Research on Equilibrium Strategies and Mechanism Design of Stakeholders in Rural Industrial Integration Development from the Perspective of Game Theory

Wenyu Wang
School of Cooperative Economics, Zhejiang Institute of Economics and Trade, Hangzhou 310018, Zhejiang, China
Corresponding author: Wenyu Wang (e-mail: annawxa@vip.163.com)

ABSTRACT Rural industrial integration is a key direction for implementing the rural revitalization strategy, extending agricultural value chains and improving rural economic sustainability. However, this process involves complex interactions among stakeholders such as government, enterprises, farmers, and cooperatives, and is often constrained by interest conflicts, information asymmetry, insufficient risk sharing, and cooperation failure. From the perspective of game theory, this paper treats stakeholders as decision-makers in strategic relationships and analyzes their behavioral logic and interest conflicts during rural industrial integration. The study reveals the micro-mechanism of interest imbalance in noncooperative games, with particular attention to the distortion effects of strategic choices under information asymmetry. It further explores how effective contract design, institutional arrangements, and platform mechanisms can guide stakeholder behavior toward long-term stable cooperative equilibrium. Through theoretical modeling and simulation analysis, the study shows that cooperative game mechanisms can significantly improve system welfare. Effective mechanism design is therefore essential for resolving incentive incompatibility, risk-sharing constraints, and information asymmetry problems in rural industrial integration.

INDEX TERMS rural industrial integration, game theory, stakeholders, equilibrium strategy, mechanism design

I. INTRODUCTION

RURAL industrial integration serves as a key measure to break down the urban-rural divide by facilitating the synergistic evolution of agriculture with material processing and cultural tourism to extend the industrial chain. However, practical observation shows that the process of rural industrial integration is fraught with challenges, and its success depends heavily on the effective collaboration among the diverse stakeholders involved. These stakeholders include the government, which leads policy supply and environment creation; enterprises, which invest capital and technology; farmers, who provide core resources and labor; and cooperatives, which play a coordinating role. Each stakeholder makes decisions based on its distinct resource endowments, objective functions, and risk preferences: the government pursues macro-level social benefits, policy performance, and regional stability; enterprises aim to maximize market profits and minimize investment risks; Farmers are in a state of superposition of limited rationality and livelihood vulnerability. Their decision-making includes the pursuit of stability in short-term economic income, and is also deeply affected by social trust, information asymmetry and risk perception; and cooperatives need to balance the efficiency of collective action with the rights and interests of individual members. In the absence of effective coordination, the strategic interactions among all parties are prone to falling into a "prisoner's dilemma." For example, companies may reduce investment in special assets because they are worried about farmers defaulting, and if farmers lack an effective organized risk-sharing mechanism, they may refuse to participate in new cooperation models because they are worried about market risks; in fact, through the collective actions of cooperatives, farmers can transform individual risks into collectively manageable risks, while passive wait-and-see often leads to them being gradually marginalized in the reconstruction of the industrial chain, but facing higher long-term risks. Excessive government intervention may stifle market vitality, while the weakening of cooperative functions leads to a break in communication ties. This divergence of goals and conflict of strategies constitutes a deep-seated structural contradiction in the integration of rural industries. In this paper, the main analytical paradigm is introduced in terms of game theory, it develops the model of the game analysis with four main stakeholders in order to simulate the micro-foundations and evolutionary trends of interest conflicts in the process of rural industrial integration in a systematic manner. The model takes information asymmetry as the core constraint and describes the cooperation obstacles caused by cognitive biases and information differences in performance capabilities among various subjects in strategic interactions. On this basis, the aim of this study is to understand what contractual and institutional set-ups i.e. mechanism design can be utilized to direct the strategic options of all the parties between short-term non-cooperative equilibrium seeking profit maximization to long-term win-win cooperative equilibrium. This study helps to understand the intimate driving mechanisms behind rural industrial integration and address research gaps in micro-interactions by analyzing the synergy between local agriculture innovation. Furthermore, it serves to support the construction of a more sustainable and comprehensive model of rural industrial development, providing theoretical and policy-wise frameworks for the high-quality advancement of the regional economy.

II. RELATED WORK

The driving mechanism and structural constraints of rural industrial integration development are diversified. Xiaomeng et al. [1] used the TOPSIS model to quantitatively measure, rank and compare the development level of rural characteristic industries in different districts and counties in Xi'an metropolitan area. Yadav et al. [2] constructed a comprehensive index to systematically evaluate the sustainable development level of handicraft industry from multiple dimensions such as economic sustainability, socio-cultural impact, environmental friendliness, and skill inheritance and innovation, providing tools for strategic planning. Through in-depth analysis of the development of new industries in a rural area of Quebec, Canada, Doloreux et al. [3] examined the roles played by different actors and their initiative in identifying and utilizing local/non-local resources and creating new industrial opportunities. Li et al. [4] measured and spatially visualized the coupling and coordination level at the county level in China. Ye et al. [5] summarized the current development trend based on observations and literature review of rural industrial revitalization practices in China. Fang [6] systematically expounded the evolution of urban-rural integration development theory from the perspective of human geography and development economics. Monda et al. [7] designed a multi-stakeholder participation framework that embeds digital technology into the rural development policy cycle (from problem identification to monitoring and evaluation). Vladimirov [8]'s analysis confirms that there is a significant positive correlation between the level of rural development and the performance of agricultural complexes. Peng [9] clarifies the dynamic relationship between the scale of rural finance, financial efficiency and rural industrial development. Mack et al. [10]'s review shows that broadband access does have a positive impact on rural areas, including promoting business establishment, increasing employment opportunities, increasing property value and improving accessibility to education and medical services. Most studies regard the various stakeholders as atomized units that passively respond to policies or markets, or only emphasize their one-way function, failing to place them in a strategic interaction framework. This paper aims to introduce game theory as the core analytical tool, construct a game analysis model that includes multiple stakeholders such as government, enterprises, farmers, and cooperatives, and is committed to revealing the micro-foundation of interest conflicts in rural industrial integration. On this basis, it explores contract design and institutional arrangements that can guide the strategic choices of all parties to tend towards long-term cooperative equilibrium.

III. METHODS

A. IDENTIFICATION OF STAKEHOLDERS AND STRATEGIC SPACE

First, the four key stakeholders in the game are precisely defined, and their respective sets of strategic choices are clarified. The government, as the representative of public interest and rule-maker, aims to maximize total social welfare, specifically by promoting regional economic growth, ensuring food security, maintaining social stability, and achieving ecological protection. The government's strategic space can be simplified into two typical choices: one is "high-intensity support," which involves deep intervention through a proactive policy toolkit including fiscal subsidies, tax breaks, infrastructure support, and priority project approval; the other is "low-intensity intervention," which primarily provides basic public services and maintains market order without large-scale dedicated resource investment. However, it must be emphasized that high-intensity support is often accompanied by the redistribution effect of financial resources, which may produce negative externalities to other non-supported industries or adjacent areas through channels such as transfer payment crowding out, administrative attention deflection, and land index tilt. If the costs of such policy spillovers are not made explicit in the benefit matrix, the net benefits of government intervention will be overestimated. Therefore, the opportunity cost of government intervention will be taken into consideration in the subsequent mechanism design of this article to avoid simply equating "high intensity" with "high efficiency." Enterprises, as important responders to market demand and carriers of capital and technology, aim to maximize long-term investment returns while controlling operational risks. Their strategic choices mainly revolve around their level of participation and depth of cooperation: one is "deep participation," manifested in long-term dedicated asset investment, establishing close interest linkages with farmers, and introducing advanced technologies and management models; the other is "shallow participation," manifested in short-term, speculative investment, maintaining simple market transaction relationships with farmers, and having a low risk tolerance. As the main body of agricultural production and core members of rural communities, farmers typically prioritize income stability and livelihood security in their decision-making, exhibiting a clear risk-averse characteristic. The "complete rationality" assumption of classic game theory faces challenges here: farmers are not proficient in long-term discount optimal strategy calculators, but show strong loss aversion and status quo preference under conditions of incomplete information and lack of risk response tools. Behavioral economics summarizes this type of decision-making characteristic as "ecological rationality" - seeking satisfactory solutions rather than optimal solutions under specific constraints. Farmers' strategic space can be summarized as follows: first, "active cooperation," which involves actively participating in new business models (such as land-shareholding and standardized production), receiving skills training, and fulfilling contractual commitments; second, "passive observation," which involves adhering to traditional business methods, maintaining a cautious attitude towards new developments, and favoring short-term cash income. This kind of "risk aversion" is not a departure from rationality, but a rational choice under the constraints of limited information and livelihood vulnerability. Against the backdrop of rapid advancements in rural industrial integration, "passive observation" is by no means a low-risk strategy. As the industrial chain integrates and market concentration increases, farmers outside the cooperative system will face systemic risks such as shrinking sales channels and outdated technical standards, and their long-term livelihoods will be even more uncertain. Cooperatives (or similar farmer cooperative organizations) play a crucial role in connecting small farmers with the large market and coordinating collective action. Their strategic choices are reflected in their organizational effectiveness: first, "active coordination," which involves effectively integrating member resources, representing farmers in negotiations, providing integrated production, supply, and marketing services, and conducting fair and reasonable internal distribution; second, "passive operation," where organizational form outweighs content, service functions are weakened, and it is difficult to effectively protect the interests of members. The strategy choices of these four types of subjects are not isolated, but interdependent and mutually influential. The decision of any party must take into account the possible reactions of the other parties, thus forming a complex game network. To simplify the analysis, the initial model assumes that the information is relatively sufficient, that is, each subject has a basic understanding of the game structure (strategy space, payoff function), but the problem of information asymmetry in reality will be given special consideration in the mechanism design section [11,12]. The strategy choices of these four types of agents are not isolated but interdependent and mutually influential. This study explicitly takes information asymmetry as the core premise of model construction. The initial game is set as an incomplete information game, where each agent has cognitive biases about each other's strategic motivations, costs and benefits, and performance capabilities. This is the key micro-mechanism leading to the cooperation dilemma.

B. GAME TYPES AND PAYMENT STRUCTURES

The first paradigm that is mostly combined in this model is non-cooperative game theory to cooperative game theory. Non-cooperative game theory examines the potential equilibrium points (including Nash equilibrium) that may be achieved when agents decide independently on their self-interest optimizing principles in the face of no binding obligations or other effective coordination measures. These equilibria are generally inefficient, such as the case when everyone is conservative. Cooperative game theory, in turn, examines the possible benefits obtainable by way of binding agreements and alliances and how to equitably and reasonably apportion the cooperative surplus to result in Pareto-optimal results. The relative assignment simulation is the reflection of the profit and loss of the combinations of different strategies of each subject. The price is not an exact financial amount, but a relative index of utility/satisfaction. In illustration, when enterprise adopt a strategy of high-intensity government support, deep participation, active cooperation of farmers, and active coordination of cooperatives, it is expected to create a better total system welfare and payments of all parties are relatively high, on the contrary, when enterprises adopt Strategy of shallow participation to eliminate risks, total system welfare may fail, as well as, the farmers lose their incomes and active coordination of cooperatives fail. Through the comparison of the payment structure in cases of varied strategies mixes one can discern those cases where the phenomenon of the so-called prisoner dilemma (individual rationality results in collective irrationalities) will occur and the ones where the phenomenon of collective rationality can be promoted in order to achieve the cooperation equilibrium. It pays attention to the multiplicity of equilibrium and its stability, and research into how to leave a low-level equilibrium and transition to a high-level equilibrium [13].

C. MECHANISM DESIGN FRAMEWORK

Mechanism design is the main outcome of the research, and its purpose is to design game rules to guide individual stakeholders to spontaneously self-organize to meet system goals (i.e., cooperative equilibrium) and work for personal interests. The design of an effective mechanism should be based on some basic principles: first, incentive compatibility, ensuring that honest reporting of privately held information and agents adopting cooperative strategies are the best responses to difficulties; second, risk sharing, establishing an effective mechanism to ensure the reduction of uncertainty, especially the uncertainty borne by farmers and enterprises; third, information transparency, minimizing information inconsistencies, and punishing opportunistic behavior through technical or non-technical means. The contract design structure will be based on three levels of specific mechanism design: the first level is contract design, formulating long-term contracts such as minimum purchase price, profit recovery, liability for breach of contract, etc., to stabilize the expectations of all parties; the second level is institutional arrangements, establishing an industrial integration development council composed of representatives from multiple parties, responsible for organizing supervision and resolving differences; the third level is platform construction, using digital technology to establish a public information service platform involving production, sales, and credit. This section will simulate the impact of the introduction of these mechanisms on key strategy selection and final equilibrium results [14,15].

IV. RESULTS AND DISCUSSION

A. ANALYSIS OF THE INTERACTION AND EQUILIBRIUM OF MAIN STRATEGIES

When subject to simulation analysis, it is found that the optimal scenario of the integrated rural industrial development will be the type of strategy mix, i.e., a high-intensity government support policy, deep enterprise engagement, proactive farmer cooperation, and active coordination by cooperatives; this will lead to highly efficient cooperative equilibrium. With such equilibrium, policy resources are optimally used, capital and technology smoothly brought to the fore, production factors are easily harmonized and general welfare of the system is high. Nevertheless, such a balance is not stable by nature and rather weak. The difficulty of the game is that any action of any entity based on the short-term self-interest of an action can result into a chain reaction that leads to the workings of the system into a low-level non-cooperative equilibrium. For example, when enterprises receive government support, they may choose to participate superficially in order to save costs (such as lowering procurement standards or reducing technical guidance). This will inhibit farmers' willingness to cooperate. If cooperatives fail to effectively play their role in risk buffering and interest coordination, farmers may turn to a passive wait-and-see attitude. However, this "passive observation" does not have a real risk avoidance effect in the stage of deepening industrial integration. When standardized production and contract farming become the mainstream, farmers operating in isolation will find it difficult to connect with the market, and their actual operating risks and income volatility will increase significantly. The efficiency of the government policy investment will be significantly lower, and the role of cooperatives in coordination will also lose its power, bringing the situation of grip of inactivity and development stagnation to a standstill. Table 1 shows the payouts (expressed as a relative index of 0-10) and the total welfare index of the system for each subject under four typical strategy combinations. The data clearly reveals the value and dilemmas of cooperation. The values shown in Table 1 are calibrated based on the following method: First, a field survey was conducted in six rural industrial integration demonstration counties, and 186 valid questionnaires and interview records were collected, including government subsidy intensity, enterprise investment return rate, income comparison of farmers before and after participating in cooperatives, cooperative operating costs, etc.; secondly, the analytic hierarchy process was used (AHP) invited 18 experts in the fields of agricultural economics, industrial organization and game theory to conduct pairwise comparisons and weightings on the relative benefits of four types of stakeholders under eight typical strategy combinations. Finally, the objective weights of expert ratings and field data were integrated through the entropy weight method to obtain a standardized relative index in the 0-10 range. The total welfare index is defined as the arithmetic sum of the payment values of four stakeholders to characterize the overall synergy of the system.

It can be seen that the fully cooperative scenario (total welfare index 28), is not only much better, but also the worst scenario, in this case the total non-cooperation scenario (index 13). Nevertheless, it must be mentioned that with an intensive government-sponsored situation, when companies opt to give superficial involvement, their own payments (6) are lower than those of profound involvement (7), but the disparity is not vital. Moreover, as soon as it is predicted that the farmers might not cooperate, a more rational approach consists of selecting the strategy of shallow participation to avoid risk. This clearly shows the reasoning of the prisoner dilemma: rationality (vigorous risk-aversion) of the individual could result in irrationality (waste of the total welfare) of the people. Thus, the solution to this predicament is to create external regulations that will transform the expectations of each subject regarding payment, and the decision to cooperate is the best one in this case.

B. SENSITIVITY ANALYSIS AND RISK FACTORS

The external environment of integrated development of rural industries is extremely complex and constantly changing. The payment structure of the game may be greatly influenced by external shocks like changes in the market price, policy modification, and liberalization by natural catastrophes hence promoting the change in the equilibrium state. Sensitivity analyses were performed on the vital risk factors in order to test the strength of the various equilibrium states. The findings of simulation indicate that risk coping abilities of different stakeholders largely differ. Farmers are the most vulnerable at the individual level, bearing the brunt of external shocks due to their limited resource endowments and means of risk diversification. However, this vulnerability precisely highlights the necessity of organized risk management through cooperatives—through mechanisms such as collective bargaining, joint procurement, and mutual guarantee funds, cooperatives can transform the individual risks of scattered farmers into manageable collective risks. This disadvantage exacerbates their risk aversion, leading them to adopt conservative strategies in the absence of effective organizational safeguards. However, it needs clarification that so-called "conservative strategies" (such as passive observation) are no longer truly low-risk

TABLE 1. Simulation Comparison of Main Strategy Payments in Rural Industrial Integration

Strategy Combination	Government payments	Enterprise Payment	Farmers' payments	Cooperative payment	Total Welfare Index
High-intensity support, deep involvement, proactive cooperation, and active coordination.	8	7	6	7	28
High-intensity support, superficial participation, passive observation, and inactive operation.	5	6	4	4	19
Low-intensity intervention, deep involvement, proactive cooperation, and active coordination.	6	5	5	5	21
Low-intensity intervention, superficial participation, passive observation, and ineffective operation.	3	4	3	3	13

Note: The total welfare index is the sum of the payment values of the government, enterprises, farmers, and cooperatives. The higher the value, the better the overall collaborative performance of the system; all values are normalized and are only used for qualitative analysis of strategy comparison.

TABLE 2. Simulated Change Rate of Entity Payments under Risk Events (%)

Risk events	Changes in government payments	Changes in corporate payments	Changes in farmers' payments
Market prices fell by 20%	-10	-15	-25
Policy support to reduce by 30%	-20	-18	-30
Natural disasters occur	-15	-20	-40

options in the deepening stage of industrial integration: when stable contractual networks form across the upstream and downstream of the industrial chain, isolated farmers face systemic risks such as increased market access barriers and rising transaction costs. Table 2 simulates the percentage decrease in payments by each entity relative to the benchmark cooperative equilibrium payment when three typical risk events occur. This intuitively reveals the asymmetric distribution of risk among the entities.

It has been demonstrated that even with any form of shock risk, the payments of farmers are the most affected (e.g. as big as -40% during natural disasters). Such volatility in income and losses is devastating of the willingness of, and faith in, farmers to integrate the industry, easily inducing a vicious circle of risk shock -targeted withdrawal of farmers-systems integration -sustained eroded welfare of aggregate system. At the same time, policy changes are important to influence the government payments, where it is implied that the policies must be able to ensure continuity and stability in order to ensure that other stakeholders are not under a high degree of uncertainty as a result of changes in the government policies. As such, good conduct of risk responses whereby there are risk buffers to the most vulnerable link (farmers) is an essential element in sustaining the cooperative equilibrium. Therefore, establishing risk buffer mechanisms for the most vulnerable link (farmers) through organizations such as cooperatives is a key element in maintaining a balance in cooperation.

C. SIMULATION OF MECHANISM DESIGN EFFECTS

Based on the foregoing analysis, this study proposes and simulates a mechanism design scheme aimed at promoting cooperation and mitigating risks. The core is the construction of a composite mechanism of "incentive-compatible contracts + information-sharing platform." Incentive-compatible contracts aim to make cooperation a better choice for all parties under risky conditions through the binding of interests (such as "guaranteed acquisition + secondary dividends") and risk-sharing (such as establishing an industry development risk fund). The information-sharing platform aims to improve the transparency of production, sales, and contract performance through digital means, reducing information asymmetry and mitigating moral hazard and adverse selection. Figure 1 compares the stability and system performance of cooperative equilibrium under four scenarios: no mechanism, only incentive contracts, only information platforms, and composite mechanisms. Stability is measured as how often the cooperative equilibrium is maintained across 100 simulations. It should be noted that when calculating the average total welfare index, the compound mechanism scenario has deducted the mechanism operating costs - including the average annual construction and maintenance fees of the digital platform, labor and legal expenses for contract supervision and execution, management fees of risk funds, etc. This process ensures that the evaluation of cooperative balance is economically rational and avoids the theoretical bias of "discussing cooperation regardless of cost."

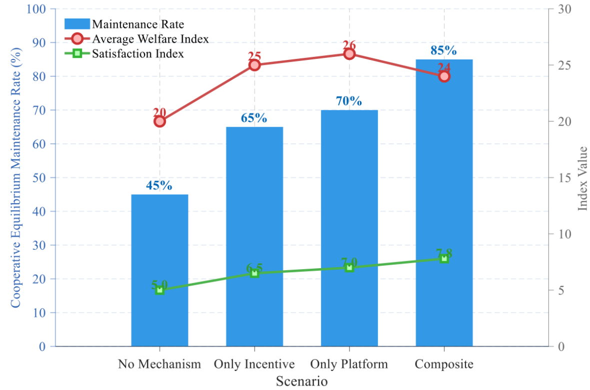

FIGURE 1. The impact of mechanism design on equilibrium stability

Simulation results show the positive effects of mechanism design. The use of a single incentive contract and information platform has greatly improved the maintenance rate of cooperative equilibrium and the degree of welfare. However, a composite mechanism that combines the two will produce the highest effectiveness, significantly increasing the stability of the cooperative equilibrium from 45% to 85%, and optimizing overall welfare and stakeholder satisfaction as much as possible. Although the total welfare index after deducting costs of the composite mechanism (24) is slightly lower than the information platform scenario only (26), considering its significantly higher equilibrium maintenance rate and subject satisfaction, from a dynamic perspective, the composite mechanism can achieve intertemporal compensation of net welfare in the long term by reducing transaction frequency risks and stabilizing cooperation expectations. Of course, the cost of the mechanism itself is relatively high, and due to rural realities (such as the digital divide and lack of contract spirit), the implementation of the mechanism becomes complicated, which requires the mechanism structure to be adaptable and flexible rather than universal.

V. CONCLUSION

This paper analyzes the strategic relations between the government, enterprises, farmers, and cooperatives within a game theory framework to optimize the integrated development of the rural fiber material economy. By modeling the decision-making interactions among these stakeholders, the research identifies equilibrium solutions that balance industrial innovation with sustainable rural growth and collective prosperity. Based on the research, the entrenched problems of industrial integration are found in the strategic conflict based on the difference between the objective functions of each stakeholder that can easily result in non-cooperative equilibria that is inefficient. According to the findings, the policy implications of this paper are of the following nature to the government, the government should no longer be a direct input resource in the economy, but rather an institutional provider and maintainer in the market environment, with its role being to establish a dynamic and precise policy support system (e.g. through effect-linked subsidies) as well as a sufficient and fair regulatory and arbitrated market environment. In the case of enterprises they must forget short-term speculative mentality and seek to achieve long-term stable development, that is, forming closer, contractual interest groups with farmers and cooperatives (i.e. shareholding cooperation and profit sharing). To enhance their bargaining power, farmers must join cooperative organizations that facilitate their adaptation to the high-quality standards of production and modernized collaborative models. These cooperatives are essential for capacity building, serving as critical intermediaries for technical data and material processing services while ensuring that farmers remain competitive within the evolving industrial framework.

AUTHOR CONTRIBUTIONS

Wenyu Wang designed, collected and analyzed the data, and drafted the manuscript. Wenyu Wang conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Wenyu Wang participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

FUNDING

This research received no external funding.

ACKNOWLEDGEMENTS

Not applicable.

REFERENCES

[1] X. Fu, P. Zhang, M. Zhang, and Z. Li, "Performance evaluation of rural characteristic industry development in metropolitan areas based on the TOPSIS method—Taking the Xi'an metropolitan area as an example," Journal of Resources and Ecology, vol. 14, no. 5, pp. 1044-1052, 2023, doi: 10.5814/j.issn.1674-764x.2023.05.015.

[2] U. S. Yadav, R. Tripathi, G. P. Yadav, and M. A. Tripathi, "Proposal of a global handicraft index for sustainable development: A visionary approach for small industry and developing strategies for handicraft (rural industry)," European Journal of Sustainable Development Research, vol. 6, no. 2, pp. 179-185, 2022, doi: 10.21601/ejosdr/11909.

[3] D. Doloreux, C. De Fuentes, J. A. Peerally, and S. Quilley, "New industrial path development in "less glamorized regions": Actors, agencies, and rural opportunities," Journal of Economic Geography, vol. 25, no. 3, pp. 407-425, 2025, doi: 10.1093/jeg/lbae045.

[4] X. Li, Y. Liu, and Y. Guo, "The spatial pattern of population-land-industry coupling coordinated development and its influencing factor detection in rural China," Journal of Geographical Sciences, vol. 33, no. 11, pp. 2257-2277, 2023, doi: 10.1007/s11442-023-2175-x.

[5] Y. Ye, N. Chen, R. Gao, and X. Yao, "Study on the Development Status, Difficulties and Countermeasures of Rural Industrial Revitalization," Frontiers in Economics and Management, vol. 4, no. 5, pp. 259-264, 2023, doi: 10.6981/FEM.202305_4(5).0031.

[6] C. Fang, "On integrated urban and rural development," Journal of Geographical Sciences, vol. 32, no. 8, pp. 1411-1426, 2022, doi: 10.1007/s11442-022-2003-8.

[7] A. Monda, R. Feola, R. Parente, M. Vesci, and A. Botti, "Rural development and digital technologies: A collaborative framework for policy-making," Transforming Government: People, Process and Policy, vol. 17, no. 3, pp. 328-343, 2023, doi: 10.1108/TG-12-2022-0162.

[8] N. A. Vladimirov, "Assessing the impact of rural development for the agro-industrial complex of the Russian Federation," Statistics and Economics, vol. 20, no. 3, pp. 35-45, 2023, doi: 10.21686/2500-3925-2023-3-35-45.

[9] Q. Peng, "The Dynamic Equilibrium Relationship between Rural Financial Scale, Rural Financial Efficiency and Rural Industrial Development under Rural Revitalization Strategy–Cointegration Analysis based on VAR," Frontiers in Economics and Management, vol. 3, no. 12, pp. 273-289, 2022, doi: 10.6981/FEM.202212_3(12).0036.

[10] E. A. Mack, S. Loveridge, T. Keene, and J. Mann, "A review of the literature about broadband internet connections and rural development (1995-2022)," International Regional Science Review, vol. 47, no. 3, pp. 231-292, 2024, doi: 10.1177/01600176231202457.

[11] M. Sharopova and A. Sharopov, "Challenges and prospects in industrial development in rural areas," 2025; 4(38):61-64, doi: 10.5281/zenodo.15745891.

[12] M. N. Guseva and Antsiferova OYu, “Current State and Trends in Human Capital Development in Agro-Industrial Complex and Rural Areas in RUSSIA,” Regional Economy. South of Russia, vol. 11, no. 3, pp. 14-22, 2023, doi: 10.15688/re.volsu.2023.3.2.
[13] X. Huang, “How Does the Reform of Collective Operating Construction Land into the Market Promote the Integrated Development of Rural Industrial Integration? Empirical evidence from China,” Frontiers in Economics and Management, vol. 5, no. 7, pp. 90-112, 2024, doi: 10.6981/FEM.202407_5(7).0013.
[14] Z. Long, S. Chen, and Z. Fu, “Impact of large-scale land management on rural industrial integrated development and mechanism,” Resources Science, vol. 44, no. 8, pp. 1560-1576, 2022, doi: 10.18402/resci.2022.08.03.
[15] M. Masoudi and A. Ranjbar Sarvestani, “Evaluation of ecological capability and current establishment of industrial, rural, and urban development using GIS in parts of Fars Province, Iran,” Journal of Environmental and Earth Sciences, vol. 6, no. 3, pp. 72-82, 2024, doi: 10.30564/jees.v6i3.6736.