Under this analytical framework, this paper conducts a typological comparison of practices in typical villages and towns in Jintang County, so as to reveal the structural logic and realization mechanism of synergy among multiple agricultural operators.

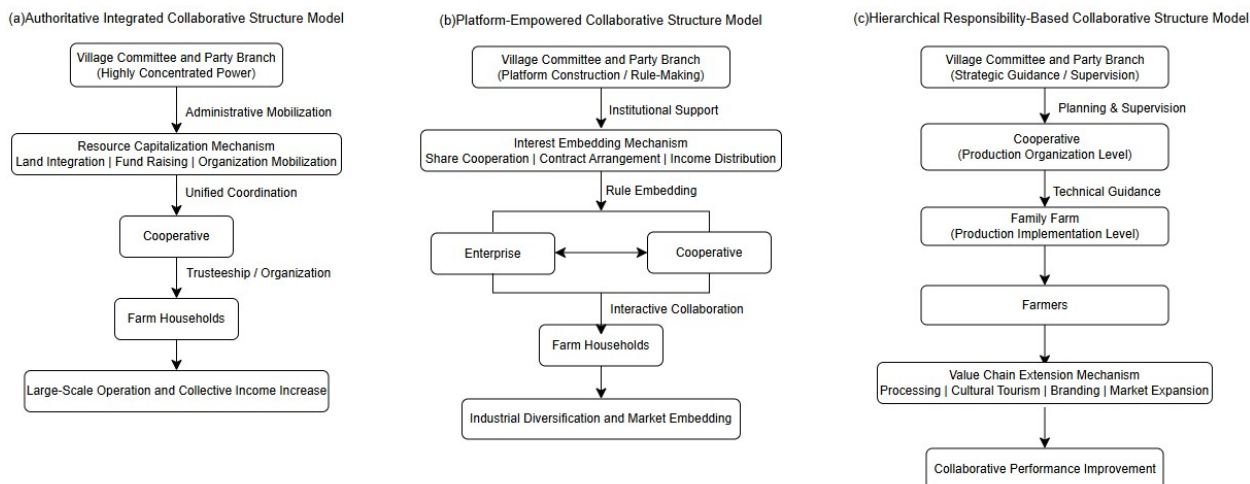


Figure 1. Embedded structure diagram with different mechanisms

3. Research Design

3.1. Research Method and Case Selection

This paper adopts the multi-case comparative research method, guided by the theoretical construction of synergetic structure types. Multi-case research emphasizes the replication and comparison of the same theoretical proposition in different situations, and extracts an explanatory analytical framework by identifying differentiated paths and common mechanisms. Compared with single-case research, multi-case research is more conducive to revealing the comparative relationship among structural types and enhancing the robustness of theoretical inferences.

Case selection follows the principle of theoretical sampling, emphasizing the identification of structural differences under similar institutional backgrounds. As an agricultural county in the eastern part of Chengdu City, Jintang County has a high proportion of agriculture in its county economic structure, and is dominated by hilly terrain with scattered land and obvious differences in resource endowments, presenting typical characteristics of agricultural structural transformation. Under a relatively unified policy and institutional environment, different villages and towns within the county show diversified development paths, providing an appropriate field for comparing different synergetic structures.

On this basis, this paper selects 3 representative village and town cases through field research and preliminary data screening. These cases differ in resource conditions, industrial foundation and development stage, but all involve the synergetic practice of multiple agricultural operators.

3.2. Data Sources and Analysis Methods

The research data mainly come from three sources: first, field research and on-site observation from February 2024 to February 2025; second, semi-structured interviews with members of village committees, heads of cooperatives, enterprise representatives and farmers; third, relevant public materials and village-level archives.

In the analysis process, this paper sorts out and summarizes materials around dimensions such as “power structure”, “resource integration”, “interest linkage” and “industrial integration”, and identifies the common mechanisms and differential paths of different synergetic structures through cross-case comparison. Conducting comparison under the same county institutional environment helps reduce the interference of macro-policy differences on the analysis results, and focuses the research on synergetic structure and its operation mechanism.

4. Multi-case Comparison: Typological Analysis of Synergetic Structures

4.1. Authoritative Integration Structure - A Case Study of Wan'an Village

(1) Situational Constraints and Structural Formation Conditions

Wan'an Village is located in a hilly area with fragmented farmland, scattered resources, and a weak agricultural foundation. Over a long period, the combination of land fragmentation and labor outflow has led to low agricultural production efficiency and slow development of the village collective economy. Under the circumstances of scattered resource factors and insufficient market connection capacity, agricultural operators lack a stable synergy mechanism, resulting in high organizational and coordination costs. Under such conditions, it is difficult for individual operators to achieve scale expansion and risk sharing. There is an urgent need to form an action core with integration capabilities to reduce transaction costs and promote resource concentration.

(2) Structural Characteristics: A Highly Centralized Action Core

In the synergy practice of this village, the village committees form a clear power core, undertaking key functions such as resource integration, rule-making, and organizational

mobilization. The synergetic structure presents a “center-radiation” pattern, in which the village committees act as *order parameters*, imposing structural constraints and guidance on other subjects.

Under this structure, cooperatives, farmers, and other market entities operate around village-level organizations, with the power-responsibility relationship dominated by a vertical responsibility chain. Through unified planning and centralized decision-making, the village committees reduce the negotiation cost among multiple subjects and improve action consistency.

(3) Synergy Mechanism: Resource Integration and Organizational Mobilization

At the operational level, the village committees take the lead in establishing collectively-run agricultural cooperative organizations. By integrating scattered land resources, such organizations promote substitute cultivation and production trusteeship services to realize large-scale operation. Through unified organization of cultivation, sowing, prevention, and harvesting, agricultural production processes are standardized and mechanized, and the scale effect gradually emerges.

After the stable operation of cooperative organizations, village-level organizations further integrate external technical and market resources to strengthen professional support and capacity building. The whole synergy process shows an obvious path of “administrative mobilization - resource concentration - scale expansion”. The improvement of synergy efficiency mainly relies on the organizational capacity and authority of the action core.

(4) Structural Performance and Institutional Implications

Under the authoritative integration structure, the degree of land scale and agricultural mechanization has been significantly improved, and the income of the village collective economy has increased. Centralized coordination alleviates the problem of resource dispersion and obviously reduces organizational and coordination costs.

In terms of institution, this structure has strong initial advantages in situations with weak resource endowments and insufficient market foundation. Its advantage lies in realizing rapid resource concentration and unified action in the short term, but its sustainable operation highly depends on the leadership capacity and governance stability of village-level organizations. Once the action core is weakened, the synergetic structure may face adjustment pressure.

Similar structural characteristics are also reflected in other cases, such as the practice of multi-village joint infrastructure construction, which all present a centralized integration logic led by village-level organizations.

4.2. Platform Empowerment Structure - A Case Study of Yunqiao Community

(1) Situational Trigger and Structural Transformation Conditions

Yunqiao Community is located in a hilly area with a relatively single agricultural industrial structure and a weak collective economic foundation. In the early stage, stable income was obtained through land and fish pond leasing. However, the tenant withdrew capital in 2020, interrupting the original income structure and exposing the collective economy to sustainable risks. Under the background of limited resources and frustrated business models, the original path relying on external operators is unsustainable, and the village needs to explore new organizational forms to restore asset operation capacity.

Different from the situation of authoritative integration, Yunqiao Community does not simply suffer from resource scarcity but faces the demand for institutional restructuring caused by the failure of the original cooperative structure.

(2) Structural Characteristics: Platformization and Decentralized Collaboration

In the process of synergy reconstruction, the village committees do not adopt a highly centralized decision-making model. Instead, consensus is formed through the villagers’

Congress, and the collective economic organization takes the lead in re-operating assets. On this basis, village-level organizations gradually turn to the role of platform construction by establishing corporatized operation entities, introducing social capital, and selecting local personnel to participate in management.

In this structure, the village committees mainly undertake the functions of rule-making and resource coordination, while specific operation and market decision-making powers are gradually delegated to corporatized entities and professional management teams. The synergy relationship presents a relatively equal interactive feature with a relatively decentralized power structure. Multiple subjects form a cooperative network through contracts and equity arrangements.

(3) Synergy Mechanism: Market Embedding and Multi-Agent Interaction

In terms of operation mechanism, the community participates in market-oriented operation by investing collective assets as shares, introduces social capital and professional management forces, and forms a composite structure of "collective capital + market entities + local operators". Through resource reallocation and industrial integration, aquaculture, catering services and other formats are gradually linked to promote industrial chain extension.

This synergy path does not rely on the strong mobilization of a single action core, but realizes multi-agent collaboration through institutionalized cooperation and interest linkage mechanisms. The village committees play the role of institutional guarantee and risk coordination rather than directly intervening in specific operational decisions.

(4) Structural Performance and Institutional Implications

Under the platform empowerment structure, the scale of collective assets has been significantly expanded, operating income has increased steadily, and the industrial form has transformed from single agriculture to a composite format. Decentralized collaboration releases the vitality of subjects, improves the degree of market embedding, and stabilizes the synergy network.

In terms of institution, this structure is applicable to situations with a certain industrial foundation that need transformation and upgrading through institutional innovation. Its advantage lies in enhancing subject autonomy and innovation ability, but it also puts forward higher requirements for the clarity of institutional design and the stability of interest distribution.

Similar synergy logic can also be observed in the market-oriented development path of Zhuxin Village, which realizes multi-agent co-governance through share cooperation and enterprise embedding, but this paper will not elaborate further.

4.3. Hierarchical Responsibility Structure - A Case Study of Lihuagou Village

(1) Development Foundation and Structural Formation Conditions

Lihuagou Village is located in an area with convenient transportation and a relatively mature industrial foundation, with a relatively stable agricultural production system and initially formed characteristic industries. Under superior resource conditions and a relatively solid market foundation, village development has shifted from the "resource integration stage" to the "industrial deepening stage". The focus of synergy is no longer simple resource concentration, but the construction of a clear division system and responsibility chain to improve industrial organization efficiency and brand value.

(2) Structural Characteristics: Hierarchical Responsibility and Professional Division of Labor

In the synergetic structure of this village, a top-down hierarchical responsibility system has been formed. The village committees mainly undertake strategic planning, resource coordination, and institutional guarantee functions; cooperatives and industrial consortia are responsible for production organization and technical services; family farms and farmers

undertake specific production tasks. The power-responsibility relationship presents hierarchical and institutionalized characteristics.

Compared with the previous two structures, this model neither relies on highly centralized mobilization nor emphasizes equal decentralized consultation, but achieves stable operation through clear division of labor and responsibility definition. The village committees play a leading role in industrial development direction, land coordination, and brand building, while market-oriented entities are responsible for specific operation and resource allocation.

(3) Synergy Mechanism: Industrial Consortium and Value Chain Extension

In terms of operation mechanism, Lihuagou Village has established land share cooperative organizations and industrial consortia around characteristic industries, forming a multi-level organizational structure of "collective organization - cooperative - family farm". Production links are integrated through order agriculture, trusteeship services, etc. On this basis, the integration of agriculture and tourism and brand building are promoted to realize industrial chain extension.

Meanwhile, village-level organizations expand industrial space by revitalizing collective assets and introducing social capital, while specific operational activities are undertaken by professional entities, thus forming a "strategy-execution" hierarchical structure in governance. This mechanism effectively reduces internal uncertainty and improves the level of professional division of labor.

(4) Structural Performance and Institutional Implications

Under the hierarchical responsibility structure, the industrial scale has expanded steadily, characteristic products have formed certain brand influence, and integrated development of agriculture, tourism and other formats has been realized. The collective economic income has increased, and the stability of the industrial system has been enhanced.

In terms of institution, this structure is applicable to villages with a good industrial foundation and entering the deepening development stage. Its advantage lies in improving governance efficiency and brand value through responsibility chains and professional division of labor, but its operation premise is a relatively mature industrial foundation and organizational capacity.

Similar hierarchical responsibility synergy logic can also be observed in the industrial integration practice of Gongjia Village, which promotes characteristic industrial development through clear division of labor and share cooperation, but this paper will not elaborate further.

5. Cross-case Comparison and Extraction of Synergy Mechanisms

5.1. Comparative Logic of Synergetic Structure Types

Based on the comparative analysis of the three types of synergetic structures, it can be found that the synergy among multiple new agricultural operators is not a single model, but presents structural differentiation with changes in development stages and resource conditions. Different types of synergetic structures differ significantly in power centralization, resource integration approaches and responsibility distribution patterns.

The authoritative integration structure is characterized by a highly centralized action core. By strengthening organizational mobilization and resource coordination, it achieves rapid start-up in contexts with scattered resources and a weak market foundation. The platform empowerment structure, on the basis of existing development, constructs a multi-agent interactive network through institutionalized decentralization and contractual arrangements to enhance market embedding. The hierarchical responsibility structure realizes industrial deepening and branded development through clear responsibility chains and professional division of labor.

The three types of structures are not superior or inferior to each other, but institutional arrangements corresponding to different development stages and situational conditions. Synergetic structures show obvious stage and context dependence, and their evolution direction reflects a progressive logic from centralized mobilization to divided cooperation and then to deepened hierarchical responsibility.

5.2. Structural Evolution of the Role of Village Committees

Cross-case comparison shows that the role of village committees in synergetic structures presents dynamic evolution. In the initial stage of development, village committees usually act as direct leaders, integrating resources and reducing coordination costs through centralized decision-making and administrative mobilization. In the transformation stage, their role gradually shifts to platform builder and institutional guarantor, promoting inter-agent interaction through rule design and interest coordination. In the stage of industrial deepening, they undertake more functions of strategic guidance and risk coordination, focusing on macro planning and brand building.

This role evolution reflects the differences in institutional functions undertaken by grassroots organizations at different stages. Village committees are both the initiators of synergetic structures and the maintainers of institutional order, and their way of exercising power adjusts with the complexity of synergetic structures.

5.3. Differentiation and Restructuring of the Roles of Multiple Agents

With the evolution of synergetic structures, the roles of new agricultural operators have also changed. In the stage of resource integration, cooperatives and farmers are mostly in a passive participation position. In the platform stage, enterprises and professional management entities are gradually embedded, forming a contractual cooperation network. In the hierarchical responsibility structure, each entity undertakes clear responsibilities according to professional division of labor, forming a stable industrial consortium.

The changes in agent roles indicate that multi-agent synergy is not simple aggregation, but structural restructuring through functional differentiation and institutional arrangements. The interactive relationship among agents shifts from one-way dependence to multi-directional cooperation, and the synergetic network is gradually institutionalized.

5.4. Three Key Mechanisms for Synergy Realization

Behind different structural types, three key mechanisms for the operation of multi-agent synergy can be summarized.

First, the resource capitalization mechanism. Through land integration, asset revitalization and the introduction of social capital, resource concentration and scale expansion are realized. Resource capitalization provides the material basis for the initiation and deepening of synergy. Second, the interest embedding mechanism. Through share cooperation, income distribution arrangements and employment promotion, the interest structures of collectives, enterprises and farmers are embedded in the same institutional framework, reducing opportunistic risks and enhancing the stability of synergy. Third, the industrial extension mechanism. Through industrial chain extension and the integration of agriculture, culture and tourism, agriculture is promoted to upgrade from single production to a complex value chain, achieving scale effect and brand spillover effect.

The above mechanisms show different intensities and combinations in different structural types, and jointly constitute the operational foundation of multi-agent synergy.

6. Conclusion

This study applies collaborative governance theory to compare three typical villages within the same institutional context, revealing how diverse new agricultural business entities display structural differentiation under different resource conditions and development stages. The findings show that collaborative structures are not uniform models but differentiated institutional arrangements shaped by combinations of power allocation, resource integration, and interest linkage. Each type demonstrates distinct strengths in reducing transaction costs, improving organizational capacity, and enhancing industrial stability, reflecting stage-specific adaptability. From a social science perspective, the paper places multi-actor collaboration within a framework of structural reorganization and institutional evolution, highlighting the key role of grassroots organizations in governance networks. It further identifies three core mechanisms-resource capitalization, interest embedding, and industrial chain extension-to explain the internal logic of collective economic growth and industrial upgrading. Future large-scale comparative research could further strengthen the explanatory capacity of this framework.

References

- [1] Guo Xiaoming, Lü Zhuofan, Zhou Xiaojuan. Holistic Governance and Rural Resilient Development: A "Four-Dimensional" Theoretical Analysis Framework [J]. *Social Science Research*, 2024, (04): 13-22.
- [2] Wen Hong, Lin Bin. Compliance Confirmation: A Vertical Coordination Mechanism for Breakthrough Innovation in Grassroots Governments-An Examination of District A's Establishment of an Urban-Rural Integration Pilot Zone [J]. *Journal of Public Administration*, 2023, 20(02): 1-11+164. DOI: 10.16149/j.cnki.23-1523.2023.02.001.
- [3] Li Hongjia. Research on Collaborative Governance of Government-Purchased Public Services Based on the SFIC Model [J]. *Administration and Law*, 2024,(10):70-79.
- [4] Xiong Lei, Zhang Qi, Tang Huiling, et al. Research on Collaborative Development Between New Agricultural Business Entities and Smallholder Farmers Based on Evolutionary Game Theory [J]. *Journal of Chongqing University of Technology (Natural Science)*, 2024, 38(09): 260-269.
- [5] Jiang Yichen. Research on Collaborative Governance of Rural Ecological Environment in Province S under the Context of Rural Revitalization [D]. Xi'an University of Technology, 2024. DOI: 10.27398/d.cnki.gxalu.2024.001174.
- [6] Zhou Juan. Research on Multi-stakeholder Collaborative Participation in Rural Human Settlements Governance [D]. Guizhou Minzu University, 2024. DOI:10.27807/d.cnki. cgzmz.2024.000192.