World Scientific Research Journal (WSRJ) ISSN: 2472-3703
www.wsr-j.org

Analysis on Development Strategy of Agricultural Products E-commerce Supply Chain Based on System Dynamics

Xianfeng Wu, Guozhu Wang

School of Economics and Management, Chongqing University of Posts and Telecommunications, Chongqing, 400065, China

---

Abstract: With the rapid popularization of the Internet and the development of information technology, e-commerce has gradually become a new form of promoting economic and social development. All industries have explored the best mode of combining themselves with electronic commerce. As the core engine of developing agricultural economy and promoting agricultural transformation, electronic commerce plays an important role in improving the income of rural residents and eliminating the two element structure of urban and rural areas. Thus, e-commerce provides new ideas and techniques to solve the problems existing in the traditional agricultural supply chain. It is of great theoretical and practical significance to study how to use e-commerce to develop the supply chain of agricultural products. Based on the theories of supply chain, agricultural product supply chain and electronic commerce, this thesis uses system dynamics tools to construct the system dynamics model of the supply chain of agricultural products, and simulates the research model based on Vensim software. In addition, this thesis gives strategies in the supply of agricultural products by combining the research conclusions and the imitation results. The main contents of this thesis are as follows: firstly, the background and significance of the research are introduced, and this thesis gives the research innovation points based on the domestic and foreign research review.in addition, the basic concepts and theoretical bases related to the research are expounded. Secondly, the system dynamics theory is used to analyze the inner parts of farmers, suppliers, distributors, logistics enterprises and the government. The operation mechanism, the main influence factors and the internal relations between the various factors has obtained based on system dynamic model, and this thesis determined the boundary of the system. Then, through the causal analysis of the production, processing, sales and transportation of agricultural products in the supply, this thesis determined the cause and effect diagram based on the causality analysis of the system and the model of the supply chain system of agricultural products is drawn. Finally, the variables in the related data are quantified, the model variable equation is established, and the system dynamics model of the supply chain of agricultural products is constructed. In addition, this thesis also takes the Fengjie navel orange e-business supply chain as the research object,

collects and deals with the data needed in the model, established the specific functions of the variables in the model, and simulates the model by the system dynamics software Vensim, In order to verify the feasibility and operability of the system dynamics model, the thesis tested the variables systematically. The research conclusions shows that the seller's increase in the network platform investment can effectively expand the market demand, and the contract price between suppliers and vendors has a significant impact on the output value of the navel orange e-commerce supply chain. When the government increases the investment in the logistics infrastructure, the investment has a significant effect on the output value of the navel orange electronic business chain. But the promotion effect gradually weakened in the certain stage. Finally, this thesis puts forward some suggestions on the development of e-business supply chain according to the simulation results and analysis, in the aspects of market demand, coordination optimization of each node in supply chain, information management and logistics system.

Keywords: agricultural supply chain, e-commerce, system dynamics, vensim.

1. INTRODUCTION

1.1 Research Background

E-commerce of agricultural products is of vital importance to the development of rural areas, which is conducive to boosting the degree of informatization in rural areas, promoting the rural economy and the overall development of rural and urban areas. At the same time, it can also help farmers increase their income, eliminate stubborn three-agricultural issues, and change backward rural areas. Economic appearance. With the deep implementation of the “Internet Plus” strategy in rural areas, rural e-commerce has become a pillar force for promoting rural economic growth. E-commerce in agricultural products has also been written into the major strategies of the central and local governments, which has become an important direction for the country to develop rural economic levels and improve the living standards of farmers.

The “Central Document No. 1” of 2017 clearly stated that it is necessary to further promote the development of rural e-commerce, promote the circulation efficiency of agricultural products in the market, strengthen the connection between rural e-commerce enterprises and logistics companies, and build a way to integrate online and offline development. Perfect agricultural product e-commerce supply chain circulation system. At the same time, in the process of developing e-commerce of agricultural products, local governments must support the construction of local e-commerce platforms for agricultural products, and actively introduce a number of well-known e-commerce platforms for agricultural products in other places to strengthen the infrastructure of rural e-commerce service stations. To lay a solid foundation for the development of e-commerce in agricultural products.

In the process of developing e-commerce of agricultural products, the key lies in realizing the transformation of transaction methods. The e-commerce of traditional agricultural products adopts the “hand-to-hand” trading method. Today, it is necessary to conform to the trend of the

Internet in the entire world and use e-commerce thinking to achieve The trading and circulation of agricultural products. At present, China's agricultural development is fast and swift, and the types and quantities of agricultural products have been increasing year by year. However, there is also a structural shortage, which leads to a backward production and trading pattern of agricultural products. The asymmetry of information between agricultural products and markets has gradually expanded, resulting in the sale of agricultural products. Great adverse effects. Therefore, it is imperative to develop the e-commerce of agricultural products to solve the production, circulation and sales of agricultural products.

According to relevant information of BCG, the demand for agricultural products in China has increased year by year, especially the growth rate of online demand is very rapid. China's 2016 e-commerce development of agricultural products is relatively good. The retail sales of agricultural products have reached RMB220 billion, which is an increase of 50% compared to 2015. The number of e-commerce parks for agricultural products in all regions is 200, accounting for all e-commerce parks. The ratio is 12%; the freshness of fresh e-commerce reaches 100 billion yuan, an increase of more than 80% compared with the same year, and the data forecast shows that it will reach 150 billion by 2018. However, the current development of agricultural products e-commerce is not always smooth, but is an era in which opportunities and challenges coexist. Behind the prosperity is a large number of agricultural e-commerce companies suffer huge losses. According to the survey, of the more than 4,000 fresh electronic e-commerce providers in China, about 90% are at a loss. The pastoral preference with the reputation of the "Chongqing Fresh Food E-commerce First Platform" is now faced with such a difficult situation. Although hundreds of fresh products are sold on the platform, there are few buyers. The main reasons for this embarrassing situation of fresh e-commerce are the high cost of cold-chain logistics, low quality of fresh produce, poor consumer experience, irregular financing channels, and fracture of capital chain. Among them, the cost of cold-chain logistics is high. Poor quality of fresh produce has become a fatal pain point for fresh e-commerce. The high cost of cold-chain logistics has caused fresh e-commerce companies to make profits difficult. According to incomplete statistics, the cost structure of fresh e-commerce companies accounted for 23% of the total cost of logistics, storage and loss costs, especially for regional fresh e-commerce. The proportion is higher. At the same time, the quality of fresh products is mixed, and the low quality level is also the main reason for the loss of the fresh e-commerce. Many consumers report that the received fruit is rotten or unfamiliar, and the physical object is inconsistent with the picture. These problems are in sharp contrast with the pre-purchase expectations of consumers and reduce consumer loyalty, causing consumers to abandon their second purchase. The logistics service is not in place, and the quality of fresh produce purchased on the internet is not good enough. Therefore, the consumer groups cannot form sufficient purchasing requirements. Sporadic small orders are difficult to recover for the costs of platform construction and operation, logistics and distribution, etc. This is a vicious cycle. Inevitably lead to loss of e-commerce platform.

1.2 Related Research status

In the field of rural e-commerce research, Hertweck B M analyzed the positive significance of developing rural e-commerce for local rural areas. On the one hand, it helps to improve agricultural modernization, and on the other hand, it can also prompt farmers to use the network proficiently. The research of Kelepouris T et al shows that the use of RFID technology can deeply promote the application of information technology in agricultural production and marketing, improve the level of agricultural informatization, and then promote the development of rural e-commerce. Ding Minghua conducted research on the development mode of rural e-commerce in China and believed that by integrating the Internet and agricultural development, we can quickly find the focus of China's rural economic development, improve the transformation, upgrading, and development of rural industries, and The development of the service industry has played an important role. Mu Yanhong and Wang Duchun clustered and analyzed 15 rural e-commerce demonstration villages in Heilongjiang through cluster analysis, and discussed the results of the cluster analysis to provide useful advice for the development of rural e-commerce in Heilongjiang. With reference to the study, the study considers that Heilongjiang lacks investment in the construction of rural e-commerce platforms. It is also necessary to build rural e-commerce platforms focusing on B2B and B2C. Through these platforms, it will provide a more complete platform for farmers' agricultural products trade. .

In the field of agricultural product supply chain research, Johnson G.I believes that the agricultural product supply chain is a horizontal and vertical integrated strategic alliance, and the alliance is mainly composed of the production, circulation, and sales of raw materials. Zhao Xiaofei analyzed the deficiencies of various traditional agricultural product supply chains and constructed a modern agricultural product supply chain system based on information and supported by the organizational system. Zibo Wen believes that the scientific evaluation of the performance of the supply chain alliance is conducive to improving the circulation efficiency of agricultural products, and builds a cross-border agricultural product supply chain alliance performance evaluation system that includes three first-level indicators and 12 second-level indicators. Dong Yude and others started from the perspective of supply chain and studied the governance safety traceability system of the agricultural product supply chain, which is of great significance for strengthening the quality and safety of agricultural products and protecting consumer rights .

2. RESEARCH METHODS AND AGRICULTURAL PRODUCTS E-COMMERCE SUPPLY CHAIN MODEL

2.1 Research Methods

System dynamics (abbreviated as SD-system dynamics) belongs to the class of system simulation methods. The founder of the method is Prof Forest, who has a relatively mature application in information feedback system research. His initial name was industrial dynamics. System dynamics has a wide range of applications and has a strong ability to solve problems. Generally, it can be divided into the following steps:

(1) System analysis. This step is the first step in the system dynamics method. Its main purpose is to analyze the data of the research object to analyze it in a holistic manner, and then it is clear what kind of problems the dynamic system will solve and the fundamentals of system construction. Objectives, and through the above analysis, preliminary definition of the system boundary, to find the endogenous and exogenous variables included in the dynamic system.
(2) Analysis of system structure. The main purpose of this step is to complete the division of the system blocks. The main contents include two aspects, one is the relationship between the sub-blocks and the sub-blocks, and the second is the relationship between the various factors inside the sub-blocks, through the above analysis A diagram of the causality of the entire system is drawn to identify the feedback loop and verify the scientific nature of the feedback system.
(3) Model construction. Through the systematic analysis of the research object and the analysis of the system structure, the corresponding system dynamics model is constructed. Before the model is built, the type of the system variables and the relationship between the variables must be clearly defined. The variables in the system should have state variables, rate variables, auxiliary variables, and constants. The action relationship refers to setting initial values for all constants, some auxiliary variables, and some state variables, and determining the mathematical relationship of the causal chain, that is, the variable function. The variable functions are linear and non-linear. Linear functions, linear functions can be directly expressed in the input of the equations, and some nonlinear functions need to use the table function and design parameters of the table function according to the corresponding data.
(4) Model simulation and policy analysis. After completing the problem-oriented model construction work, it is also necessary to simulate the model that has been constructed, and to provide a theoretical basis for subsequent policy suggestions through system simulation analysis, thereby improving the scientificity of the model construction and the research conclusions. Relevance, to achieve in-depth and systematic analysis of the problem; In addition, the model needs to be modeled internally, the basic operation is to make the model variable in different values, including the relationship between variables, initial values and structural equations, and then achieve different Simulation under the situation, and through the analysis of the simulation results of different scenarios, the key measures to solve the problem, but also need to verify the practicality of the model with the actual case.

2.2 System boundary

Agricultural products refer to primary products and primary processed products of various plants and animals produced in crop farming, aquaculture, forestry, animal husbandry, and aquaculture [59]. The connotation of e-commerce is very rich. It usually refers to the use of information networks to transform the trading methods of goods or services, including a series of business activities, including information transfer and commodity trading. In recent years, the development of e-commerce has been rapid. The complete process includes transaction, payment, and logistics and distribution. E-commerce can be seen as an efficient combination of information, capital, and logistics. The e-commerce supply chain of agricultural products is

a complex conceptual system, including three modules of agricultural products, e-commerce and supply chain, but it is not limited to the characteristics of having three modules. Broadly speaking, the e-commerce supply chain for agricultural products refers to a series of electronic transaction activities that take agricultural production and sales of agricultural products as the center, including agricultural production, electronic payment, customer relationship and information management. In a narrow sense, the e-commerce supply chain of agricultural products refers to the electronicization of agricultural product trading activities and is mainly engaged in electronic business services related to the production, supply, and sales of agricultural products. The e-commerce of agricultural products mainly utilizes the advantages of resource integration of e-commerce platforms, fully exerts the synergies of all parties to improve the industrial chain, and at the same time promotes the efficient interoperability of information of all parties, thereby achieving efficient integration of capital flows, information flows, and logistics resources. To achieve the optimization of production, processing, distribution and sales of agricultural products. In addition, a complete e-commerce supply chain for agricultural products can also guarantee the security of agricultural products and the stability of supply, and achieve win-win cooperation between all parties in the supply chain.

Determining the system boundary mainly refers to determining the main body and elements of the system. The main subjects of the agricultural product supply chain system include farmers, cooperatives, processing companies, wholesalers, markets, retailers, and consumers. In addition, because the government plays an important role in the macro-control of the supply chain's layout and coordination, the government is also the subject of the system. The e-commerce supply chain of agricultural products is the same as the main body of agricultural product supply chain system, with the difference that the former integrates e-commerce activities. The subjects involved in the e-commerce supply chain of agricultural products include farmers, cooperatives, processing companies, wholesalers/markets, retailers, and consumers. The agricultural product supply chain logistics system mainly includes the following steps: farmer/cooperative agricultural product production, processing enterprise processing, seller sales, and logistics enterprise distribution. The specific components of the system and the relationships between the elements are analyzed in detail in the next section.

2.3 System Analysis

Farmers and Their Activities System Analysis

Farmers are the most important part of the production process. Their main activities include the cultivation/planting of agricultural products and sales activities with suppliers/processing companies. Farmers purchase raw materials to produce primary agricultural products and sell them to suppliers/processors. To realize the maximization of farmers' benefits is the overall goal in the production process. Therefore, this paper selects six factors such as farmer's output of agricultural products, total production cost of farmers, sales of farmer's agricultural products, sales price of farmer's agricultural products, sales income of farmer's agricultural products, and profit of farmer's agricultural products. Activities are systematically described. The sales income of farmers is determined jointly by the sales price of agricultural products of

agricultural households and the sales volume of agricultural products of farmers. The profit of sales of agricultural products of rural households is jointly determined by the income from the sale of agricultural products of agricultural households and the total production cost of farmers. Production costs include raw material costs, planting costs, epidemic prevention costs, labor costs, and transaction costs. Therefore, the system description for constructing production activities in this paper is shown in Figure 1.

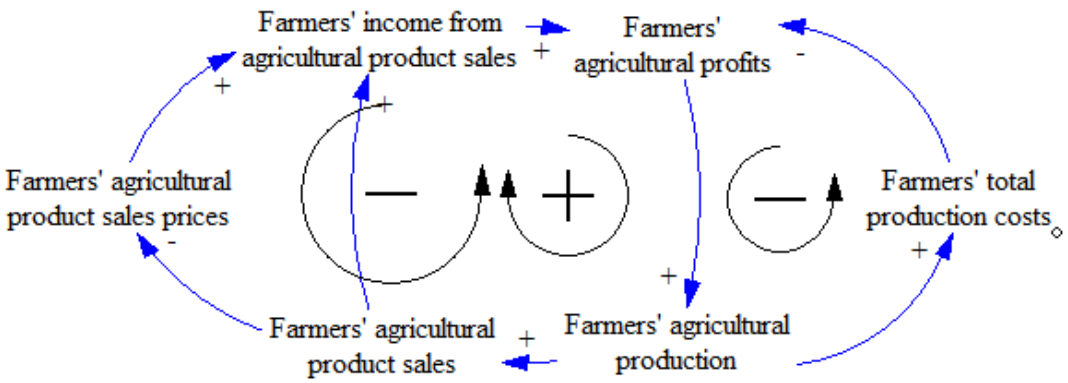

Figure 1 Causality diagram of rural household activities

Suppliers and Their Activities System Analysis

Agricultural product processing refers to the physical and chemical processes that change the appearance and biological characteristics of agricultural products. In the agricultural product supply chain, suppliers are the main players in the processing of agricultural products. The supplier purchases primary agricultural products from farmers and processes them to produce processed agricultural products and then sells the products to sellers by entrusted agents. Therefore, suppliers have two trading stages. One is to buy primary agricultural products from farmers, and the other is to sell processed agricultural products to sellers. The two transaction processes are characterized by transaction prices and transaction volumes. Increasing the quality of agricultural products through packaging is a core business of supplier processing. Therefore, suppliers play an important role in product quality.

The supplier costs mainly come from the cost of raw material purchases, supplier processing costs, inventory costs, and transaction costs. Among them, the transaction cost is determined by its contract with farmers and sellers. It is described in detail in Section IV of Chapter III of this paper. The purchase cost of suppliers is determined by the purchase price and purchase amount of suppliers, and the processing cost of suppliers is the amount of processed agricultural products. It is determined jointly with the unit processing cost. The profit of the supplier comes from the difference between the supplier's sales revenue and the supplier's cost. A part of the supplier's profit is used for the research and development of processing technology as a guarantee for improving product quality. The relationship between processing activities is shown in Figure 2.

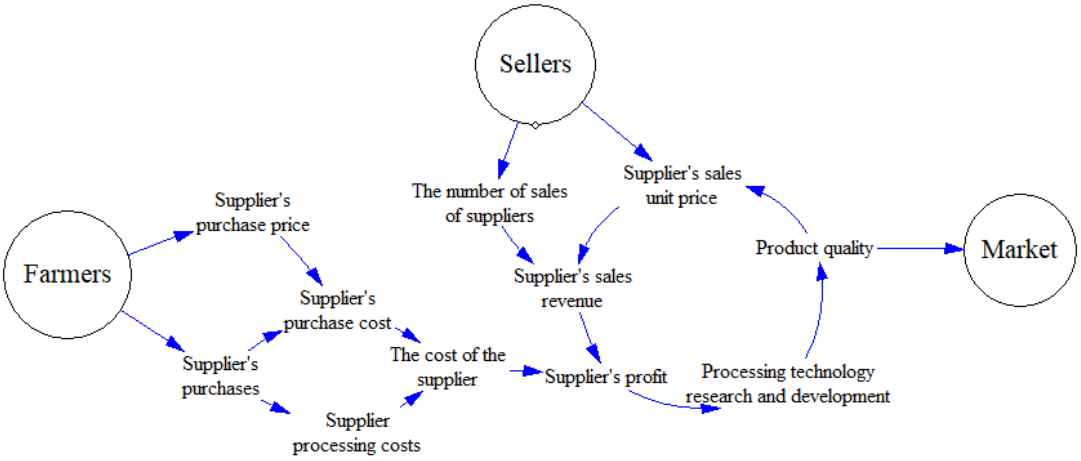

Figure 2 Causality diagram of supplier activities

Retailers and Their Activities System Analysis

As the most important subject in the supply chain, the seller has an important role in connecting multiple entities. The main activities of the seller include: logistics activities and fund activities with suppliers, logistics transportation transactions with logistics companies, and market trading activities.

The seller purchases processed agricultural products from the supplier at the seller's purchase price, and the purchase cost is determined by the purchase quantity and price. After the stock is formed, stocks are generated, resulting in inventory costs. Inventory costs are determined by the purchase volume and the unit stock cost. Sellers sell goods and generate transaction costs. After a successful transaction, transportation will work with logistics companies to generate logistics costs. The transaction cost depends on the online and offline sales. The logistics cost depends on the sales volume and the transportation distance. Therefore, the seller's cost is mainly composed of purchase cost, inventory cost transaction cost and transportation cost. The seller sells the processed products to the market and generates sales revenue. The sales profit obtained is used in part to build a sales network platform to carry out product online promotion and reduce unit transaction costs. The other part is used for offline promotion to expand market demand.

Logistics Enterprises and Their Activities System Analysis

Figure 4 shows the causality diagram of logistics companies in their logistics activities. The main variables are logistics enterprise income, logistics transportation volume, unit transportation price, and logistics enterprise unit transportation cost. When the seller needs more logistics and transportation, it will increase the income of the logistics company. On the one hand, it will increase the profits of the logistics company and make the company have more funds to invest in logistics facilities, such as transportation tools and transport personnel, so as to improve the efficiency of logistics and transportation. As a result, logistics costs per unit of logistics companies can be reduced, which will further increase corporate profits and form a positive feedback loop. On the other hand, the increase in logistics revenue will drive the

government's GDP and supply chain to expand, and the government will have more funds to improve transportation conditions. Improve the efficiency of logistics transportation and reduce logistics transportation costs of logistics companies. In the system, the relationship between the seller and the logistics company is represented by the sales volume of the seller/variables of the logistics transportation volume, the unit transportation cost, the unit transportation price.

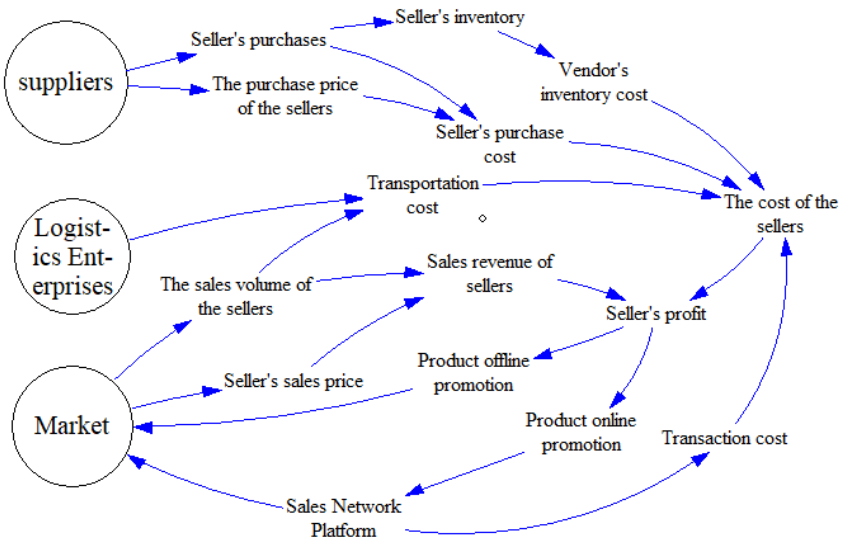

Figure 3: Cause and Effect Diagram of Salesman Activity

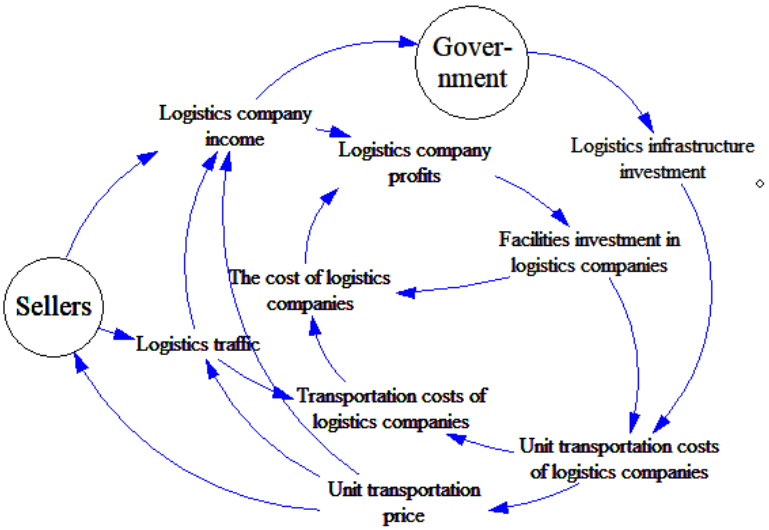

Figure 4: Causal relationship diagram of logistics company activities

Based on the above analysis, this paper gets the system causality diagram shown in Figure 5.

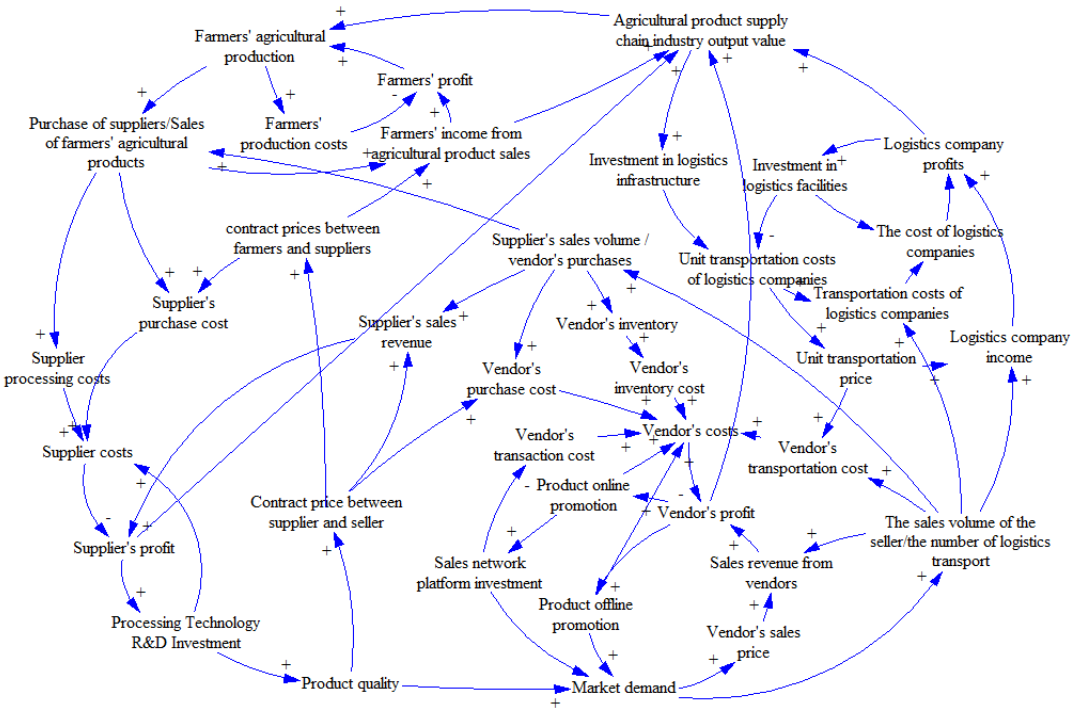

Figure 5 system causality diagram

Because there are many variables in the system and there are many paths of causality, some important critical paths are analyzed as follows:

Output value of agricultural products supply chain industry → investment in logistics infrastructure → transportation cost of logistics enterprises → transportation cost of logistics companies → cost of logistics companies → profits of logistics companies → output value of agricultural products supply chain industry.

Profits of logistics enterprises → investment in logistics facilities → transportation costs of logistics companies → transportation costs of logistics companies → costs of logistics companies → profits of logistics companies.

Market Demand → Vendor Sales Price / Vendor Sales Volume → Vendor Sales Revenue → Vendor Profit → Product Line Promotion → Market Demand.

Product online promotion investment → sales network platform investment → market demand → sales price of sellers / sales volume of sellers → sales revenue of sellers → profit of sellers → input of product online promotion.

Processing technology R&D investment → product quality → contract price of supplier and seller → supplier sales revenue → profit of seller → input of processing technology R&D.

Processing technology R&D investment → Product quality → Contract price between supplier and seller → Contract price between farmer and supplier → Supplier purchase cost → Supplier cost → Supplier profit.

Profits of sellers → input of processing technology R&D → product quality → market demand → sales volume of sellers → sales volume of suppliers → sales revenue of sellers → profit of sellers.

Market Demand → Vendor Sales Volume → Vendor Purchase Volume → Vendor Inventory → Vendor Inventory Cost → Vendor Cost → Vendor Profit → Product Line Promotion → Market Demand.

Market Demand → Vendor Sales Volume → Vendor Sales Volume → Farm Household Sales → Vendor Purchase Cost / Vendor Process Cost → Vendor Cost → Vendor Profit → Process Technology Investment → Product Quality → Market Demand.

3. FLOW DIAGRAM

The system dynamic simulation simulation software adopted in this paper is Vensim. Before using the software, it must be familiar with the basic operation and flow of the software before it can be used to make the model flow chart. Because the model of system dynamics changes over time, you set the model's initial time, final time, time step interval, and time unit. This paper sets the initial test time to 2008, the final time to 2018, and the time interval to 1 year. Taking the farmer's output of agricultural products, product quality, logistics transportation costs, and market demand as state variables, the farmer household's increase in agricultural product output, product quality improvement, and logistic enterprise unit transportation cost reduction value are used as rate variables, and the model flow chart is established as shown in Figure 6 Show.

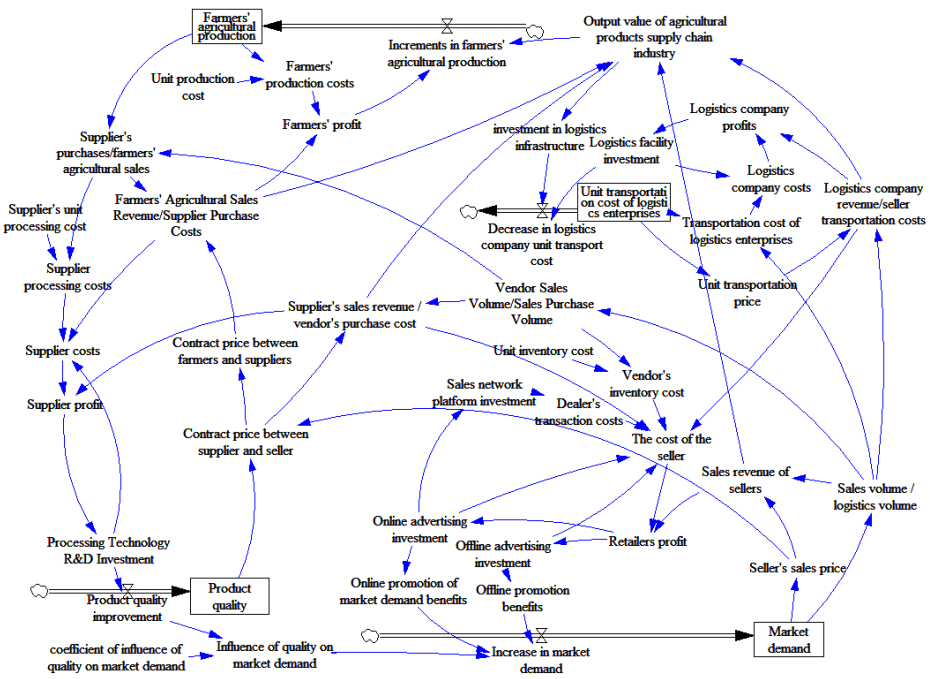

Figure 6 System flow diagram

4. SIMULATION AND RESULTS ANALYSIS

This paper simulates the navel orange in Fengjie of Chongqing as an example. The simulation results are as follows.

4.1 Analysis of Simulation Results of Production Value of Agricultural Products Supply Chain Industry

The simulation results of the output value of the agricultural product supply chain industry are shown in Figure 7. The simulation results show that the production value of the Fengjie navel orange supply chain industry has grown rapidly from 2008 to 2018, and it is forecasted to maintain a growth trend in the next 10 years, but it will reach 2024. The year started to slow down. This is because in the past ten years, national income has risen significantly and the quality of people's lives has risen; e-commerce has gradually developed, more markets have opened up, market demand has expanded, and the output value of the entire industrial chain has increased. Since then, e-commerce equipment has become more abundant and the system has become more robust. The market demand has gradually become saturated, and the growth rate has also dropped.

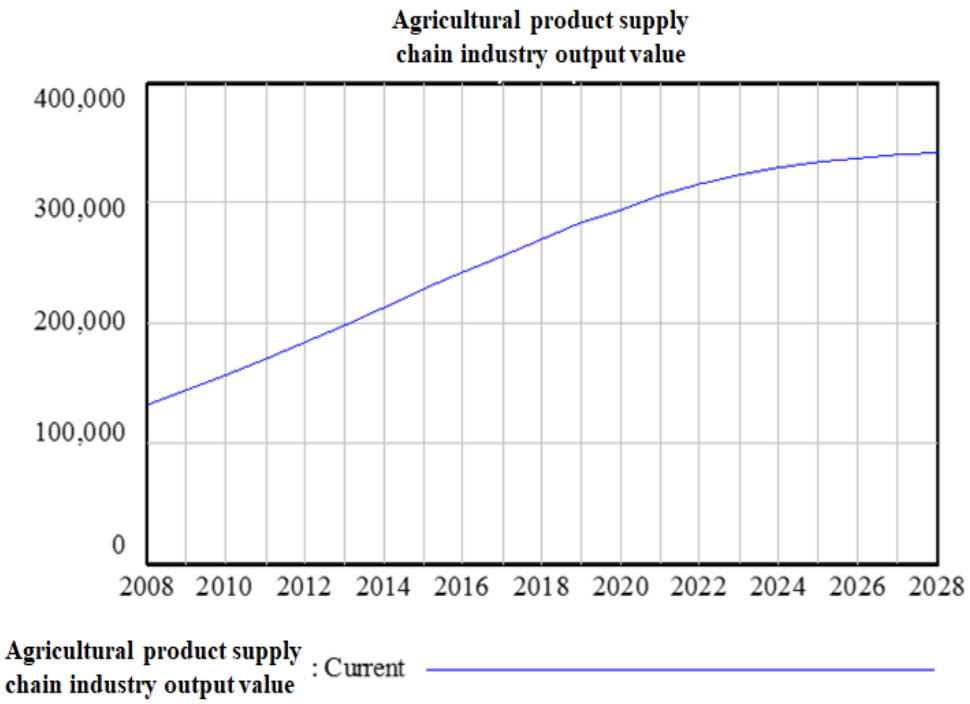

Figure7 Simulation results of agricultural production supply chain industry output

4.2 Analysis of Simulation Results of Farmers' Agricultural Production

The simulated results of Fengjie Navel orange production are shown in Figure 8. The simulation results show that from 2008 to 2022, the output of navel oranges of farmers also maintained a steady high growth rate. It is predicted that the growth rate will begin to slow after 2023.

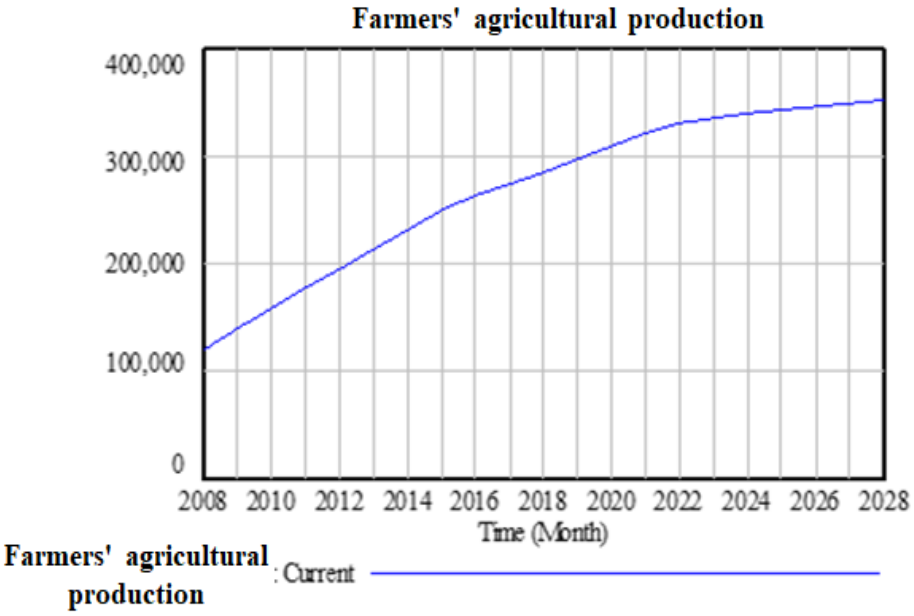

Figure 8 Simulation results of Farmers' agricultural production

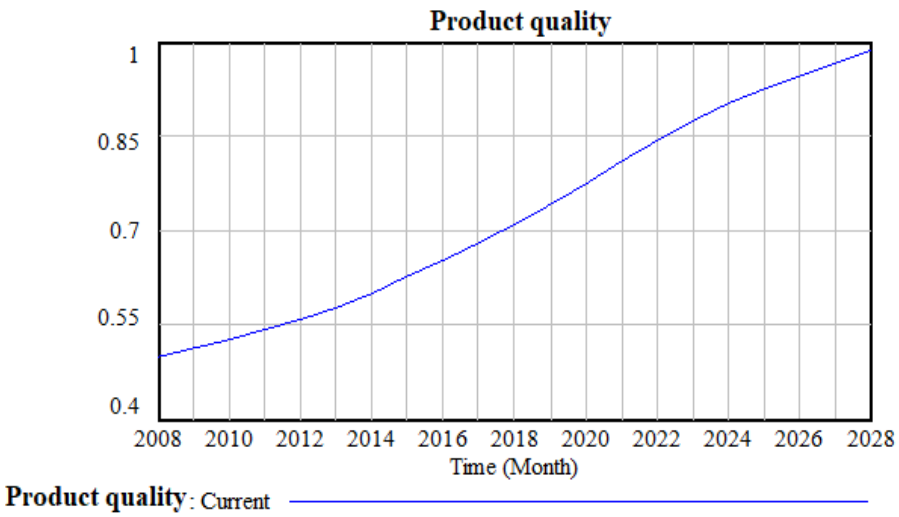

Figure9 Simulation Results of Product Quality

4.3 Product quality simulation results analysis

The simulation results of the quality of Fengjie Navel orange are shown in Figure 9. The simulation results show that the quality of navel orange maintained a rapid growth from 2008 to 2018, and it is predicted that this trend will begin to slow down in 2023. From 2008 to 2013, the growth rate was not rapid, and the growth rate increased from 2013 to 2023, and the growth slowed from 2023 to 2028. The growth rate shows the trend of rising first and then decreasing. This is because of the increase in demand and huge benefits brought about by e-commerce, which has caused farmers and processing companies to pay attention to product quality, and has also provided them with a large amount of funding sources. Product quality and market

demand form a virtuous circle. However, after 2023, the technical problems faced by quality improvement have gradually increased, and the market demand has increased at a rapid rate. Therefore, product quality has met with bottlenecks in technologies, markets, etc. Therefore, the improvement of product quality has slowed down.

5. SCENARIO SIMULATION AND RESULTS ANALYSIS

5.1 Vendors perspective analysis

The online sales platform provides sellers with a wide range of customer resources while at the same time reducing unnecessary intermediate costs for direct transactions between users and vendors. The goal of companies selling online is to be able to conduct marketing activities directly on the website to obtain sales consulting and product sales orders. The functions of the online sales platform are as follows: First, it is equipped with sales-oriented corporate website marketing functions; second is the domestic and foreign market opening-based corporate website marketing functions; third is good search engine performance, with good search engine performance and The user experience and complete effect evaluation system can effectively use various means to obtain business opportunities.

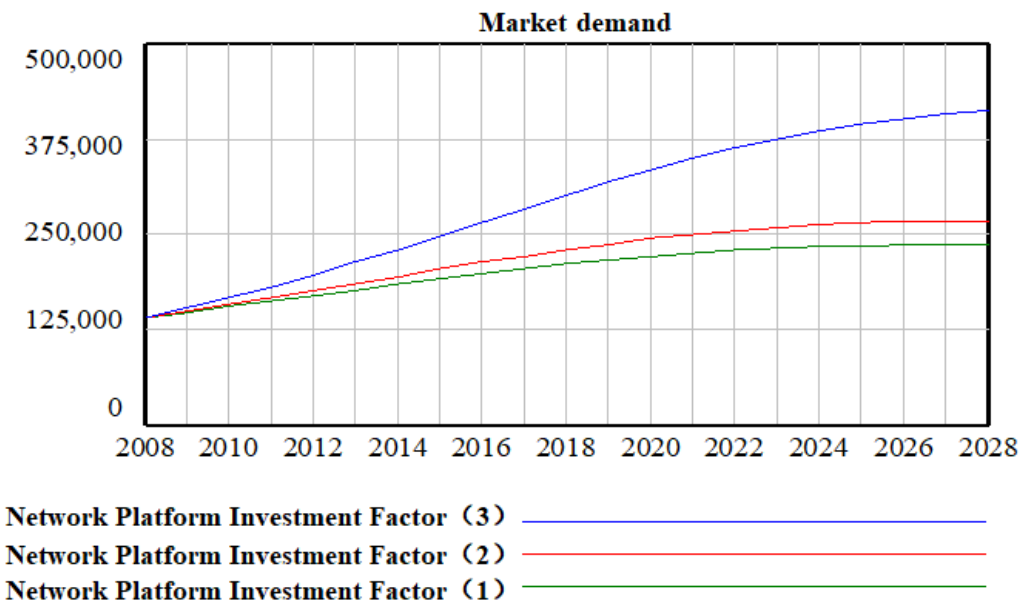

Figure11 Adjusting the Impact of Network Platform Factors on Market Demand

The investment ratio of the website platform, ie the ratio of sales companies' investment in website platform and online sales, increased from the initial value of 0.05 to 0.055, 0.06. Simulations show that the investment and construction of the network platform will affect the market demand for navel oranges. As shown in Figure11. It can be seen that the small increase in the platform coefficient can have a large demand for the market, and the growth rate is gradually expanding. This article understands that Fengjie County is located in remote areas

and the development of e-commerce is slow, with little impact at the initial stage, but with the passage of time, the impact is getting more and more profound.

5.2 Contract price analysis

Suppliers and sellers are the two main players in the supply chain. The relationship between the two benefits is directly reflected in the price cooperation and struggle negotiated by the two parties for their respective interests. Therefore, this article intends to study how the cooperation and struggle between the two parties will affect the output value of the entire industrial chain. From the supplier/seller contract price coefficient initial value of 0.60 to 0.65, 0.70, the simulation results in the effect of increasing the contract price between the supplier and the seller on the output value of the navel orange supply chain industry, as shown in FIG12.It can be seen that the price of both parties will make a very significant change in the output value of the navel orange supply chain. In the range of 0.6 to 0.7, the higher the price coefficient between suppliers/sellers is because the seller's receipt price must be higher than its purchase price, ie, the seller's output value must be higher than the supplier's output value. However, under actual circumstances, suppliers will not give up their rights because of the high output value of the entire supply chain. Therefore, the trade-off between the two parties should also include competition between multiple vendors and multiple suppliers.

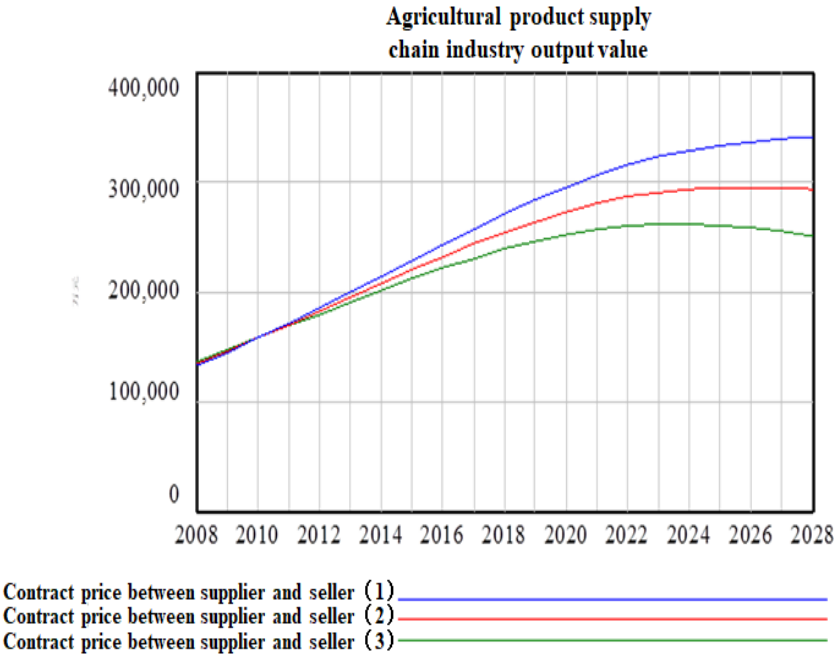

Figure12 Effect of adjusting the price coefficient between suppliers and sellers on the output value of agricultural product supply chain industry

5.3 Logistics company perspective

The value of the input coefficient of the logistics infrastructure was changed from the initial value of 0.05 to 0.06. The effect of the input factor of the logistics infrastructure on the output value of the agricultural product supply chain industry was simulated, as shown in Figure 13.

It can be seen that the input factor of logistics infrastructure has a significant impact on the output value of the supply chain. During the period from 2009 to 2025, an increase in the investment in logistics infrastructure will bring about significant positive effects on the output value, especially during the period from 2009 to 2022. The increase in output value is even greater. The decrease in the magnitude of the period from 2022 to 2025 is due to the weak logistics infrastructure in the early period. The improvement of logistics links brings greater benefits to the entire supply chain, and the positive effect of improving logistics infrastructure investment is significant. 2022 Years later, logistics facilities were of a certain level, which was sufficient to meet the demand of e-commerce supply chain of agricultural products, and the effect of increasing the input of logistics facilities to the output value of the supply chain industry gradually became smaller, but it was still a promoting effect. However, after 2025, the increase in the investment in logistics infrastructure will have a negative impact on the industrial output value. It can be understood that the level of logistics is high enough to meet all the needs of the local e-commerce supply chain of agricultural products, and the increase in logistics infrastructure investment cannot be applied to logistics. The price has a significant impact, and on the contrary increases the cost, so the increase in logistics infrastructure investment at this time shows a negative effect on the output value of the industrial chain.

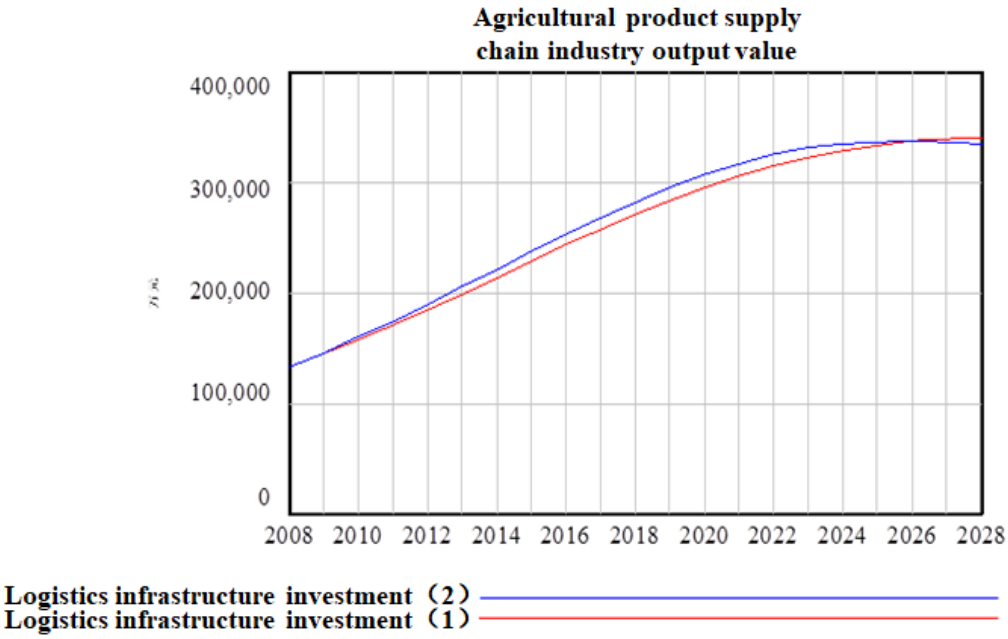

Figure13 Adjusting the Input Factor of Logistics Infrastructure Effect on the Output Value of Agricultural Products Supply Chain Industry

6. RELATED RECOMMENDATIONS

6.1 Create a differentiated online sales platform

The online sales platform plays an important role in reducing information asymmetry between sellers and the market and increasing sales. Through the online sales platform, agricultural products can be understood by more consumers, and it can promote the market share of the

sellers. For sellers, we must start from two aspects to create a differentiated online sales platform. The first is to build an online sales platform that accurately locates target customers, platform features, platform functions, etc., highlights differences, and seeks markets; this approach facilitates the seller's own unified management and management of agricultural products, but the self-built platform is bound to pre A large amount of platform construction costs are invested. If the seller's own financial strength is insufficient or it is a small-scale operation of agricultural products, it is not recommended to build an online sales platform; at the same time, the trust and access volume of the self-built online sales platform cannot be guaranteed, and the operating effect is not Well, profitability is difficult. Second, if unconditional self-built network sales platform, sellers should actively use third-party platforms to conduct shop construction, specialty building, brand marketing, etc. on e-commerce platform such as Taobao, Tmall and JD. Logistics system to increase market share of agricultural products. Third, regardless of whether it is a self-built or third-party online sales platform, sellers need to invest a certain amount of cost to conduct online publicity, increase the popularity of sellers and agricultural products, and then increase market demand to increase their competitiveness and increase sales revenue.

6.2 Construct a reasonable contract price coordination mechanism

Both suppliers and sellers are rational people who make decisions based on maximizing their own interests. Because of the inconsistency of the interests of both parties, suppliers expect to sell processed agricultural products to sellers at higher contract prices, while sellers, on the contrary, The contract price coordination between the two parties affects the overall profit level of the supply chain to some extent. Therefore, suppliers and sellers must first sign a reasonable contract for the purchase of agricultural products, and improve the contract by adjusting the key parameters of the purchase contract, such as the contract price, the order quantity, and the proportion of risk sharing, so as to balance the interests of both parties and achieve the main behavior of the supply chain. The transformation from decentralized decision-making to centralized decision-making. From the above analysis, the suppliers and sellers in different stages have different contribution rates to the total output value of the agricultural product supply chain, and the corresponding optimal contract price coefficient is also different, but the contract between the supplier and the retailer under the market mechanism may not be able to reach the agricultural product. The optimal level of e-commerce supply chain output value, at this time the government departments involved in external contract price coordination is particularly important, the introduction of a series of policies and regulations on the contract price control. At the same time, for some agricultural products with lower overall profit levels, suppliers and sellers are provided with preferential policies such as capital subsidy and tax reduction to increase their enthusiasm for e-commerce activities of agricultural products.

6.3 Optimize E-commerce Logistics System for Agricultural Products

Perfect logistics system of agricultural products is the fundamental prerequisite for the development of e-commerce of agricultural products. First, the government must increase investment in the construction of logistics infrastructure, and actively introduce a series of

policies and regulations concerning the improvement of logistics infrastructure, and provide certain logistics cost subsidies for enterprises that actively promote e-commerce in agricultural products, and increase the participation of enterprises in e-commerce of agricultural products. The enthusiasm for construction; Second, all localities should make full use of rural e-commerce related special financial funds to build a sound county, township and village three-level logistics system, with the county-level logistics center as the hub, according to the local logistics construction to rationally layout agricultural products Logistics distribution service points, while integrating the existing logistics network, forming a complete logistics distribution network. Third, accelerating the construction of cold-chain logistics infrastructure can promote better docking of agricultural products, especially fresh produce, with the quality of agricultural products. The government should actively encourage and encourage the independent research and development of agricultural product logistics companies, especially cold-chain logistics companies. The cold chain logistics technology of agricultural products has mobilized new types of agricultural business entities in agricultural production areas to participate in the construction of cold storage in the field, and has implemented policies such as tax reduction and exemption, and giving financial subsidies. Fourth, explore new ways and models for cooperation between rural areas, agriculture, and enterprises. Use social enterprise resources to carry out modern agricultural production and network marketing of agricultural products, promote the joint development of agricultural products and the Internet, and at the same time minimize the cost of new logistics construction.

7. SUMMARY

The purpose of this article is to seek to develop and optimize the path of e-commerce supply chain for agricultural products. Based on the summarization of domestic and foreign research, related concepts, and theoretical foundations, the system dynamics model is used as the main research tool for e-commerce supply chain of agricultural products. The detailed and in-depth analysis of the behavior of the main subjects such as farmers, cooperatives, agricultural products suppliers, sellers, logistics companies, and governments. At the same time, the use of Vensim software to achieve the system of the causality diagram; then the type of the relevant variables to determine the system flow chart; through the Fengjie navel orange e-commerce supply chain related data and data collection, collation and analysis, the use of qualitative and quantitative combination The method can realize the assignment of variables in the system flow chart and the determination of the structural equations, obtain the dynamics system model of the e-commerce supply chain of agricultural products, use the special Vensim software to simulate the system model, and obtain the real and effective simulation results. According to the simulation results, the following conclusions are drawn: First, sellers' increased investment in online platforms can effectively expand market demand; Second, contract prices between suppliers and sellers have a significant impact on the output value of navel orange e-commerce supply chain industry; When the government increases the investment in logistics infrastructure,

investment has a significant effect on the output value of navel orange e-commerce industry chain, but the promotion effect gradually weakens after a certain period.

REFERENCES

[1] Hertweck B M 1. The effects of comparison shopping behaviour on dynamic pricing strategy selection in an agent-enabled e-market.[J]. International Journal of Electronic Business, 2009, 7(2):149-169.

[2] Kelepouris T, Pramatari K, Doukidis G. RFID - enabled traceability in the food supply chain[J]. Industrial Management & Data Systems, 2013, 107(2):183-200.

[3] Minghua Ding "Internet+Agriculture" Creates a New Path to the Development of Rural E-Commerce in China[J]. Business Times, 2016(15):97-98.

[4] Mu Yanhong, Wang Duchun,. An Empirical Analysis of the Development Level of Rural E-Commerce in Heilongjiang Province--A Case Study of 15 Rural E-Commerce Comprehensive Demonstration Counties [J]. Jiangsu Agricultural Sciences, 2016, 45(5):608-611.

[5] Johnson G. I and P. J. Hofman. Agri-product Supply-chain Management in Developing Countries. ACIAR Proceedings，2004(119).

[6] Zhao Xiaofei. Study on the Construction of Modern Agricultural Products Supply Chain System in China [J]. Agricultural economic issues 2012(1):15-22.

[7] Zibo Wen. Research on Performance Evaluation of Cross-border Agricultural Products Supply Chain Alliance——Based on the Empirical Analysis of Guangxi-ASEAN [J]. Journal of Beijing Jiaotong University, 2017, 16(3).

[8] Dong Yude, Ding Baoyong, Zhang Guowei. Based on agricultural product supply chain quality safety traceability system [J]. Journal of Agricultural Engineering, 2016, 32(1):280-285.