Study on the Circulation of Agricultural Products Based on Cloud Computing from the Perspective of Rural Revitalization Strategy

Yitang Zeng and Meihong You*
School of Management, Wuhan Donghu University, China
*Email: 504065833@qq.com

Abstract. The construction of modern circulation system of agricultural products is an important content to promote the prosperity of rural agricultural industry and the implementation of rural revitalization strategy. In practice, the main modes of agricultural products circulation include wholesale market type, agricultural super-docking type, farmers market type and network platform type, each mode has its own advantages and disadvantages. From the perspective of the implementation of rural revitalization strategy, there are still some problems in the circulation of agricultural products at present, such as high circulation cost, facilities are backward, professional brokers is in the ascendant, the level of information service is low, fund shortage. At the same time, there are some new trends, such as high growth to high quality development, orderly circulation system of agricultural products under national macro-control, efficient, safe, healthy, green and intelligent ecological development, "pyramid" agricultural product market system with Chinese characteristics, and so on. It is necessary to speed up the circulation of agricultural products based on cloud computing from six aspects: innovative trading mode, innovative supply and demand mode, innovative distribution mode, innovative organization mode, innovative product brand and innovative operation mechanism, so as to lay the foundation for realizing the strategy of rural revitalization.

1. Introduction
The implementation of the strategy of rural revitalization is a major strategic arrangement made by the Nineteenth National Congress of the Party and a general grasp of the work of "agriculture, countryside and farmers" in the new era. Promoting industrial prosperity and increasing farmers' income are the material guarantee for the implementation of the strategy of rural revitalization. Building a modern circulation system for agricultural products based on cloud computing is conducive to reducing circulation costs, improving circulation efficiency, promoting the development of agricultural industries, and promoting the implementation of the strategy of rural revitalization.

At present, the research on the circulation of agricultural products has attracted the attention of many scholars. Clare Narrod et al. (2009) argued that a regulatory system of agricultural product quality and safety needs to be established to improve the efficiency of agricultural product circulation [1]. Thakur M and Hurburgh C R (2009) pointed out that all links of the circulation market of agricultural products should be open and transparent and can be tracked and traced from time to time [2]. Jalalia (2011) and others suggested that the e-commerce platform for agricultural products should provide information on the output, price, transportation and circulation of agricultural products, and improve the service of online banking [3]. Maertens (2011) and others suggested that small-scale farmers could choose to work for large-scale agricultural companies or join in the circulation system.
of agricultural products in the form of cooperatives or companies with certain production scale through cooperation [4]. Aubry C and kebir L. (2013) pointed out that supermarkets can accurately detect changes in demand for agricultural products, thus leading farmers to produce and reducing risks [5]. Euisik Hwang. (2011) found that the development of agricultural cooperatives can help to better sell agricultural products to a certain extent [6]. B. suryaningrat (2015) proposed that farmers, large and small farmers, industries (processors or producers), food stores and consumers are the strong participants in cassava product supply chain through the study of cassava industry in Indonesia [7]. Xu Xizhi (2015) proved through MSCP paradigm that agricultural products channel "agricultural cooperatives - fresh supermarket - consumers" can significantly improve the efficiency of agricultural products circulation system [8]. Peng Yusong and others (2017) found that the circulation of agricultural products will rely on "Internet +", relying on the network platform to achieve [9].

The relevant achievements are relatively few according to the current research situation. How to determine the obstacles in the circulation of agricultural products based on cloud computing, how to analyze the trend of the circulation of agricultural products based on cloud computing, and how to realize the innovation of the circulation of agricultural products based on cloud computing are the contents that this paper tries to answer.

2. Main modes of circulation of agricultural products

The rapid change of the external environment makes the circulation channel mode of agricultural products develop, change and innovate constantly, but the function of the circulation channel is always the fundamental factor to determine the circulation structure and efficiency, which mainly includes the functions of transportation, inventory, ownership, communication and production. According to different transaction modes, the circulation channel modes of agricultural products in China are sorted out and summarized. As shown in figure 1, four main circulation channel modes have been basically formed: wholesale market mode, agricultural supermarket docking mode, agricultural trade market mode and network platform mode.

![Figure 1](image)

2.1. Wholesale Market Mode

The channel for the circulation of agricultural products with the wholesale market as the core means that most of the agricultural products produced by farmers are purchased by agricultural cooperatives or cooperative organizations and so on, and then distributed to retailers, markets or supermarkets through the wholesale market of the origin of agricultural products, place of wholesale market, and finally to consumers (see figure 2). The main channel members involved in the wholesale market model of agricultural products are "farmers + middlemen / consumers (organizations / individuals)".
2.2. Circulation mode of agricultural super docking
This mode eliminates the intervention of the wholesale markets of production and consumption places, improves the efficiency and income of the circulation to some extent, and reduces the cost of circulation (see figure 3).

2.3. Circulation mode of agricultural trade market
The disadvantages of this model are obvious. First of all, the variety of agricultural products is small, the homogenization is serious, and the choice of customers is small, which can not meet the diversified consumption demand. Secondly, the environmental problems of agricultural trade market. Rotten vegetables, fruits, live fish and poultry in the market seriously affect the air quality in the agricultural trade market. Finally, the flow of people in the farmers’ market is relatively strong, and the parking volume of motor vehicles is relatively large, which is easy to cause traffic congestion [10].

2.4. Circulation mode of network platform type
This kind of transaction mode includes the comprehensive e-commerce platform represented by Ali, Jingdong, Yihaodian, Suning, etc., the vertical e-commerce platform represented by Tiantianguoyuan, Tuotuo industrial society, etc., the logistics cut-in e-commerce platform represented by Shunfeng optimization, the o2o fresh e-commerce platform represented by Wal Mart, Calefu, Yonghui, etc.

Although the circulation mode of agricultural products based on the network platform promotes the online transaction of agricultural products, there are some shortcomings: first, most of the agricultural products are sold by the third-party sellers, unable to control the quality, safety and quality of the agricultural products traded; second, there are many sellers on the platform, there is no unified standard in the quality and price of agricultural products.

3. Barriers of the circulation of agricultural products

3.1. High circulation cost
China's total amount of agricultural products logistics is increasing year by year. However, it is a pity
that the proportion of agricultural products logistics in total social logistics has a downward trend. It can be seen that the development of agricultural products logistics lags behind. Generally speaking, the circulation cost of agricultural products in China is on the high side [11].

3.2. *Agricultural circulation facilities are backward*
In a considerable number of mountainous and rural areas, the road surface is still gravel pavement, and even some roads are not accessible. The road construction in remote areas and backward mountainous areas is lagging behind, and the problem of insufficient overall transportation capacity has not been fundamentally solved, which directly affects the transportation and sales of agricultural products. The modernization of logistics facilities and equipment is low, the special technical equipment for agricultural products logistics is insufficient.

3.3. *The professional brokers is in the ascendant*
At present, some agricultural brokers have set up agricultural product brokerage companies, which have greatly enhanced the economic benefits and competitiveness of related agricultural products. However, the serious shortage of professional brokers and the worrying quality are not conducive to improving the added value of agricultural products, saving the circulation cost of agricultural products, improving the flow efficiency of agricultural products, reducing the unnecessary loss of agricultural products, and effectively avoiding market risks.

3.4. *The information service level of agricultural products circulation is low*
The construction of the information system of agricultural products circulation in China is not perfect in the following aspects: (1) most of the market has not updated the information equipment, and has not made the market become the information exchange platform for agricultural products. (2) the circulation information of agricultural products cannot be shared in time. (3) online sales still need to be developed.

3.5. *The circulation of agricultural products is facing the dilemma of fund shortage*
In recent years, a variety of agricultural product characteristic exhibitions, production and marketing docking activities, e-commerce innovation have greatly promoted the formation of agricultural product business flow. However, these activities are mostly dominated by the government, rather than institutions specialized in agricultural product marketing and promotion services. Moreover, these activities cost a lot of money in various forms and have not achieved the actual publicity effect and the ability to attract social funds is limited. On the other hand, the payment and settlement of agricultural products transactions are mainly completed by capital flow.

4. *The trend of the circulation of agricultural products based on cloud computing from the Perspective of rural revitalization strategy*

4.1. *From high growth to high quality development*
The circulation of agricultural products is changing from high growth to high quality. The circulation of agricultural products not only pursues the speed and scale of circulation, but also the quality and efficiency of circulation, the emergence of digital production, digital circulation and digital consumption, and the development trend of "pull supply chain" centered on consumption and market.

4.2. *Orderly circulation system of agricultural products under national macro-control*
The circulation of agricultural products needs to rely on policies, investment and more on the market. We should deal with the relationship between the government and the market, give full play to the role of the market. At the same time, the government industrial policy and its effective guidance for the construction of the public welfare market should also be based on the market to play a good role.
4.3. Efficient, safe, healthy, green and intelligent ecological development
In the new historical period, the goal of circulation of agricultural products should be determined to establish "efficient, safe, healthy, green, intelligent and ecological development", which is very important under the current new economic conditions. "Efficient, safe, healthy, green, intelligent and ecological development" is very important, and should be taken as the goal of the modernization of agricultural products circulation.

4.4. E-commerce development of digital agricultural products
Digitalization of agricultural products -- realize standardization, informatization and traceability of agricultural products safety and health, and protect the interests of consumers.
Transaction digitalization -- when online transaction has not yet occurred, digitalization has informed the provider of the variety, data and time of the transaction. So there are some new concepts: the concept of pre-position; C2B, C2F, S2B, CSA, B2B2C, o2o model innovation; transaction index appears.
Payment digitization -- the extensive application of card base payment, network payment, mobile payment, telephone payment, ATM payment, face brushing payment and so on in the wholesale market of agricultural products.
Digitalization of material distribution -- logistics management, vehicle flow management, ETC electronic toll collection system, cold chain warehouse management, product blockchain management, quality inspection management, etc. in the trading floor.
Digitalization of merchants (members) -- dynamic management of merchants (members), management of booth charging and renting, digitalization service of merchants (members), management of water, electricity, and automobile of merchants (members), management of free declaration of merchants (members), etc.
Digitalization of market function -- Digitalization of transaction function, payment function, logistics function, information function, tourism function, etc.
Digitalization of supply chain -- market supply chain has experienced main supply chain, platform supply chain and ecological supply chain. Its ultimate goal is to digitalize supply chain and explore the mode innovation of "pull supply chain".

4.5. "Pyramid" agricultural product market system with Chinese characteristics
In the development process from agricultural informatization to e-commerce of agricultural products, online transactions of various agricultural products are very active in China. The e-commerce system of agricultural products includes online agricultural products futures trading, online agricultural options derivatives trading, bulk agricultural products e-trading, agricultural products online B2B, agricultural products "new retail", entity enterprise o2o trading, agricultural products online trade fair, etc. (see figure 4) The so-called "pyramid" structure system of agricultural e-commerce has been formed and is playing a huge role.

Figure 4. Pyramid system of agricultural products online transaction.
5. Innovation in the Circulation of Agricultural Products based on cloud computing from the Perspective of rural revitalization strategy

5.1. Innovate to form a modern trading market with farmers as the main trading body
Taking the farmers as the main body, the market as the link, the demand as the direction, the change of the product trading mode as the breakthrough point, the innovation trading organization as the focus, the modern information system, the modern logistics system, the modern trading system as the support, promotes the establishment of the large-scale modern agricultural products trading market, opens the supply and demand information docking channel, makes the farmer truly become the independent pricing, the free competition market trading main body, enhances the circulation and the transaction efficiency. First, the modern trading market can be built by the county and township governments, or by the regional wholesale market through modernization. Second, the modern trading market is based on the information sharing platform. Agricultural producers can release the production and sales information of agricultural products, and improve the bargaining power of farmers. Third, this way will make small planting scale, scattered distribution of farmers concentrated in a network platform, on the one hand to expand the scale of the market, on the other hand to improve the quality of information transmission.

5.2. Innovate the supply and demand mode and form the value-added chain
By connecting the information of supply, demand and logistics distribution of agricultural products, we can promote the formation of closed-loop industrial value chain of supply and demand of agricultural products circulation with farmers as the main body of value realization.

As shown in figure 5, a complete value chain of agricultural products should generally include breeding of improved varieties, technological research and development, supply of agricultural materials, planting or breeding, logistics, sales brand marketing and consumption.

![Figure 5. Value chain of agricultural products.](image)

Many empirical data show that there is a smile curve in the value chain of agricultural products. In the upstream production end of the supply chain, the value-added of improved breeding is the largest, followed by the research and development of planting or breeding technology, and then the supply of agricultural materials, planting or breeding is the lowest value link. In the downstream circulation link of supply chain, In the downstream circulation of the supply chain, the value of logistics is the smallest, sales is the second, brand marketing value-added is the largest. Therefore, we should study the division and organization of the circulation value chain of agricultural products and the distribution law of the value-added income of the circulation value of agricultural products, make full use of the advantages of the "long tail effect" and "network effect" brought by the Internet to reconstruct the upstream value chain of agricultural products under the differentiation strategy, so that the supply chain of agricultural products in remote rural areas can be upgraded through the link of the Internet and cross-border cooperation to form a more efficient supply chain network to not only increase the added value of products, but also to provide better services for middle and high-end consumers.

5.3. Innovate distribution mode and form a logistics distribution system
The supply chain concept leads the construction of agricultural products circulation facilities and promotes the extensive utilization of modern logistics facilities, so as to connect the production
farmers, the agent distribution and the final consumers, and add the processing, packaging, transportation and other logistics distribution activities in the whole circulation link, thus greatly increasing the value chain and system chain of its value. Establish a "short radius, zero inventory" agricultural product distribution mode characterized by the distribution center of the production place, establish a logistics warehouse in the origin of agricultural products, and equip with comprehensive fresh-keeping and cold storage equipment. Through online order booking, based on the principle of "nearby distribution", combined with the Jinlinbao, Fengchao, rookie station and crowdsourcing services, solve the "last kilometer" problem of distribution in multiple aspects and in depth. Achieve short distance of agricultural products, quality-preserving fresh-keeping distribution, save social logistics costs, improve logistics distribution efficiency, improve consumer consumption comfort, and form a "short radius, high efficiency, excellent service" system of agricultural logistics distribution. The characteristic of the new distribution mode of agricultural products is the traceability of agricultural products, and its essence is to protect the production interests of farmers and the rights and interests of consumers to the greatest extent.

5.4. Innovate the organizational model and form a farmer union
The production scale of small-scale peasant households in China is small and the distribution is not centralized, which is not conducive to the large-scale sales of products and the expansion of the market. Through the establishment of production consortiums, these small farmers can be centralized, the production scale can be expanded, and unified guidance and cultivation can be carried out at the same time, the production efficiency and the planting quality of agricultural products can be improved, the competitiveness of agricultural products can be guaranteed, and the transformation of farmers from small-scale producers to modern producers and operators can be promoted. In addition, production consortiums can also expand the industrial chain of agricultural products, process agricultural products, build special brands according to the particularity of characteristic agricultural products, improve the market competitiveness of regional agricultural products, promote the deep processing and reprocessing of agricultural products, extend the agricultural industrial chain to form new advantageous products and brands, and promote the development of agricultural scale, intensification and specialization.

5.5. Innovate the product brand and form a modern agricultural innovation system
A brand should be created according to market demand. Farmers can make full use of the characteristics of large amount of network information and symmetrical information between supply and demand and adjust their product varieties and planting scale in time according to consumer preferences and agricultural product market division. After that, through the market selection, the characteristic agricultural products of a certain region will be formed, and the farmers will be inspired to improve their varieties and form the brand of agricultural products with regional characteristics. In addition to carrying on online outlets and offline stores brand publicity, public relations publicity is also important, such as cooperation with internet platform and popular traffic software or online popular software through the Internet platform to strengthen the publicity and promotion of featured agricultural products [12]. In addition, farmers can participate in the National Agricultural Expo, agricultural products exchange forum, etc., and the local government can also cooperate with relevant departments and associations to hold provincial or national characteristic agricultural products exhibitions, promote agricultural products and brands, and enhance brand awareness.

5.6. Innovate the operation mechanism and form the coordination relationship
Innovate the operation mechanism is to realize the fast, efficient, and safe flow of product flow, logistics, capital flow and information flow.

(1) Power and responsibility distribution mechanism
While providing diversified services for farmers, the circulation system of agricultural products must coordinate the division of labor and clarify the service attributes. For different services,
corresponding institutions can be set up for special management. If necessary, service flow chart and department structure chart can be developed to optimize internal institutions, reasonably distribute rights and responsibilities, avoid the overlapping of institutions, the intersection of functions or missing functions and the resulting inefficiency of management services.

(2) Benefit distribution mechanism

Establish a mechanism of interest distribution with farmers as the main body. The circulation system of agricultural products can be established by the local government in conjunction with relevant national departments, with Internet enterprises, e-commerce platforms, local leading enterprises, etc. as the main force, and with the collective investment of enterprises and farmers as the assistance. The specific distribution of interests shall be based on the contract, the proportion of capital contribution or collective negotiation, so as to ensure the equal relationship between the main bodies.

(3) Quality supervision mechanism

The long-term and healthy development of the circulation system of agricultural products requires continuous consumption flow, with the emphasis on the quality of products and consumer experience. Strengthening the supervision of the producing area of agricultural products can effectively reduce the accidents of product quality. We should guide farmers to standardize planting, regularly sample and test the qualified rate of products, and put an end to the quality unsafe products from the source.

(4) Logistics coordination mechanism

As the core link of the circulation of agricultural products, the time, cost and service of logistics distribution will affect the consumer experience of agricultural products. Therefore, it is very important to improve the logistics distribution mechanism, use the information platform to select the qualified logistics providers and reduce the transportation risk. Logistics companies can adopt long-term contracts or mutual investment and other methods to reduce transportation costs and ensure the reliability and safety of distribution.

(5) Precision marketing mechanism

The feedback mechanism of interaction with consumers shall be established in the product circulation link. Based on consumer information and product information, the specialization of product segmentation and customer category shall be realized. Different products shall be provided for different types of consumer groups and sold on the corresponding consumption platform.

(6) Information management mechanism

The circulation system of agricultural products should establish information management rules and regulations, including information maintenance and management system, information distribution system, information use system, to ensure the effective use and security of information.

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