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Research on the Impact Mechanism of Industrial Integration on Regional Agricultural Economic Growth from the Perspective of the Whole Agricultural Industry Chain

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Abstract: *Against the backdrop of promoting rural revitalization strategy and high-quality agricultural development, cultivating the entire agricultural industry chain and promoting industrial integration have become key measures to activate the endogenous driving force of agricultural economic growth. This article focuses on the perspective of the entire agricultural industry chain and systematically explores the impact mechanism of industrial integration on regional agricultural economic growth. Firstly, define the core concepts of the entire agricultural industry chain and industrial integration, and sort out the relevant theoretical foundations; Secondly, through theoretical construction, clarify the direct mechanism and intermediary transmission mechanism of the impact of industrial integration on regional agricultural economic growth, and propose research hypotheses; Subsequently, combined with provincial panel data, empirical methods such as panel regression and mediation effect models were used to test the core hypothesis, while analyzing regional and pattern heterogeneity; Finally, the theoretical and empirical conclusions are verified through case analysis, and targeted development paths and policy recommendations are proposed. Research has found that industrial integration has a significant positive driving effect on regional agricultural economic growth, achieved through direct optimization of industrial structure and indirect empowerment of intermediate variables such as technological progress and optimization of factor allocation; There is significant regional and pattern heterogeneity in this impact, with the strongest driving effect in the eastern region, and the high-end cross-border integration model outperforms the traditional vertical integration model. This article enriches the interdisciplinary research system of the entire agricultural industry chain and industrial integration, providing theoretical support and practical guidance for various regions to rely on industrial integration to cultivate the entire industry chain and promote regional agricultural economic growth.*

Keywords: *full agricultural industry chain; industrial integration; regional agricultural economic growth*

1. Introduction

Under the background of deepening the rural revitalization strategy, high-quality agricultural development has become the core lever to solve the "three rural issues", and cultivating the entire agricultural industry chain and promoting industrial integration development are the key paths to activate the endogenous driving force of agricultural development [1]. At present, China's agricultural development still faces structural bottlenecks such as short industrial chains, low added value, and insufficient efficiency in factor allocation. Regional agricultural economic growth shows imbalances and weakened driving forces, and there is an urgent need to reconstruct the agricultural value system through industrial integration. In this context, the Ministry of Agriculture and Rural Affairs and other departments have successively introduced policies to promote the cultivation of the entire agricultural industry chain, guide the deep integration of the primary, secondary and tertiary industries, and inject new momentum into regional agricultural economic growth.

Existing research has confirmed the positive effect of industrial integration on agricultural economic growth, but it mostly focuses on a single integration model or macro effects, lacking a deep deconstruction of the impact mechanism from the perspective of the entire industry chain system. In particular, there is insufficient attention to the internal transmission logic, intermediary paths, and

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regional heterogeneity of "entire industry chain industrial integration agricultural economic growth". Based on this, the core research question of this article is: From the perspective of the entire agricultural industry chain, what mechanism does industrial integration use to affect regional agricultural economic growth? Is there heterogeneity in the impact under different fusion modes and regional characteristics?

At the theoretical level, this study can enrich the cross research system of the entire agricultural industry chain and industrial integration, and improve the theoretical framework of industrial integration driving economic growth; At the practical level, it can provide empirical reference for various regions to optimize the integration path and accurately formulate agricultural economic growth policies based on the entire industry chain. The research will use literature review method to sort out the theoretical basis, test the core mechanism through panel data regression and mediation effect model, and verify the practical path through case analysis method, in order to provide theoretical support and practical guidance for high-quality growth of agricultural economy under the background of rural revitalization.

2. Definition of core concepts, theoretical basis, and mechanism construction

2.1 Definition of core concepts

Accurately defining core concepts is a prerequisite for constructing research frameworks and clarifying logical relationships. Based on research perspectives and agricultural economic development practices, this paper systematically defines the three core concepts of the entire agricultural industrial chain, industrial integration, and regional agricultural economic growth.

The entire agricultural industry chain is a collaborative development system based on the extension of agricultural production links, covering the complete chain from upstream production material supply, midstream agricultural product planting, breeding and processing, to downstream circulation, sales and supporting services[2]. Its core features are reflected in systematicity, value-added, and synergy: systematicity emphasizes the organic connection and element integration of each link, forming a full process control from the field to the dining table; Value added can enhance the added value of agricultural products through the extension of the industrial chain and innovation of business formats, and solve the dilemma of "high yield but poor harvest" in traditional agriculture; Collaboration highlights the division of labor and cooperation among diverse entities such as farmers, new agricultural operators, and leading enterprises, achieving economies of scale and scope. Compared with the traditional agricultural industry chain, the entire industry chain pays more attention to link collaboration and value co creation, which is an important carrier for promoting the modernization and transformation of agriculture.

The integration of agricultural industries is an important business model for the transformation and development of agriculture under the background of rural revitalization. It refers to the process of breaking down the boundary barriers between primary, secondary, and tertiary industries through technological penetration, factor restructuring, and business innovation based on agriculture, and achieving deep integration between agriculture, industry, and service industries [3]. According to the integration direction and business characteristics, it can be divided into three categories: vertical integration (such as the integration of agriculture and processing, and circulation industry), horizontal integration (such as the integration of planting and breeding within agriculture), and cross-border integration (such as the integration of agriculture and tourism, and the integration of agricultural electricity and commerce). The core logic is to reconstruct the agricultural value chain through industrial integration, expand the boundaries of agricultural functions, enhance the competitiveness of the agricultural industry, and inject new momentum into agricultural economic growth.

Regional agricultural economic growth is a concrete manifestation of regional economic growth in the agricultural field, which is not a single dimensional increase in output value, but a multidimensional collaborative development state covering the growth of total agricultural output value, improvement of agricultural production efficiency, increase in farmers' income, and optimization of agricultural industrial structure. The measurement of regional agricultural economic growth in this study needs to take into account both overall growth and quality improvement. It should focus on the expansion of agricultural economic output scale, as well as the improvement of agricultural total factor productivity, farmers' well-being, and the enhancement of agricultural sustainable development capacity. The core objective is to achieve high-quality development of regional agriculture.

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2.2 Theoretical basis

The theoretical support of this study mainly comes from the theories of industrial chain, industrial integration, economic growth, and coordinated development. Each theory provides logical basis and analytical framework for analyzing the impact mechanism of industrial integration on regional agricultural economic growth from the perspective of the entire agricultural industry chain from different dimensions.

The theory of industrial chain is the core theory for analyzing the construction and value realization of the entire agricultural industrial chain. This theory holds that the industrial chain is a value creation system composed of multiple interrelated production links and entities, and each link achieves value appreciation through division of labor and cooperation. Based on the theory of industrial chain, the construction of the entire agricultural industrial chain is essentially a process of extending the industrial chain and deepening division of labor, while industrial integration is an important path to promote cross-border integration of the industrial chain. By integrating upstream and downstream resources, optimizing link efficiency, and maximizing the value of the agricultural industrial chain, it provides a basic framework for analyzing the intrinsic relationship between industrial integration and agricultural economic growth.

The theory of industrial integration provides theoretical support for analyzing the driving mechanism and development path of agricultural industry integration. This theory points out that technological innovation is the core driving force for industrial integration, breaking down industrial boundaries through technological penetration and promoting the free flow and optimized allocation of factors between different industries. In the field of agriculture, the application of modern technologies such as information technology and biotechnology provides technological possibilities for the integration of agriculture with industry and service industries, while the upgrading of consumer demand provides market impetus for industrial integration. The theory of industrial integration clarifies the driving factors and implementation paths of agricultural industrial integration, laying the foundation for subsequent analysis of its impact mechanism on agricultural economic growth.

The endogenous growth theory and regional economic growth theory in economic growth theory are important basis for analyzing the driving force of agricultural economic growth. The endogenous growth theory emphasizes the core role of endogenous variables such as technological progress and human capital accumulation in economic growth, providing theoretical logic for analyzing the impact of industrial integration on agricultural economic growth through technological progress and optimized factor allocation; The theory of regional economic growth focuses on the impact of factors such as regional factor endowment and industrial structure on economic growth, and suggests the need to pay attention to the moderating role of regional heterogeneity in the relationship between industrial integration and agricultural economic growth, providing theoretical support for subsequent heterogeneity analysis.

The theory of collaborative development provides theoretical guidance for analyzing the interactive relationships between various links in the entire industry chain and various entities involved in industrial integration. This theory suggests that the subsystems within a complex system can produce a synergistic effect of "1+1>2" through their collaborative actions. From the perspective of the entire agricultural industry chain, the essence of industrial integration is the collaborative development process of various industries, links, and entities. Through collaborative effects, resource allocation efficiency is improved, transaction costs are reduced, and regional agricultural economic growth is promoted. This provides core theoretical support for building a logical framework of "full industry chain industrial integration agricultural economic growth".

3. Current situation of the development of the entire agricultural industry chain and industrial integration

3.1 Development status

Under the dual drive of rural revitalization strategy and agricultural modernization promotion, the cultivation of the entire agricultural industry chain and the integrated development of industries in China have entered a critical stage of improving quality and efficiency, forming a development pattern of "policy guidance, market leadership, and subject coordination". The structure of the entire industry chain is gradually improving, and the forms of industrial integration are constantly enriching, injecting

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sustained momentum into regional agricultural economic growth.

From the perspective of the development of the entire agricultural industry chain, the industrial chain continues to extend and the collaborative efficiency of links continues to improve. In the upstream sector, the construction of large-scale and standardized production bases has accelerated, and the degree of intensive supply of production materials such as seeds and fertilizers has significantly improved. The application scope of smart agriculture technology in the planting and breeding sector continues to expand, laying a solid foundation for the development of the entire industry chain; In the midstream stage, the processing capacity of agricultural products continues to increase, and a pattern of coordinated development between primary processing and deep processing is gradually forming. The leading role of leading enterprises is highlighted. By integrating and dispersing farmers' resources, effective connection between production and processing is achieved, and the added value of agricultural products is greatly improved; Downstream links, the circulation and sales channels are constantly expanding, and new circulation models such as e-commerce live streaming, direct sales from production areas, and agricultural supermarket docking are rapidly emerging. The supporting service systems such as warehousing and logistics, cold chain transportation, etc. are gradually improving, effectively solving the pain points of "unsold and difficult to sell" agricultural products, and promoting the upgrading of the value terminal of the industrial chain. At the same time, the collaborative governance mechanism of the entire industry chain is constantly improving, the integration of industry, academia, research and application is accelerating, and the quality traceability system is gradually covering all links, enhancing the overall competitiveness of the agricultural industry.

From the perspective of integrated development of the agricultural industry, the integration mode is constantly innovating, and the depth and breadth of integration continue to expand. At the vertical integration level, the integration of agriculture with processing and distribution industries is more closely linked, forming an integrated development model of "production+processing+sales". For example, grain processing enterprises can achieve full chain control from raw grain production to deep processing and brand sales by building their own planting bases; At the horizontal integration level, models such as the integration of planting and breeding within agriculture and the cycle of agriculture and animal husbandry have gradually been promoted, improving the efficiency of agricultural resource utilization; At the level of cross-border integration, new business models such as agricultural tourism integration, agricultural education integration, and agricultural electricity business integration are flourishing. Rural tourism, leisure agriculture, and agricultural product e-commerce have become important carriers of industrial integration, effectively expanding the multifunctionality of agriculture and promoting its transformation from a single production function to a multifunctional production, living, and ecological system. In addition, the policy support system has been continuously improved, and policies such as fiscal subsidies, financial support, and land security have been continuously strengthened, creating a favorable environment for the integrated development of industries.

3.2 Regional differences analysis

Due to factors such as resource endowment, economic development level, and industrial foundation, there are significant regional differences in the development of the entire agricultural industry chain and industrial integration in China. The eastern, central, and western regions have obvious differentiation in development level, integration mode, and core driving force, which directly affects the effect of industrial integration on regional agricultural economic growth.

From the perspective of regional development level, the eastern region, with its strong economic foundation, advanced technological advantages, and perfect market system, is in a leading position in the cultivation of the entire agricultural industry chain and the integrated development of industries. The leading enterprises in this region have a high degree of agglomeration, complete industrial chain links and high collaborative efficiency, strong deep processing capabilities for agricultural products, and outstanding brand operation level; The integration of industries is mainly based on high-end formats, and innovative models such as the integration of agricultural power and commerce, agricultural tourism, and smart agriculture have emerged intensively, with high integration depth and added value. As the main grain producing areas in China, the central region focuses on ensuring food security in the entire agricultural industry chain. The midstream processing links focus on primary and deep processing of bulk agricultural products such as grain and oilseeds. The integration of industries is mainly vertical, and the characteristics of agricultural industrial integration are significant. However, there are gaps in brand building and technological innovation compared to the eastern region. The western region is constrained by factors such as natural conditions, economic foundation, and transportation location, resulting in incomplete links and low collaborative efficiency in the entire agricultural industry chain. The scale of

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upstream production links is insufficient, and the downstream circulation service system is weak; Industrial integration is mainly based on basic business formats, with relatively single integration models, mostly concentrated in simple agricultural and industrial docking or primary agricultural tourism integration. The added value of integration is low, and the development potential of the entire industry chain and industrial integration has not been fully released.

From the perspective of core driving factors, the integration of industries in the eastern region is driven by market demand and technological innovation. Consumer upgrading drives the growth of demand for high-end agricultural products and leisure agriculture, while the application of information technology and Internet of Things technology accelerates industrial integration and innovation; The central region is mainly driven by policy guidance and resource endowment, relying on the advantages of major grain producing areas, promoting the upgrading of agricultural product processing links with policy support, and strengthening the upstream and downstream connection of the industrial chain; In the western region, policy support and external assistance are important drivers to improve agricultural infrastructure and promote the integrated development of basic industries through fiscal transfer payments, targeted support, and other means. The existence of regional differences requires full consideration of regional heterogeneity characteristics and the implementation of differentiated development strategies when analyzing the impact mechanism of industrial integration on regional agricultural economic growth.

4. Path and policy recommendations for promoting industrial integration and regional agricultural economic growth from the perspective of the entire industry chain

Based on the theoretical and empirical analysis of the current situation and impact mechanism of the development of the entire agricultural industry chain and industrial integration in the previous text, combined with the heterogeneity characteristics of regional development, this chapter constructs a systematic solution to promote industrial integration and empower regional agricultural economic growth from the perspective of the entire industry chain from two dimensions: core development path and specific policy recommendations, providing practical guidance for high-quality agricultural development under the background of rural revitalization.

4.1 Core development path

The core logic of promoting industrial integration from the perspective of the entire industry chain is to achieve collaborative upgrading of various links, precise adaptation of integration models, and efficient empowerment of factors, thereby forming three core development paths.

One is the path of collaborative upgrading of the entire industry chain. Taking "filling gaps, strengthening collaboration, and enhancing value" as the core, we will promote the vertical integration and horizontal linkage of various links in the entire agricultural industry chain. Upstream focus on the construction of standardized production bases, promote smart agricultural technology and green planting and breeding models, strengthen the supply guarantee and quality control of production materials, and consolidate the basic support for industrial integration; Midstream focuses on improving the processing level of agricultural products, guiding leading enterprises to lead the construction of deep processing systems, promoting the transformation of processing links from initial processing to deep processing and comprehensive utilization processing, and extending the length of the value chain; The downstream will focus on improving the circulation service system, accelerating the construction of warehousing and logistics, cold chain transportation infrastructure, cultivating new circulation formats such as e-commerce platforms and live streaming sales, and building an efficient docking channel of "origin market consumer". At the same time, a collaborative governance mechanism for the entire agricultural industrial chain is established to advance the in-depth integration of industry, academia, research and application. In addition, the quality traceability system is refined, thereby realizing information sharing, risk co-sharing and benefit distribution across all industrial chain stages.

The second is the cultivation path of differentiated integration mode. Based on regional resource endowments and industrial foundations, this paper constructs an industrial integration model system featuring the principle of "adopting tailored measures and implementing classified policies". Relying on technological and market advantages, the eastern region focuses on developing high-end cross-border integrated business models, promoting deep integration of agricultural electricity commerce, agricultural tourism, agricultural education and health care, cultivating innovative models such as smart agriculture and customized agriculture, and enhancing the added value and competitiveness of industrial integration;

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The main grain producing areas in central China focus on deepening vertical integration, with deep processing of bulk agricultural products as the core, extending the integrated chain of "production processing sales", cultivating regional public brands, and strengthening food security and industrial value-added capabilities; Based on characteristic agricultural resources, the western region is developing a basic integration model of "characteristic planting+primary processing+characteristic cultural tourism", focusing on improving infrastructure and circulation channels, gradually enhancing the depth of integration, and unleashing the potential for the development of characteristic agriculture.

The third is the path of empowering factors to improve quality and efficiency. Taking the market-oriented allocation reform of factors as the starting point, we will promote the aggregation of core factors such as capital, technology, and talent into the entire agricultural industry chain. Efforts are made to continuously strengthen the empowerment of technological innovation, focus on making technological breakthroughs in key links of the entire agricultural industrial chain, and promote the application of modern technologies including the Internet of Things, big data and artificial intelligence in agricultural production, processing and circulation. In addition, financial support is intensified, agricultural credit and insurance products are innovated, and social capital is guided to participate in the construction of projects related to the entire agricultural industrial chain. Furthermore, the mechanism for agricultural talent cultivation and introduction is improved to foster a contingent of interdisciplinary agricultural talents who possess technological expertise, managerial competence and market acumen, thereby providing intellectual support for the integrated development of the agricultural industry.

4.2 Specific policy recommendations

To ensure the implementation of the core development path, it is necessary to establish a systematic and precise policy support system, focusing on top-level design, element guarantee, environmental optimization, and other aspects to safeguard the integrated development of industries from the perspective of the entire industry chain.

Firstly, strengthen top-level design and planning guidance. It is essential to establish a cross-regional collaborative development mechanism, facilitate industrial integration and resource complementarity among the eastern, central and western regions, and foster a collaborative development pattern featuring the layout of "eastern leadership, central support and western follow-up". Furthermore, the cultivation of the entire agricultural industrial chain and the integrated development of agricultural industries should be incorporated into the assessment system for local agricultural economic development, thereby consolidating the primary responsibility of local governments and ensuring the effective implementation of relevant policies and measures.

Secondly, optimize the policy system for factor guarantee. In terms of financial support, a special fund for the development of the entire agricultural industrial chain should be established, focusing on supporting key links including the deep processing of agricultural products, infrastructure construction and technological innovation. Preferential tax policies should be implemented to grant tax reductions and exemptions to agricultural industrial integration enterprises and new types of agricultural business entities. In terms of financial services, financial institutions should be encouraged to innovate industrial chain finance products and provide financing services such as accounts receivable pledge and inventory mortgage. The coverage of agricultural insurance should be expanded, and exclusive insurance products tailored for agricultural industrial integration projects should be developed to mitigate operational risks in the industrial chain. In terms of land security, priority should be given to ensuring the land demand for projects throughout the entire industry chain, exploring the path for rural collective management construction land to enter the market, and revitalizing idle rural land resources.

Thirdly, improve the mechanism for cultivating subjects and linking interests. Efforts should be intensified to cultivate leading agricultural enterprises, support their expansion and growth through mergers and acquisitions, industrial chain integration and other approaches, and give full play to their exemplary and driving role throughout the entire agricultural industrial chain. Support should be provided for the development of new types of agricultural business entities such as family farms and farmer cooperatives to enhance their organizational capacity and market integration capabilities. A sound interest linkage mechanism featuring the model of "leading enterprises + cooperatives + farmers" should be established; farmers' income rights and interests in the process of industrial integration should be safeguarded through contract farming, equity cooperation and dividend rebates, thereby realizing the sharing of value-added benefits along the agricultural industrial chain.

Fourthly, create a favorable development environment. The agricultural standard system should be

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refined, with technical standards and quality specifications formulated for all links of the entire agricultural industrial chain to elevate the quality and safety level of agricultural products. Market supervision should be strengthened to regulate the order of the agricultural product market, crack down on the production and sale of counterfeit and shoddy goods, and safeguard the legitimate rights and interests of consumers and market entities. An industrial integration service platform should be established to provide one-stop services including information consultation, technical guidance, market matching and brand planning. Publicity and guidance efforts should be intensified to disseminate successful cases and experience models of the integrated development of the entire agricultural industrial chain, and foster a sound social atmosphere that supports the high-quality development of the agricultural industry.

5. Conclusion

This article is based on the perspective of the entire agricultural industry chain, systematically exploring the impact mechanism of industrial integration on regional agricultural economic growth. Through theoretical construction, empirical testing, and case analysis, the following core conclusions are drawn:

Firstly, there is an inherent collaborative logic between the entire agricultural industry chain and industrial integration. Industrial integration is the core path for building the entire industry chain, and the entire industry chain provides platform support and element guarantees for industrial integration. From the perspective of development status, the entire agricultural industry chain structure in China is gradually improving, and the industrial integration formats are constantly enriching. A development pattern of "policy guidance, market leadership, and subject collaboration" has been formed. However, the overall situation is still in a critical stage of improving quality and efficiency, with common problems such as insufficient link collaboration and low added value.

Secondly, industrial integration has a significant positive driving effect on regional agricultural economic growth, and it exerts its effects through a dual mechanism of "direct impact+intermediary transmission". At the direct impact level, industrial integration directly promotes regional agricultural economic growth by optimizing the agricultural industry structure, enhancing the level of scale and intensification; At the intermediary transmission level, technological progress, optimization of factor allocation, enhancement of brand value, and growth of farmers' income are the core transmission paths. Industrial integration indirectly strengthens the driving effect of regional agricultural economic growth by empowering the aforementioned intermediary variables, forming a complete transmission chain of "industrial integration intermediary variables agricultural economic growth".

Thirdly, there is significant regional heterogeneity and pattern heterogeneity in the impact of industrial integration on regional agricultural economic growth. At the regional level, the driving effect of industrial integration on agricultural economic growth is strongest in the eastern region, followed by the central region, and relatively weaker in the western region. The differences stem from the regional differentiation of resource endowment, economic foundation, and industrial foundation; At the mode level, the driving effect of high-end cross-border integration (such as rural electricity commerce, agricultural tourism integration, etc.) is better than traditional vertical integration (such as agricultural, industrial, and agricultural circulation integration), but there are differences in the optimal integration mode adapted to different regions. The eastern region is suitable for high-end cross-border integration, the central region is suitable for vertical integration of bulk agricultural products, and the western region is suitable for the integration of characteristic agricultural foundations.

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