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The Rural Information-based Construction under the Perspective of Expanding Agricultural Industrial Chain

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Abstract On the basis of expounding connotation and significance of expansion of agricultural industrial chain, coupled with the connotation of rural informatization connotation, this article analyses the role of rural informatization in expanding agricultural industrial chain; it can enhance market competitiveness of industry chain, improve the operational efficiency of industry chain, and promote the income and quality of farmers in industry chain. Under the perspective of expanding agricultural industrial chain, this article puts forwards thinking about the construction of rural informatization as follows: first, give full play to the leading role of the government; second, strengthen the construction of information-based network facility; third, integrate information resources in rural areas, and improve the quality of information; fourth, build comprehensive information service platform in rural areas; fifth, improve organizational level of production and management of individual farmers; sixth, strengthen the construction of information-based personnel in rural areas; seventh, strengthen publicity and training, promote overall cultural quality and information awareness of farmers.

Key words Expansion of agricultural industrial chain, Rural areas, Information-based construction

To achieve well-off society by 2020, the focus is rural areas and the difficulty is also rural areas; without the well-being of farmers there would be no better-off life of people across China, and without the modernization of rural areas there would be no modernization of China. Since 2004, 8 consecutive No. 1 documents have been issued by the central government, which are all related to issues concerning agriculture, countryside and farmers. Since the Sixteenth National Congress of Communist Party of China, the dense promulgation and implementation of a series of policies benefiting the farmers and invigorating agriculture by the central government, has promoted the development of agriculture and rural areas, also benefited the farmers. But we must also note that the foundation of agriculture remains weak, the development of rural areas lags behind, and increasing farmers' income remains difficult. Therefore, issues concerning agriculture, farmers and countryside are still the top priority of the party's work. In order to address issues concerning agriculture, farmers and countryside, the fundamental is development, and expanding agricultural industrial chain is an important path of development. The expansion of agricultural industrial chain needs to be supported by rural informatization, and if without the support of informatization, expanding agricultural industrial chain, developing agricultural industrialization and even developing modern agriculture would be the pie in the sky, nothing but "Utopia." Since 2005, the central government has issued 6 consecutive No. 1 documents, all attaching great importance to acceleration and development of information-based construction in rural areas. Therefore, under the perspective of

expanding agricultural industrial chain, the study of the construction and development of rural informatization is of positive practical significance to solving issues concerning agriculture, farmers and countryside.

1 The connotation and significance of expansion of agricultural industrial chain and rural informatization

1.1 The connotation and significance of expansion of agricultural industrial chain The agricultural industrial chain can be divided into traditional industrial chain and modern industrial chain. The traditional agricultural industrial chain is the form of industrial organization compatible with traditional agricultural production mode, and the industrial chain is narrow and short, only including simple supply of agricultural means of production, primary production and marketing chain of agricultural products. There is neither vertical extension forward or backward, nor horizontal expansion, therefore, the added value of agricultural products is difficult to increase, and the agricultural comparative advantage is difficult to upgrade^[1]. Expansion of the agricultural industrial chain is to extend vertically forward and backward based on traditional agricultural industrial chain—extend forward to provide chemical fertilizer, seed source and agricultural machinery equipments for farmers so as to promote the development of related industries, for example, modernized seedling-growing, breeding workshop, and various sizes of plastic greenhouses, can effectively promote production and processing of agricultural materials, the development of facility agriculture and related industries; extend backward to initial processing and deep processing of agricultural products, sales,

service and other sectors of agriculture-related products, which can also effectively promote the development of related industries. Laterally each link can be expanded outward – for example, to provide related technology, information, and policy advisory services for farmers before planting and breeding; to provide technology, information, finance and other services in the process of planting, breeding and processing of agricultural products; to provide logistics services to each link of industrial chain; based on characteristics of modern agriculture and the local natural resources, in whole process of crop growth and whole process of poultry and livestock breeding, to develop the rural tourism including ecological element, ornamental element, cultural element, experiential element, participatory element, entertainment element, leisure element, popular science element, and other elements. The agricultural industrial chain after expansion will no longer limit agriculture-related products to

the primary industry, but incorporate processing, logistics, sales and other industries of agriculture-related products in conjunction with tourism, originally falling within the category of the secondary and tertiary industries, into industrial chain, that is, the primary industry extends and expands to the secondary and tertiary industries. As to longitudinal extension and horizontal expansion of agricultural industrial chain, there is enormous space for imagination. After expansion, the function of every link and product on the industrial chain will be expanded, to assume the role of upgrading and creating value, in order to expand the scale of the industrial chain. The expansion of agricultural industrial chain includes three aspects: first, to extend the length of industrial chain; second, to increase the width of the industrial chain; third, to expand the thickness of industrial chain (Fig.2).

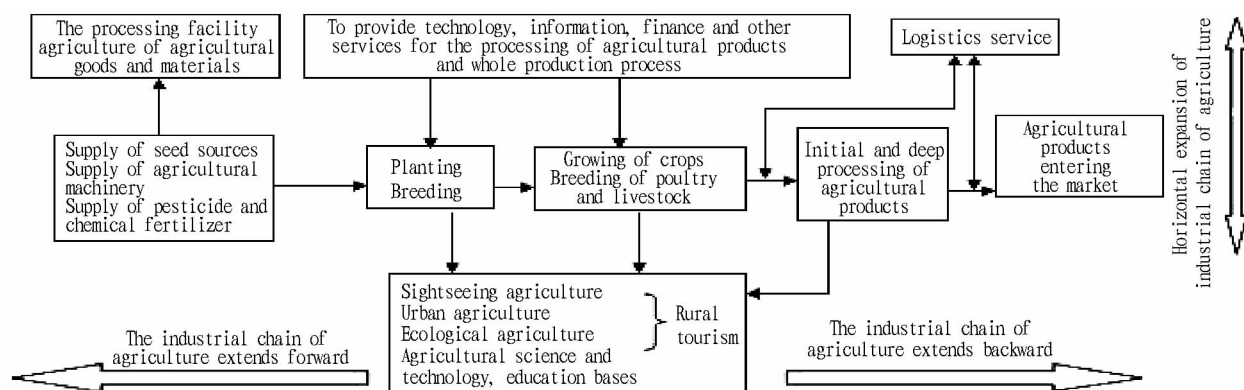


Fig.1 The modern industrial chain of agriculture and its expansion

The agricultural industrial chain expanded is a system; companies – farmers – companies is the main line of agricultural industrial chain; rural households (farmer cooperatives), processing enterprises of agricultural products, logistics enterprises of agricultural products, sales enterprises of agricultural products and other types of enterprises of agricultural products are the main economic subject in agricultural industrial chain. All economic subjects are closely interrelated via product, technology, capital, contract and information, so as to form product chain, technology chain, capital chain, contract chain and information chain^[2]. The information chain is the chain consisting of information flow in industrial chain, and the basis for maintaining the normal operation of other chains. All links of entire industrial chain connect and reflect the relations between supply and demand at any time dependent on supply-demand relation, and all these are reflected from supply and demand information^[2]. In addition to planting breeding information, production and operation information and market information, the information flowing in information chain includes policy information, capital information, logistics information and so on.

The expansion of agricultural industrial chain is the only way for transformation of traditional agriculture, and development of modern agriculture, the significance of which is as follows. First, it is conducive to the development of agricultural industrialization. The agricultural industrial chain is the prerequi-

site for agricultural industrialization, and stability and regulation of industrial chain is the basis for development of industrialization; the extension and expansion of agricultural industrial chain can promote the large-scale development of agricultural industrialization. Second, it helps improve the standardization of agricultural products, and large-scale production. The expansion of the agricultural industrial chain makes the agricultural products develop from initial processing to deep processing, and adapt to the consumer demand in the city; at the same time, promotes the export sales of the primary agricultural products and processed farm and sideline products. As people enhance the quality requirements of agriculture-related products, the market demand contributes significantly to standardized and large-scale production of agricultural products. Third, it is conducive to increase of farmers' income and adjustment of industrial structure. The expansion of agricultural industrial chain means the enhancement in agricultural organization level, and increase in value-added links of agriculture-related products. The farmers who join the industrial chain can not only get the support and services concerning technology, information and capital and reduce the risk of market transactions, but also increase income by enhancing value-added of agriculture-related products. At the same time, the establishment of industrial chain concept will help farmers to break the narrow geographical concept and pure concept of self-interest, to establish new

idea of large market and cooperation and with a proper division of labour, and to expand farmers' operation idea. In addition, the establishment of industrial chain concept can be beneficial to adjustment of agricultural industrial structure through market guide^[3].

1.2 The connotation of expansion of rural informatization

The rural informatization, the extension of agricultural information-based concept, is a kind of social and economic form, a part of social information, and an important indicator of measuring overall strength of agriculture in one country or region. The connotation of rural informatization is rich and the extension of rural informatization is broad, covering the entire rural areas, agricultural system, mainly including rural resources and environment, rural community and economy, agricultural production, agricultural science and technology, rural education, market of agricultural products, agricultural means of production market, agricultural policies and regulations, rural management, public services in rural areas and other aspects of informatization. The rural informatization means that in various fields related to agriculture and rural areas, by virtue of computer technology, microelectronics, communications technology, opto-electrical technology, remote sensing technology and other types of modern information technology and related intelligence technology, people acquire, collect, arrange, process, store, classify, retrieve and transmit information concerning agriculture and rural areas, so as to effectively develop and use a variety of information resources regarding nature, production, market, talents, agricultural technology, business management, social management, and public service, associated with agriculture and rural areas. The core content of rural informatization includes three closely interrelated dimensions-agricultural information technology dimension, agricultural information service dimension and agricultural information application dimension. The main content of application dimension includes the following aspects: informatization of agricultural production and operation, informatization of rural social management, informatization of rural public management service (Fig.2).

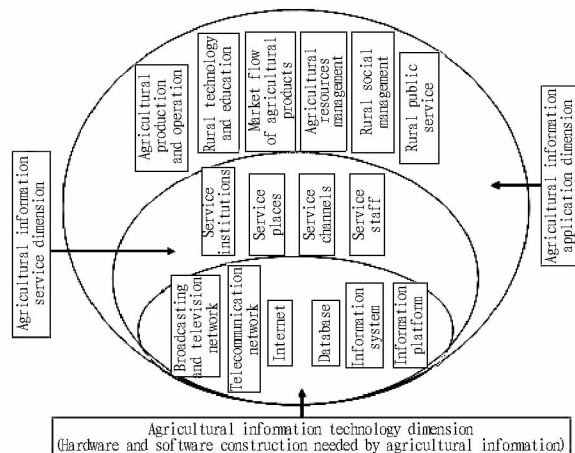


Fig.2 Three-dimension structure of agricultural informatization connotation

2 The role of rural informatization in expanding agricultural industrial chain

The agricultural industrial chain expanded is the form of industrial organization under the concept of modern agriculture. Informatization plays an important supporting role in making the agricultural industrial chain either extend forward and backward or expand horizontally, and promoting industrialization of all links. The market economy is information-led economy, and if the information is absent, it will lead to uncertainty in direction of agricultural industrial chain, and loose "chain", thus all economic subjects in industrial chain "grope in the dark" in production and management, and even are "off the chain". The result is that all economic subjects linger at the edge of market economy, failing to get out of the traditional agricultural era. Therefore, the rural informatization is indispensable in the expansion of agricultural industrial chain, whose role is reflected in the following aspects.

2.1 It can enhance market competitiveness of industry chain

In traditional agricultural industrial chain, the channel of obtaining information is single, and inadequate agricultural information leads to blindness and lagging of production and operation, thus in the market competition, the farmers are always at a disadvantage, bearing great risk. In the expansion of agricultural industrial chain, accurate, timely and reliable information transmission and information processing can make the economic subjects in industrial chain obtain full market information, effectively grasp the market trends, determine their own production and management behaviour through market guidance, and adjust their own product structure, conducive to enhancement of market competitiveness. Meanwhile, the effective use of agricultural information can directly connect production and sale in industrial chain, and market, which will in a large measure reduce the circulation link, simplify the transaction procedure, and save transaction costs, resulting in enhancement of competitiveness of whole industrial chain.

2.2 It can improve the operational efficiency of industry chain

Vulnerability and uncertainty of agricultural system determine the agricultural production, and complexity of operation and management decision-making. The establishment and improvement of rural informatization, coupled with influx of various kinds of information, can make the connection between all links of agricultural industrial chain closer, and the operation of industrial chain more effective. Through the development of information resources, it can form considerable standardized and guiding precise information, and feed back the information timely to all economic subjects in industrial chain through a variety of channels, to provide reference for production and management decision-making, and promote the economic efficiency of all economic subjects in industrial chain, thereby enhancing the operational efficiency of the industrial chain doubly and propelling the expansion of agricultural industrial chain.

2.3 It can promote the income and quality of farmers in industry chain

In modern agricultural industrial chain, the individual farmers are not the real economic subjects, and only when joining agricultural economic organizations and or relying

on the leading enterprises can it be economic subject. All economic subjects in industrial chain share the cooperation information, to form close and steady partnership in industrial chain, therefore, the individual farmers can obtain stable income during the period and with steady operation of industrial chain, the income is increased. For individual farmers, receiving multi-channel agricultural information is conducive to improvement of operation awareness and the overall quality. Rural informatization can promote the farmers to expand horizons, open mind, and strengthen the skills, so that they truly become the main force in the expansion of agricultural industrial chain.

3 Thinking about the construction of rural informatization under the perspective of expanding agricultural industrial chain

3.1 Give full play to the leading role of the government

Agriculture is the weak industry protected by the state, and rural informatization has the characteristic of public product. The information-based construction in rural areas is a complex social system project. In terms of its composition, the rural informatization widely permeates various fields of social and economic development in rural areas; in terms of its connotation, the rural informatization includes hardware construction, software construction, information network system, and information equipment manufacturing. In rural information-based construction, the hardware construction, software development, policy formulation and implementation, forging of information-based environment and so on, are all inseparable from the government. Therefore, the government should give full play to its leading role in information-based construction, increase policy support, strengthen the integration of agricultural information resources and resources development and utilization through the means of rational planning, standardization, capital input, and regulations enactment, and establish the information service platform for the development of modern agriculture and the expansion of agricultural industrial chain. The local government should work out the agricultural information policy in line with the characteristics of the region, and explore the development pattern with the local characteristics, to promote the construction of information service system in the region, and promote the expansion of agricultural industrial chain.

3.2 Strengthen the construction of information-based network facility The rural information network is an important tool for achieving rural informatization, and radio and television network, telecommunication network, and the Internet are the basic network facility for rural informatization in China, basic condition and guarantee for the implementation of rural informatization. The coverage of rural information network is the most basic issue that must be resolved in rural information-based construction. Currently, the related Internet infrastructure in rural areas is still weak. In some rural areas, especially the central and western regions, the basic conditions for network use are still scanty, and the cost of Internet access in rural areas is still high as relative to the farmers' income level, thus for most farmers, the computer is still luxury article. Therefore, we

should strengthen efforts in the infrastructure building of rural information network, increase input to the infrastructure building of rural informatization, establish information system in rural areas with a variety of media, expand the information network coverage, speed up the construction of "connection of villages" and other information projects, and adopt television, telephone, radio, Internet, newspapers and other media to establish the integrated information service network system combining traditional media and modern information network, as well as five-level rural information network system integrating province, city, county, township and village. By the market-oriented operation mode of "the government guiding services, social forces participating, and enterprises investing in construction", we should encourage telecom companies to exert the advantages of main business, actively participate in the basic network building of rural informatization, and upgrade the hardware facilities of rural information network.

3.3 Integrate information resources in rural areas and improve the quality of information From the macro level, in the process of agricultural information-based construction in China, the departments that provide information resources include agricultural department, science and technology department, business department, educational department, cultural department, organization department and so on. Due to the division of the government management system, there is a phenomenon of various government departments participating and various measures being proposed, in rural information-based construction, inevitably resulting in fragmentation and barriers between different industries, so that the information sharing rate is low. At the national level, it should coordinate planning, incorporate the accumulated data of various departments (information resources) into the overall sharing framework of national scientific data, and establish the national science data center and sharing services network. It should research and develop the sharing technology, to form cross-sectoral, cross-regional, cross-disciplinary, and multi-level national science data sharing service network system, so as to promote the sharing of agricultural information^[4]. At the local level, according to local characteristics, it should connect information of different departments in the provincial-level technology platform, to share information resources and promote the relevance and timeliness of information. Meanwhile, it should also speed up the integration of telecommunications network, computer network and cable television network. The integration of telecommunications network, computer network and cable television network, through technological innovation, can provide information services including voice, data, image and other integrated multimedia. Through the integration of telecommunications network, computer network and cable television network, it should accelerate the establishment of integrated information service platform in rural areas, to lay good foundation for the expansion of agricultural industrial chain.

3.4 Build comprehensive information service platform in rural areas The rural information platform is a system used to collect, process, release a variety of rural information. It is the

hub connecting promulgators and users of rural information, and the prerequisite for the use of rural information in the expansion of agricultural industrial chain. Currently, the traditional media are still the primary means of information dissemination in rural areas. In the process of rural informatization development of the expansion of agricultural industrial chain, it should combine the traditional media and the modern media technology means and methods to release information, and also fully use the advantages of high popularization rate of television and mobile phone in rural areas, to promote information service model of television, telephone and computer, and expand the coverage of information services. As the mobile phone users tend to increase year by year in rural areas, it should encourage telecom companies to carry out the voice services with rich content, strong timeliness and high relevancy (Experts unriddling the puzzles), short message services, to expand information coverage. When the telecom company launches new agriculture-related business, it should strengthen publicity via various channels and forms, in order to promote its popularity among the farmers, at the same time lower the information consumption threshold of farmers to the extreme, and make the farmers desire to consume and become the real beneficiaries.

3.5 Improve organizational level of production and management of individual farmers Only by relying on leading enterprises or adopting the form of using land to buy share, can the individual farmers join farmer cooperatives, and promote the organization degree of their production and management, so that they become an integral part of economic subjects in agricultural industrial chain. By virtue of prominent advantages in capital, technology, processing, storage, and distribution channels, the leading enterprises link farmers and markets, and guide the individual farmers in planting, breeding and processing of agricultural products, relying on agricultural production bases and contract farming, according to the market demand information. The leading enterprises expand the agricultural industrial chain, play the exemplary role in application of rural informatization, and are of positive significance to the promotion of rural informatization development.

In agricultural industrialized operation, the farmer cooperatives have the organizational function, intermediary function, carrier function and service function. The farmer cooperatives are the effective carrier for promoting the expansion of agricultural industrial chain. In terms of application of rural informatization, the farmer cooperatives also play an important role. First, the farmer cooperatives, between the grass-roots government and the individual farmers, can timely transmit policy, technology, market and other information to farmers, so that all farmers in industrial chain know the relevant information timely. Second, the farmer cooperatives can effectively search, screen and sort a variety of rural information, to make the disorderly information orderly and standardized; provide professional consulting services for farmers; guide farmers to conduct production and management decision-making, and reduce blindness. Finally, due to large-scale and professional production and management, the farmer cooperatives play an exemplary role

in using agricultural information.

3.6 Strengthen the construction of information-based personnel in rural areas The rural informatization talents are the important subjects in rural information-based construction. Therefore, in rural information-based construction, we must coordinate and promote the talent fostering, infrastructure construction, hardware configuration, software development, and establishment of service platform. The rural informatization talents not only include rural information services experts, agricultural science and technology technicians, and rural informatization management personnel, but also include rural information workers. The information worker team in rural areas is the bridge and hub connecting the grass-roots rural information service institutions and the majority of farmers. Strengthening the construction of information worker team in rural areas is an effective way to make information "enter into villages and households". Therefore, to develop the rural informatization talents serving the masses with strong sense of responsibility and reasonable knowledge structure, and especially the rural information worker team, is particularly important. We should focus on strengthening the training for agribusiness, farmer cooperatives, and major agricultural production and management households; take a variety of ways to carry out professional knowledge training for rural information workers, in order to promote the overall quality and professional skill of them, and make them enable to collect, analyse and disseminate information. Thereby another way is built for all economic subjects in agricultural industrial chain to timely get information.

3.7 Strengthen publicity and training, promote overall cultural quality and information awareness of farmers The integrated scientific and cultural level of China's farmers is low, coupled with insufficient information-based publicity, so that considerable farmers have unclear understanding of informatization and low demand for informatization. The weak informatization awareness of farmers becomes an important factors influencing information-based construction in China's rural areas. Therefore, the improvement in the overall scientific and cultural quality of farmers and strengthening information awareness of farmers, is important basis and prerequisite for the construction and development of informatization in rural areas. We can improve farmers' integrated cultural quality and information awareness through the following ways. First, we should strengthen the training for the rural labour forces in order to promote their overall scientific and cultural quality, and cultivate and improve farmers' comprehensive cultural quality and information awareness through the means of publicity, training and demonstration. Second, we should use radio, television, cell phone text messages, newspapers, billboards, large poster, and so on, to vigorously publicize the important position and role of rural information in social and economic development of rural areas, and stimulate the desire of farmers for information resources in rural areas. Third, in primary and high schools in rural areas, we should spread the knowledge of rural informatization to the students, and then make the children spread the knowledge of

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the method of combining economic leverage and administrative measures, so as to gradually realize the protection of arable land, transformation of low-yielding fields and expansion of irrigation area. In practice, we should take the following measures as follows.

First, we should adjust the proportion of land use between grain crops and cash crops in irrigation district, and increase the proportion of land use of cash crops with great market demand when the grain can ensure the market supply in irrigation district.

Second, we should adjust the land use structure in irrigation district, reduce the proportion of saline land and bare land, promote the proportion of farmland and garden plot, shut down industrial enterprises that pollute the environment, and free land for the development of modern agricultural service industry.

Third, we should adjust the internal structure of various crops, and increase the land use area of dominant crops with high yield and great benefit based on the market demand.

4.3 Make rational planning of land resources and take the road of sustainable development Through a comprehensive survey on land resources status in Jinghuiqu Irrigation District in Shaanxi Province, we should predict the land use demand of each sector, classify the regions and land use areas, adjust land use structure and land use layout, and propose the idea of further development of irrigation district. Through the optimal allocation of land resources, we should rationally use land resources, effectively protect land resources, and formulate land use planning in order to coordinate urban-rural production and living use land and urban-rural development use land.

4.4 Take the irrigation district as the unit and establish use class and price standard of land in irrigation district

In the process of land use, price will become a critical factor. Land resources departments conducting management on land level and the price of land is an important means^[7]. Jinghuiqu Irrigation District should establish sound system of land use levels and price of land, which can regulate land use, protect the interests of farmers and ensure the smooth implementation of national construction. In Jinghuiqu Irrigation District of Shaanxi Province, the land resources belong to several counties, and the land levels and price standards are evaluated by all counties

respectively, with inconvenient use, so we should take Jinghuiqu Irrigation District in Shaanxi Province as an entity, in order to evaluate levels and price of land use in the irrigation district, and cultivate holistic market of land in irrigation district. If we do not use the same rating and price standards of land use, it will not be conducive to promoting rapid cultivation of land market and it will hinder the pace of the rational use of land in irrigation district, which will make it difficult to realize rational use of land. So we should refer to relevant national regulations, conduct evaluation on the price of land use right in irrigation district, and establish benchmark land price system of land use right in irrigation district. This approach directly regards the land use right in irrigation district, an object, as a research objective, and regards the land use right in irrigation district as an independent type of land use right. According to the market conditions of land in irrigation district, we should establish our own price system, and use this price system to guide and regulate the market.

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rural informatization to their parents, so as to improve farmers' awareness of rural informatization and demand for informatization. Fourth, we should give full play to role of information workers in rural areas in transmitting and disseminating information. Fifth, the grass-roots government should work out medium-and-long-term planning of information-based training for farmers in the township, and regularly conduct the training of related information-based knowledge for farmers, in order to promote their information awareness and information acquisition skills. Increase in farmers' awareness of information and consumer demand for information will inevitably promote the development of rural informatization, and lay good foundation for the expansion of agricultural industrial chain.

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