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Research on Integration Pattern of Agricultural Product Supply Chain under Electronic Commerce Environment in China: with Zhejiang as an Example

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Abstract: The electronic commerce is a modern emerging agricultural trading pattern, which brings deep influences on the commercial circulation. The traditional agricultural product supply chain consists of the producer, local market of production and sale place, wholesaler and retailer. This pattern features low circulation efficiency and big consumption of the agricultural products. To overcome these problems, the emerging agricultural product supply chain based on electronic commerce seamlessly integrates production, processing, circulation and consumption steps of agricultural products in order to fully share the supply chain information, reduce the trading cost and shorten the trading cycle. By analyzing the current conditions of the agricultural products in Zhejiang province, this paper points out problems in circulation of agricultural products in Zhejiang province, proposes supply chain integration model of agricultural products in Zhejiang province based on electronic commerce, analyzes strengths of the integration model, and proposes the recommended strategy for the supply chain of agricultural products under the electronic commerce environment in China.

Keywords: electronic commerce, agricultural products, supply chain, integration mode

1. INTRODUCTION

The agricultural product supply chain is a research hotspot in domestic and foreign academic circle in recent several years. The World Bank, International Food and Agribusiness Management Association, Wageningen agricultural university and agricultural chain competition center are dedicated to research and development of agricultural product supply chain. The foreign scholars started to study the agricultural product supply chain from 90s of 20th century. Lambert(2000), Golan (2003) and Bosele(2002) analyzed the structure and type of the agricultural product supply chain, and constructs the preliminary framework for research on academic product supply chain^[1]. Lowe & Preckel(2004) and Clements (2008) pointed out that generally the agricultural product supply chain features long lead time, uncertain supply and demand and relative low profits^{[2][3]}. Taking the good supply chain in Greece as one example, Vlachos (2008) discussed how to establish close cooperation among the food manufacturers, retailers and other members in the supply chain to quickly respond to the demands of the consumers^[4]. Swinnen and Maertens (2011) thought that the agricultural product supply chain system is gradually transforming from the initial state-controlled vertical integration to the private vertical coordination system and the consumer's demand response and food security problems are gradually emphasized in the developing countries and transformation countries with development of the property privatization and market liberalization^[5]. The domestic scholars are studying the agricultural product supply chain from different views. Shi Sheng (2012) analyzed the cooperation performance and cooperation residual allocation among the farmers, cooperatives and supermarkets in "farmer and supermarket connection"^[6]. Huang Binhong (2013) investigated and studied establishment and implementation conditions of the quality tracing system of typical supermarkets. Some scholars studied fresh agricultural product supply chain. E.g^[7]. Gan Xiaobing (2013) analyzed the

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evolution trend of five fresh supply chain patterns in China such as direct sale, multi-level whole market and order agriculture and proposed the fresh supply chain integrated mode depending on the electronic commerce information platform^[8]. By combining the features and process of the fresh agricultural product supply chain, Xu Juan (2012) proposed the countermeasures to avoid main risks in the fresh agricultural product supply chain^[9]. Li Lin and Fan Xiujun (2014) analyzed influence of RFID technology application on double losses in the fresh agricultural product circulation, constructed two-phase profiting model of the fresh agricultural product supply chain, and mainly compared and analyzed decision of different members in technology investment, pricing and ordering^[10]. For the risks in agricultural product supply chain, Yan Bo (2014) identified the risks in the whole agricultural product supply chain according to the operation mode of the agricultural product supply chain and three IOT levels under IOT environment and proposed the risk factor package of the agricultural product supply chain under IOT environment^[11]. Zhang Cheng (2012) analyzed the sources of the risky influence factors of the agricultural product supply chain in supply, demand, information, cooperation, logistics and environment^[12]. Zhao Xin (2013) discussed the generation and management mechanism of the price risk of the fresh agricultural product supply chain. Some scholars studied the problems in the agricultural product supply chain from other views. E.g.^[13]. Lu Shan (2012) studied trust mechanism among members in the agricultural product supply chain and proposed related factors for establishment and perfection of the trust mechanism of members in agricultural product supply chain^[14]. Zhao Xiaofei (2012) proposed assumptions for constructing the modern agricultural product supply chain system in China^[15].

Electronic commerce has deep influences on the current commercial circulation and is a modern and emerging agricultural product trading pattern. Now domestic and foreign research work focuses on supply chain problem under electronic commerce environment, e.g. reconstruction of supply chain, integration and coordination of supply chain, organization structure reform of supply chain, performance evaluation of supply chain, or focuses on agricultural product supply chain problems under the traditional environment, e.g. organization structure of agricultural product supply chain, logistics and transportation of agricultural product supply chain, management of fresh agricultural product supply chain, and management of food supply chain management, but the research on the agricultural product supply chain under electronic commerce is limited, so this paper analyzes the future development pattern of the agricultural product supply chain under electronic commerce environment with the agricultural products in Zhejiang as one example.

2. CURRENT CONDITIONS AND PROBLEMS OF AGRICULTURAL PRODUCT CIRCULATION IN ZHEJIANG PROVINCE

2.1 Current conditions

2.1.1 Rich agricultural product resources in Zhejiang province

The agricultural product resources are very rich in Zhejiang province. The output of the agricultural products such as vegetable, tea, fruits, edible fungi, water foods and bamboo are listed at the top positions and the commodity rate is high. The statistical data from Zhejiang Province Statistic Bureau indicate that the output of the agricultural products in Zhejiang province (excluding bulk crops such as grain) in 2013 was ranked as the second position in history, including 5.7796 million ton fruit, 1.3044 pork, beef and mutton and 4.8377 aquatic products^[16]. Although the transportation revenue grew much and reached 39.487 billion RMB in 2013 in the village economic revenue divided by industries, compared to the revenue of other industries in the village economy (including forestry, animal husbandry and side fisheries, industry, building industry, commerce and food industry, and service industry), the transportation industry had the minimum revenue, so the agricultural product circulation industry had bigger development space in the village economy development. In 2013, 46 legal enterprises, 179 industry activity units and 2529 persons were engaged in the agricultural and livestock products wholesale^[16].

2.1.2 Preliminary formation of market-oriented agricultural product circulation pattern

Since reform and opening, Zhejiang province continuously deepens the circulation system reform and basically breaks monopoly in the agricultural product circuit industry and regional separation institution, so the market-oriented multi-channel, multi-economy component, multi-business mode and multi-business step agricultural product circulation pattern are formed. Now the circulation network with different agricultural product trading market as the main body and the retailers as the business backbones is formed in the domestic agricultural distribution channel in Zhejiang province. In recent years, with evolvement of the new businesses, especially chained supermarket and electronic commerce, it contributes much to agricultural product sale in Zhejiang province and an emerging agricultural product circulation network is gradually formed.

2.1.3 Agricultural information construction develops quickly and plays a critical role in agricultural product circulation in Zhejiang province

In recent years, the agricultural information construction develops quickly in Zhejiang province. Zhejiang province has established the Zhejiang village economy network (called as Zhejiang village network) in a manner of governmental support, hosting of the weather department, co-sponsorship of the agriculture-involved departments and market operation. Now Zhejiang village website includes the information center website, 9 provincial information sub-centers, 11 municipal information sub-centers, 80 county-level agricultural information websites and 1322 town agricultural information service stations. The Zhejiang agricultural system information websites have published 1.78 messages and the trading sum of the network agricultural products reaches over 700 million RMB.

2.1.4 Circulation pattern of agricultural products in Zhejiang province

Generally the agricultural products will be circulated via the following steps under this pattern, including producer, production place market, transportation and sale wholesaler, sale place market, retailer and consumer. The non-processed fresh agricultural products are dominant in the whole logistics chain. Such multi-step logistics chain is not adapted to sale of fresh agricultural products in time and circulation and current freshness preservation means, so loss of considerable fresh products is huge due to transportation price, transportation capacity, transportation infrastructure conditions and product freshness preservation technology. When the massive agricultural products are on sale at same time, the loss is huger due to non-smooth logistics and information, insufficient processing capability and production and sale separation. The tradition circulation pattern of Zhejiang province is shown as the figure 1:

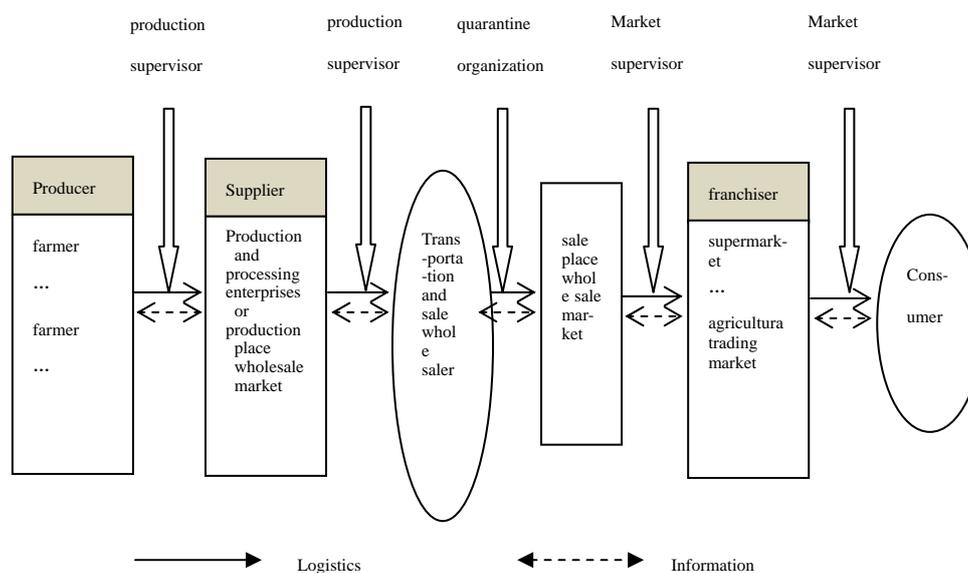


Figure 1. Circulation pattern of traditional agricultural products

2.2 Problems in agricultural product circulation in Zhejiang province

Although circulation of agricultural products evolves much in recent several years in Zhejiang province, some problems exist compared to the requirements of the agriculture modernization and development of the whole agricultural economy, which are described as follows:

2.2.1 Low systematization and non-smooth channels in circulation of agricultural products

Except a minority of foreign trade enterprises of agricultural products, most enterprises feature small scale, low professionalization and lack of deep purchase and remote sale capability, so it is difficult to realize “large-scale supply and large-scale sale” of agricultural products, which restricts development of the commodity products in village. Many farm product markets have a larger sale scale in Zhejiang province, but they mainly include the independent business users, which can not cooperate with each other, so the market radiation function is limited. Affected by the traditional institution, the production and sale of agricultural products are separated and agricultural enterprises, industry enterprises and trading enterprises do not cooperate with each other effectively. The current agricultural product circulation industry association features low circulation systemization, small-scale enterprises, weak economy strength and no scale strength. No leading enterprises and well-organized marketing system is lack in circulation of the agricultural products.

2.2.2 Backward marketing mode and rough business of agricultural product

Massive agricultural products are sold under spontaneous organization of wholesalers in Zhejiang, which feature decentralized operations and bigger blindness. Many medium-size and small-size enterprises and wholesalers feature low credit, unstandardized business, worse quality assurance and disorderly competition as well as low business level, worse commodity quality and traditional trading mode. Modern marketing patterns such as electronic commerce, chained business and logistics distribution are not well promoted and applied.

2.2.3 Weak infrastructure and low logistics efficiency for agricultural product circulation

Although the traffic infrastructure develops quickly in recent years in Zhejiang province, the remote areas, mountain area and village roads lag in construction, which affects purchase and transportation of agricultural products. The special warehouses, refrigeration warehouses and freshness preservation warehouse for agricultural products are severely insufficient. The inspection facilities of the circulation enterprises are nearly blank and the detection technologies lag in circulation of the agricultural products. The information management of the agricultural product circulation enterprises features severe weakness, small investment and lack of information management and development talents.

3. INTEGRATION MODEL OF AGRICULTURAL PRODUCT SUPPLY CHAIN IN ZHEJIANG PROVINCE UNDER ELECTRONIC COMMERCE ENVIRONMENT

3.1 Proposal of model

The integration model of the agricultural product logistics supply chain under the electronic commerce environment seamlessly combines production, processing, circulation and consumption of agricultural products via the supply chain electronic commerce information platform based on information network. The producers, suppliers and franchisers of the agricultural products realize integrated operation of production, supply and marketing of agricultural products via the information platform. Different steps are seamlessly connected. The production supervisors, quarantine organizations and market supervisors of the agricultural products can directly supervise production and processing, market access and quality security of the agricultural products via the information platform and can publish the latest international and domestic standards to guide production of the agricultural products via the information platform. The consumers can query quality and security of the purchased agricultural products via the network terminal of the information platform and can trace the production place to actually ensure rights and interests of consumers and create and protect the brands of the

agricultural products. The third-party logistics distribution center will complete the logistics distribution function of the agricultural product supply chain, so the whole flowing process of the whole agricultural products features high efficiency, coordination, can reduce loss, and save the expense.

The agricultural product suppliers will publish the production information to the upstream farmers according to the demand information provided by the franchisers and retailing terminal on the electronic commerce platform. The production and processing enterprises and agents can purchase agricultural products from farmers via the order, so it can reduce production blindness of the farmers and ensure sale channel of the agricultural products. It not only reduces the logistics cost of agricultural costs and loss of agricultural products, but also drives industrialization of agricultural production. The agricultural product supply chain can realize the advanced trading modes such as web auction via the information platform. If the platform connects the customs and bank, it can realize the network payment. The model of the agricultural product supply chain under the electronic commerce environment is shown as the figure 2.

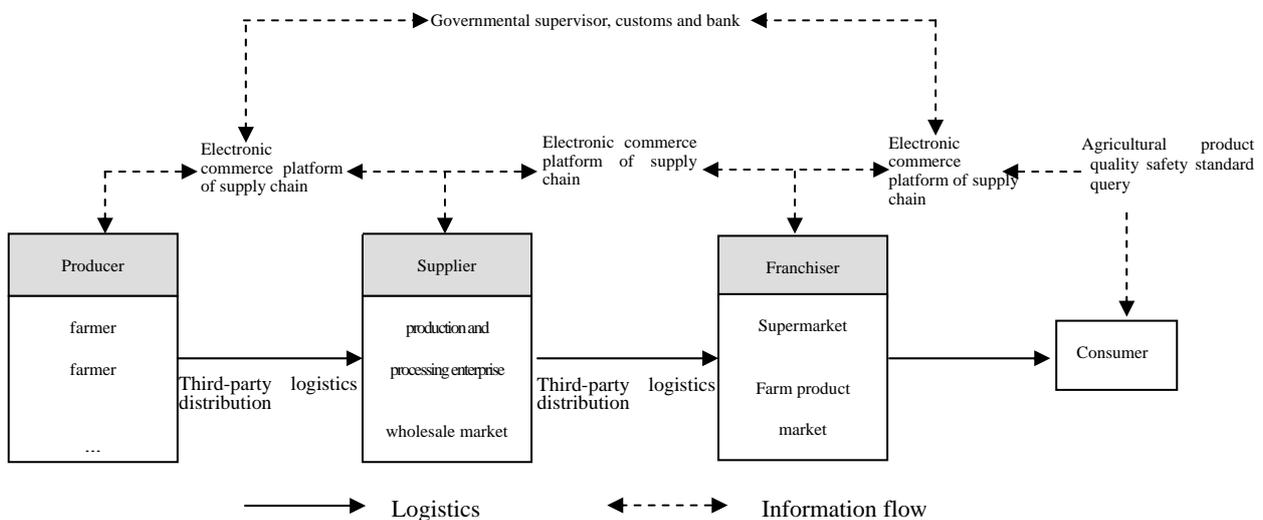


Figure 2 Agricultural product supply chain model under electronic commerce environment

3.2 Advantage of model

The management pattern of the agricultural logistics supply chain based on the information has the following strengths:

3.2.1 Full sharing of the supply chain information and full-process visibility of supply chain

The information systems of the farmers, agricultural product suppliers and agricultural product franchisers can be seamlessly connected, which improves elasticity of the supply chain management, reduces cost and risks of the supply chain logistics management, enables the market demand information of the agricultural products to accurately reach related nodes in the supply chain in time, and enhance planning of agricultural production, so it can reduce market risks of the peasants, improve their revenue, keep the agricultural products under transparent control state in the process from the field to dining tables, and effectively guarantee quality and security of agricultural products.

3.2.2 Reduce trading cost of agricultural products at circulation steps by coordinating information flow in the supply chain

With information sharing, the enterprises can collaborate and integrate the whole circulation process of the agricultural products at different nodes of the agricultural product supply chain, which can reduce loss of the agricultural products in circulation, shorten production cycle of agricultural products, improve trading efficiency,

reduce the logistics cost, and increase the value preservation period of agricultural products.

3.2.3 Planters, suppliers and franchisers of agricultural products get maximum profits

Consumers can eat the assured green and secure agricultural products, it will lay the substantial foundation for development of “order agriculture”.

3.2.4 Improve service quality and improve customer relation

The whole supply chain of agricultural products will be collaborated and managed according to the customer requirements of consumers in order to optimize service flow, improve work efficiency, improve customer satisfaction and loyalty, establish long-term customer relation, and improve prestige of enterprise brands. Brand operation of the agricultural products can erect the quality prestige of this product in consumers and further explore the consumption market.

4. COUNTERMEASURES FOR DEVELOPING AGRICULTURAL PRODUCT SUPPLY CHAIN BASED ON ELECTRONIC COMMERCE IN CHINA

To develop the agricultural product supply chain based on electronic commerce in China, the following aspects should be considered.

4.1 Speed up cultivation of modern agricultural product circulation system in China

From experiences of the developed countries in Europe and America, the key for highly modernized and highly competitive agriculture is high systematized circulation of agricultural products. Based on the problems in circulation of the agricultural products in China, it is necessary to hard develop different industry associations and professional cooperatives, support the leading enterprises, and form the circulation system of the industry association, agricultural production circulation enterprises, agricultural leading enterprises, professional cooperatives, agricultural production base and trading, and industry and agriculture integrated industrialization closely associated with peasants.

4.2 Play leading dominant role of the government and promote circulation information construction of the agricultural products in China

It is necessary to play the dominant role of the governments, further enhance the information service, promote agricultural information network and IT construction of local agricultural product wholesale market, large supermarket and forward market, improve information service quality, make the information supply continuously meet the information requirement, and drive development of information demand. To promote circulation information of agricultural products in China, governments should ensure fund investment to the information construction. The governments should emphasize the role of the legal means in circulation information construction of the agricultural products. Based on the deep investigation and research, governments should gradually establish local regulations on circulation information of agricultural products in order to adjust and standardize the economic behaviors of the participants at different circulation steps, apply the legal means to control circulation information systems of agricultural products, and ensure smooth information construction of agricultural products.

4.3 Strengthen modern logistics construction and perfect logistics infrastructure in China

It is necessary to speed up construction of large-scale and medium-scale integrated or professional logistics center, perfect fitting logistics infrastructure, increase investment to road and railway construction, form quick and smooth traffic network, strengthen construction of the fitting freshness preservation center and distribution center of the wholesale market, and construct a regional modern logistics system of the agricultural products. The existing agricultural product market should be reconstructed to change simple and crude, dirty, disorderly and worse conditions of traditional markets, and improve management level of the agricultural product market. The fresh product refrigeration chain system should be established to fully ensure transportation, storage and

distribution of the high-quality agricultural products.

4.4 Establish third-party electronic commerce trading platform and realize integrated management of logistics supply chain of agricultural products

An enterprise, which is predominant in circulation management experiences, talents and technologies, establishes one integrated agricultural product information and logistics value-added service and electronic commerce platform of agricultural product logistics in order to completely provide complete business requirements such as sale, purchase, merchant attraction, agency, research achievement and resource cooperation of agricultural products as well as publishing, query, notification and business match function.

5. CONCLUSIONS

With continuous improvement of agriculture modernization level in China, the agricultural products have transformed from insufficient total supply restriction to surplus local structure restriction. The main obstacle to restrict further development of agriculture is transformed from production field to market circulation field. The non-smooth information flowing and single trading means of the traditional agricultural product supply chain is strongly impacted by the electronic commerce based on the network and information technology. After joining in WTO, the agriculture will face more complex competition environment and more competitors in China, so the static and complex agricultural product supply chain structure can not meet the continuous and fierce market competition environment, rapidly changing environment and diversified customer demands. It is an effective means for agriculture modernization and improvement of agriculture's comprehensive competition capability in China to develop the agricultural product supply chain based on electronic commerce, apply the information tool system with Internet as the representative as strategic choice of the agricultural product supply chain reform, and optimize and reconstruct the agricultural product supply chain structure.

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