

Promoting Shandong's Agricultural Industry Chain to the Middle and High Level of Value Chain: Theoretical Framework and Path Choice

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Abstract—Firstly, the relationship between industrial chain and value chain is discussed based on existing literature. Then, based on the smiling curve theory, comparative advantage theory and industrial upgrading theory, the theoretical logical framework of industrial chain upgrading towards the high-end of the value chain is put forward. Guided by this theoretical framework, combined with the strengths and weaknesses of Shandong's agricultural industry chain, this paper explores the path choice to promote Shandong's agricultural industry chain to the middle and high end of the value chain.

Keywords—*Agricultural Industry Chain; value chain; path choice*

I. INTRODUCTION

The production and circulation of agricultural products are not only related to the life security and food safety of urban residents, but also to the income growth of hundreds of millions of farmers. How to improve the level of agricultural industry chain, increase the added value of agricultural products, ensure the quality and safety of agricultural products, reduce the cost of circulation, improve the efficiency of circulation and increase farmers' income is an important issue that needs to be studied urgently. The report of the Nineteenth National Congress of the Communist Party of China (CPC) proposed that "we should promote our industries to the middle and high end of the global value chain". The industries here include both manufacturing and agriculture. As a major agricultural province, Shandong Province plays an important role in the production and circulation of agricultural products in the whole country. We should speed up the study of how to promote the transformation and upgrading of Shandong's agricultural industry chain, and promote the agricultural industry chain to the middle and high end of the value chain. This will help to increase Shandong's share in the value of agricultural industry in China and even in the world, and enhance the core competitiveness of Shandong's agricultural industry.

II. THE RELATION BETWEEN AGRICULTURAL INDUSTRY CHAIN AND VALUE CHAIN

"Industrial chain" is a Chinese concept, which has been seldom used by foreign scholars. Most of the foreign research

on agricultural industry chain has based on the theory of value chain and supply chain, and focuses on the technical level. In domestic research, some scholars pay attention to the difference between industrial chain and value chain. [1]For example, Yu Cai (2006) thinks that the value chain focuses on the value creation and value process of the industry, while the industry chain also pays attention to the relationship and structure of each component in the value creation, which includes the basic content of the supply chain. Some scholars pay attention to the similarities and connections between them. For example, Kai Wang (2002) believes that value chain management is an integral part of industrial chain management. Strengthening value chain management will help to improve the level of industrial chain management. Some scholars also discussed the direction of upgrading the industrial chain by upgrading the value chain of agricultural products. For example, Huiling Fan (2014) pointed out that the realization of agricultural transformation and upgrading must get rid of the low end of the "smile curve" and extend to the two ends with high added value. [2]

The existing literature analysis shows that the research on the relationship between industrial chain and value chain mainly concentrates on the conceptual level, and seldom explores its theoretical basis and specific dimensions. The development of agricultural industry chain urgently needs the specific guidance of relevant theories to improve the efficiency and efficiency of industrial chain operation, but the relevant research is still very deficient, especially the research on the mechanism between industrial chain upgrading and industrial value chain is blank. However, the existing research results also show that the upgrading of the agricultural industry chain has a positive role in promoting the value-added of the industrial value chain.

III. THE THEORETICAL FRAMEWORK OF UPGRADING INDUSTRY CHAIN TOWARDS THE MIDDLE AND HIGH LEVEL OF VALUE CHAIN

Among the existing theoretical bases, there are the following theories that can provide theoretical support for upgrading the industrial chain to the middle and high-end of the value chain. One is the smile curve theory, the other is the

comparative advantage theory, and the third is the upgrading theory of the industrial chain.

A. Improving the Value of Industrial Chain Based on Smile Curve Theory

In the 1990s, Shi Zhengrong, founder of Acer Group, put forward Smiling Curve theory based on Porter's value chain analysis method and his rich experience in IT industry. That is to say, the value chain of manufacturing industry includes R&D design, processing manufacturing and marketing. Among them, R&D design and marketing at both ends of the value chain have high added value, while manufacturing in the middle has low added value, which forms a "smile curve" with high two ends and low middle. That is to say, the value chain of manufacturing industry includes R&D design, processing manufacturing and marketing. Among them, R&D design and marketing at both ends of the value chain have high added value, while manufacturing in the middle has low added value, which forms a "smile curve" with high two ends and low middle. Many researchers have proposed that the smiling curve theory is also applicable in the field of agriculture (such as Shouping Gui2006, Yan Lu 2013, Fan Huiling 2014). They think that the agricultural industry chain can be divided into different industrial chain links from upstream to downstream, such as strategic planning and R&D, breeding, storage and transportation, deep processing, marketing and brand, and the distribution of value-added range is similar to that of manufacturing industry. This theory also reveals the direction and method of agricultural industrial restructuring: industrial restructuring can only achieve more added value and win stronger competitiveness by adjusting different positions in the industrial chain and between different industries.

B. Maintaining the Integrity of Improving the Value of Industrial Chain Based on the Theory of Comparative Advantage

David Ricardo put forward the theory of comparative advantage in his masterpiece *The Principles of Political Economy and Taxation*. He believed that Each country should produce and export products with comparative advantages and import products with comparative disadvantages in accordance with the principle of "taking the two advantages as the most important while taking the two disadvantages as the least". On the basis of this theory, combined with the theory of smile curve mentioned above, it can provide a theoretical analysis framework for the development direction of industrial chain. That is to say, under the existing advantages and resource endowments, industries or enterprises should give priority to the industrial division of labor with strong value-added ability, to maximize their own interests and help them form and enhance their competitiveness.

C. Theory of Industrial Upgrading

International research on industrial upgrading began in the 1990s. Gerrifi (1999) and others believe that industrial upgrading refers to the process of gradual evolution from low-tech and low-value-added state to high-tech and high-value-added state from the perspective of global value chain.

[3]Humphrey and Schmitz (2002) are the most representative views on the relationship between industrial upgrading and value-added chain. Although this conclusion is based on the laws of manufacturing industry, it is also applicable to the agricultural industry chain. Agricultural industry is different from manufacturing industry in terms of cultivation and breeding technology, and has a high degree of similarity with manufacturing industry in the aspects of deep processing, logistics and marketing of agricultural products. [4]Therefore, agricultural industry chain can also promote the value-added of industrial value chain through single or combination of process upgrading, product upgrading, function upgrading and inter-departmental upgrading.

D. The Theoretical Framework of the Path Analysis from Agricultural Industry Chain to Value Chain

In the field of agricultural industry, the integration and application of the above theoretical basis can construct the theoretical framework of the path analysis from agricultural industry chain to value chain. Firstly, the value distribution of regional agricultural industry chain is analyzed by the smile curve theory. Then, according to the theory of comparative advantage, this paper analyses the direction of industrial chain upgrading. Finally, according to the corresponding relationship between the upgrading mode of industrial chain and the value-added of value chain, the upgrading path suitable for local industrial chain is selected. Take the development of Weifang agricultural industry chain as an example. First, using the smile curve theory to analyze which value segment Weifang's agricultural industry is on in Shandong Province and even the National industrial chain (is it low value added cultivation, or high value added circulation and service), and then analyze Weifang City. Compared with other regions in the province and other regions in China, What are the advantages and potential in the resource endowment of the agricultural industry chain (whether it is agricultural crop cultivation technology or pre-sale or after-sales service, or enterprise management level), and finally according to the areas or directions with advantages or potential for development, The decision is to determine which specific method (process upgrade, product upgrade, functional upgrade or inter-departmental upgrade) to determine the future upgrade path of Weifang's agricultural industry.

IV. THE ADVANTAGES AND BOTTLENECKS OF SHANDONG AGRICULTURAL INDUSTRY CHAIN DEVELOPMENT

A. Development Advantage

Shandong Province is a large agricultural province with superior geographical position, suitable agricultural production environment and large scale of agricultural production and circulation. In terms of industrial development, in 2017, there were 190,000 farmers' cooperatives and 55,000 family farms in the whole province, and more than 200,000 agricultural social service organizations. The total number of leading agricultural enterprises above the province's scale is more than 9600. There are 20 national-level demonstration counties of leisure agriculture and rural tourism. The total number of leisure agriculture operators is 19,000, and the

business income is 63 billion yuan. The total online retail sales in rural areas amounted to 54.19 billion yuan. A number of leading enterprises have been formed in the field of agricultural products processing. In terms of domestic trade, the industrial chain models, such as agricultural cooperatives and breeding enterprises, Shouguang vegetable wholesale market and Shandong Jiayue Supermarket Co., Ltd., have been formed. In the field of foreign trade, the development model of agricultural industry chain, represented by Zhucheng and Anqiu, has been formed.

B. Upgrade Bottleneck

Shandong Province has outstanding advantages in total agricultural production, but the industrial development is in the primary stage. There are still many problems in the development of agricultural industry, such as small scale of main body, low technology content, low added value and low overall benefit. At the same time, the industry chain is narrow and short, the technology application and innovation ability lags behind, the repeated low-level competition problem is prominent, affecting the stability of the agricultural industry chain, resulting in the inefficiency of the operation of the industry chain and the low core competitiveness.

V. PROMOTING SHANDONG'S AGRICULTURAL INDUSTRY CHAIN TO THE HIGH-END ROUTE CHOICE OF VALUE CHAIN

According to the division of labor theory, comparative advantage theory and industrial chain upgrading theory, combined with the development status of agricultural industry chain in Shandong Province, it is considered that Shandong Province should choose the following paths to promote Shandong agricultural industry chain to the high-end of the value chain.

A. Promoting Traditional Agricultural Industry to Extend to Both Ends of Smile Curve

Combining with the new and old kinetic energy conversion strategy being implemented in Shandong Province, it promotes the extension of traditional agriculture to the two ends of the smile curve with relatively high added value. One is to extend to the antenatal stage and gradually occupy a place in the field of agricultural development strategy and breeding of improved varieties. Second, actively extend to the field of agricultural products processing, and strive to cultivate a number of competitive and driven leading enterprises in industrialization. Third, extending to storage, transportation, sales and service. In the field of agricultural products storage and transportation, we should actively promote the integrated application of low-temperature packaging, storage and transportation and fresh-keeping technologies. In the field of marketing, we should increase investment in the marketing of agricultural products, scientifically combine and apply the strategies of price, distribution and promotion of agricultural products, attach great importance to brand strategy and differentiation strategy. In the aspect of industrial services, we should develop diversified agricultural production services and constantly improve the after-sales service system based on serving the pre-production, mid-production and post-production processes of agricultural production. Taking the

vegetable industry in Shouguang County as an example, the construction path of its industrial chain follows this path. On the basis of vegetable cultivation, it has achieved remarkable results in the fields of vegetable breeding, prenatal and post-natal services, and sales with relatively high added value.

B. Pay Equal Attention to Product Upgrading and Function Upgrading

Considering Shandong's comparative advantages in agricultural production, we should attach importance to and strengthen product upgrading, develop characteristic and high value-added agricultural industry, and develop new functions of products, to increase the value of industrial chain. Firstly, we should select the characteristic agricultural products with comparative advantages at home and abroad, carry out large-scale and intensive production, expand the scale of agriculture and expand the breadth of industrial chain. Secondly, we should promote the deep integration of agriculture, forestry, animal husbandry, fishery, processing, circulation, tourism, culture, health and other industries, and increase their added value through the functional expansion and comprehensive utilization of agricultural products. Third, we should actively develop efficient ecological agriculture, establish, and develop a green agricultural industry chain. Guided by the needs of consumers, we should give prominence to the increase of green and high-quality agricultural products, promote standardized agricultural production and overall supervision, and comprehensively improve the quality and safety of agricultural products. For example, the Shen county in Liaocheng has continuously explored the construction of the green agricultural industry chain and explored the combination of planting and agricultural tourism, and the added value of agriculture has increased significantly.

C. Promoting the Added Value of Each Link in the Industrial Chain Through Scientific and Technological Innovation

Shandong Province should rely on scientific and technological progress, improve the level of technology and equipment in each link, increase the value-added level of each chain, and improve the efficiency of the transformation of resources in the agricultural value chain to realize the value-added of the agricultural industry chain. In terms of R&D innovation, we should make full use of both domestic and international resources, integrate overseas resources, establish transnational laboratories or R&D bases, and enhance local R&D strength. At home, we should build a technological innovation system with leading enterprises as the main body, and give full play to the role of scientific research institutions and institutions of higher learning. In the field of production, we should innovate the transformation mode of scientific research achievements, comprehensively apply engineering equipment technology, biotechnology, information technology and environmental technology, and accelerate the development of facility agriculture. In the field of circulation, we will promote the application and popularization of new network technology, information technology and communication technology in circulation links such as certification, transaction, payment and logistics.

D. Promoting the Overall Added Value of the Industrial Chain Through the Integration of the Industrial Chain

In order to solve the problems of weak linkages and low efficiency of agricultural industry chain in Shandong Province, the strategy of industrial chain integration can be adopted to enhance the overall added value of industrial chain. This requires the rational allocation of elements among the various links of the industrial value chain to promote the synergy and aggregation effect of the industrial chain, so as to improve the overall efficiency and efficiency of the industrial chain. The integration of agricultural industry chain includes vertical and horizontal dimensions. It includes not only the integration of business flow, logistics, information flow and value flow, but also the integration within and between regions. In the process of industrial chain integration, the industry public information platform shared by all parties plays a key role in improving the integration effect. We can explore the mode of government-guided, enterprise-oriented and market-oriented operation to realize the construction and smooth operation of the industry public information platform.[5]

VI. CONCLUSION

Industrial chain upgrading is a systematic engineering, and it is difficult to complete this task with a single academic perspective. The existing industrial chain upgrading theory is relatively macroscopic, and it is not enough to guide the industrial upgrading. Based on the previous theories, this paper tries to establish an operational model and path for industrial upgrading through integration and comprehensive consideration. At present, the rapid development of technology and demand, industrial upgrading is also facing tremendous demand and potential, making full use of these opportunities, under the guidance of basic theory and science and technology, to promote the agricultural industry chain to the high end of the value chain, there are more possibilities. Of course, the operability of the theoretical framework lacks data support, and it still needs to be further verified in more specific agricultural industry practices. At present, the rapid development of technology and demand, industrial upgrading is also facing tremendous demand and potential, making full use of these opportunities, under the guidance of basic theory and science and technology, to promote the agricultural industry chain to the high end of the value chain, there are more possibilities. Of course, the operability of the theoretical framework lacks data support, and it still needs to be further verified in more specific agricultural industry practices.

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