

Information Sharing Incentive Model of Ganzhou Agricultural Product Supply Chain under the Background of Cloud Computing

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Abstract: Agricultural product informationization is an important part of agricultural informationization, but also a difficult and complex project, including the production, processing, transportation, sales, supervision and other whole process management of agricultural products. In order to solve the problems of high cost and difficult information sharing in agricultural product supply chain, the incentive model of information sharing in Ganzhou agricultural product supply chain is studied under the background of cloud computing. In the context of cloud computing, the production methods, marketing methods, and service methods of agricultural products are quietly transforming. The research shows that the quantity discount contract designed by the incentive compatibility principle in the background of cloud computing cannot achieve the perfect coordination of the supply chain, but it can realize the transmission of real demand information and the improvement of income between supply chain nodes, and promote the development of agricultural product supply chains.

1. Introduction

In recent years, information technology has developed rapidly, and the development of agricultural product supply chains has become more and more rapid. People have increasingly strict requirements on the safety and quality of agricultural products [1]. At the same time, the asymmetry of agricultural product market information has also led to the lagging reaction of farmers and enterprises to market changes, resulting in waste of resources [2]. At present, the production and sales of agricultural products in China are still at the stage of decentralized farming, information occlusion, and blind production. For a long time, the poor communication of information between suppliers and customers has led to the coexistence of "selling" of agricultural products and market supply, directly affecting the security of supply and demand of fresh agricultural products [3]. Cloud computing virtualizes resources through information technology and forms a vast resource pool, which is called "cloud" [4]. However, in the real trading environment, due to the asymmetric information and risk aversion behavior of enterprises in each node of the supply chain, the operation performance of the whole service supply chain is low, which seriously hinders the effective development of cloud computing service mode [5]. This is due to the fact that the procurement, production, sales and transportation departments within the enterprise are still independent of each other and lack of effective communication. The lack of effective information sharing between demand information and supply information among enterprises results in different degrees of disconnection between production and sales [6]. Therefore, scholars make full cooperation between upstream and downstream enterprises in supply chain by designing reasonable and effective coordination mechanism and contract.

Although China is a large agricultural country, its agricultural foundation is weak, and force majeure factors such as natural disasters and man-made disasters seriously restrict the development of agricultural economy [7]. Especially in recent years, the frequent occurrence of agricultural product quality and safety incidents is affecting the hearts of the people. How to better promote the integration of traditional green supply chain of agricultural products and modern information technology to realize the management mode of information-based green supply chain of agricultural products is becoming a new task for the development of green supply chain of agricultural products [8]. Therefore, strengthening the information management of agricultural products has become a

bastion that affects the development of China's agricultural economy and the deepening of foreign trade of agricultural products, and to some extent determines the agricultural development of China and the adjustment of rural economic structure [9]. The level of agricultural product circulation informationization is far from meeting the development needs of modern agricultural product circulation. It is urgent to establish a network technology-based agricultural product supply chain information sharing and cooperation model. The fundamental way to solve the security of supply and demand of fresh agricultural products lies in the optimization and upgrading of the supply chain of fresh agricultural products under the support of information technology [10]. Rather, "cloud" refers to a network of resources that provide resources to Internet users. In fact, the business model and application technology of cloud computing have experienced a long time of practice and accumulation. It is not the cloud computing itself that changes qualitatively at the time of the year, but people's cognition and application of cloud computing.

2. Agricultural product supply chain operation mode under the background of cloud computing

2.1 Analysis on the Development of Agricultural Products Supply Chain under Cloud Computing

In the context of cloud computing, this paper analyzes the current development status of agricultural product supply chain management, proposes a cloud computing agricultural product supply chain operation model, and describes the operation mode and content of each link under the cloud platform. In the platform, the producer node provides a farm product information resource cloud by registering and logging in to the network, and serves as a provider of the agricultural product production information resource to provide services to the market node of the platform. Relying on large-scale cloud computing processing capabilities, standardized operating procedures, broad radiation range, precise link control, and in-depth information sharing to complete the information needs of cold chain logistics systems and supply chain management decision-making programs for fresh agricultural products. Secondly, the main body of cloud merchants integrates the scattered, weak and independent agricultural product producers in different regions, and constructs a diversified agricultural product production supply network. Eliminate the concerns of enterprises, so that those who want to share information but are afraid of taking risks can share information safely, and provide legal protection for enterprises. In agricultural supply chain management, the distributed resources of each node organization are virtualized into "cloud". And centralized storage in the cloud service platform, for agricultural products green supply chain node organizations to make appropriate decisions to provide the information resources, logistics resources, financial resources, personnel resources and so on. To achieve electronic capital flow, synchronous transmission of information flow, multi-level integration of lean logistics, and coordinated promotion of business activities.

Table 1 User Rights of Agricultural Products Information Service Platform

Customer type	User privileges
System administrator	User Rights Management, System Function Configuration, Module Configuration, Information Update
Government Administration	Information Release, Product Traceability, Interactive Exchange, Quality Inspection Aggregation
Agricultural Products Enterprises	Information browsing, supply and demand information, monitoring center, remote control, data analysis
Professional/Scientific Research Personnel	Information release, project declaration, online cooperation, online training, data analysis
Peasant household	Information browsing, expert inquiry, online consulting, online trading, wealth cases
Consumer	Information browsing, treatment complaints, product traceability, information subscription, post reply

The system management sub-module is mainly responsible for the management of the platform and users. Corresponding to different functional modules on the platform, the main user rights corresponding to different user types of agricultural product information service platform are shown in Table 1.

2.2 Information Sharing Guarantee Measures in Supply Chain

Firstly, the cloud service platform of agricultural products supply chain based on cloud computing is built. The research model of supply chain coordination mechanism based on supply chain contract considers that each decision-maker of supply chain is relatively independent. The ultimate goal of each decision-maker's decision-making is to maximize its own profits, and its decision-making behavior may cause serious damage to the interests of the entire supply chain. Increase the incentive system for high-performance enterprises. For example, when the amount of local fiscal revenue reaches a certain standard, enterprises should be given tax reduction and exemption system to encourage enterprises to achieve high performance and obtain high profits. With the rapid development of economy, the supply chain of agricultural products also shows the trend of oversupply. Consumers constantly pursue the quality of products. Therefore, enterprises need to face all kinds of complex phenomena, deepen the industrial structure, strictly check from quality to quantity, and form a stable industrial chain. At the same time, for green suppliers, according to the detailed information of the company's own products, including the natural attributes and commodity attributes such as variety, category, level, etc., it is entered into the cloud platform for storage. At the same time, under the service platform, the agricultural data is collected through a large number of Internet terminals, mobile terminals, sensors, etc., to form a comprehensive and accurate cloud resource, and the user can process the cloud resources according to actual needs to achieve the purpose of on-demand service. This will become an important part of building smart agriculture.

With the rapid development of the economy, entrepreneurs and scholars at home and abroad have paid close attention to the theory and application of supply chain management. Supply chain management has gone through the following stages:

Table 2 The development stage of supply chain management

Stage	Stage description	The main points
The first stage	Inventory promotion phase	Emphasis on production and management of raw materials
		Product output is driven by inventory
Second stage	Internal integration phase	Demand pulls production
		Focus on internal process management and flexibility
The third phase	External integration phase	Production shifts to customer-oriented production
		More dependent on material procurement and external processes
Fourth stage	Information system application phase	Emphasize system seamless connection for information sharing
		Focus on interoperability among members of the supply chain
Fifth stage	Supply chain integration phase	Emphasize partner selection and cooperation effectiveness
		Focus on chain performance and collaborative commerce

3. Construction and operation process of agricultural product supply chain structure based on "cloud"

The nature of the core entities is different, and the specific operational processes of the constructed supply chain are also different. In the cloud computing service supply chain, the upstream and downstream node enterprises are inconsistent with the terminal consumer demand information mastery and the profit target, and the downstream nodes are not willing to share their demand information for their own interests. Economically developed countries have extensively used information technology to transform and upgrade traditional industries and optimize the

allocation of social resources. The information network has become the nerve system that carries social information flow, logistics, business flow and capital flow, and can effectively reduce the circulation cost. In order to gain a competitive advantage and develop into a local leading enterprise, enterprises will share information with partners, realize the advantages of resource integration, and achieve win-win or win-win with partners. Firstly, this paper analyses the situation that the degree of effort closely related to the quality and output of agricultural products affects the freshness and sales of agricultural products, and designs reasonable and effective incentive contracts for supply chain participating enterprises based on contract design theory. For the supply market, some unqualified or unsalable healthy non-green agricultural products, such as shapes, specifications, colours and lustre, or wastes in the production and processing process, can be used as commodity information, converted into standard data and entered into the cloud platform. In order to promote users to better use the platform services, agricultural product information service platform can also develop its own advantages and improve its shortcomings by analyzing the parameters of its service quality.

In the environment of cloud computing, in the recycling link, both supply and demand markets provide convenient and efficient green recycling channels and information sharing, and make full use of the idle resources of green logistics distributors to achieve the maximum resource utilization and benefits of the overall supply chain network. In this platform, the producer node and the market node can communicate, and the requester first sends the request to the server. Informatization, as a driving force of social development with high added value, high growth, high efficiency, low energy consumption and low pollution, is an inevitable choice for reforming traditional commodity circulation system and realizing the modernization of commodity circulation system, especially fresh agricultural products. After ordering online, customers can quickly receive the goods from the nearby physical stores and enjoy the after-sales service of the nearby physical stores by generating delivery notifications through system configuration. However, this model is difficult to promote and slow due to the small batch size and high cost of supply chain logistics. However, with the globalization of the economy and the diversification of consumer demand, there is a serious uncertainty in the demand of the end consumer market. The degree of contact between the supply chain nodes at all levels and the consumer market is also different. Supply chain nodes close to the consumer market have more effective demand information. Elimination incentives are a kind of negative incentives. The supply chain industry associations are for companies that do not want to share information or those that are opportunistic to share information as required, and those that fail to meet the target amount. Enterprises with competitive advantages are selected as key support targets.

4. Conclusion

In recent years, cloud computing has developed rapidly, and the cloud service platform has been slowly applied to the field of agricultural products. However, in general, the green supply chain of agricultural products in the context of cloud computing is still based on the primary stage, the foundation is not strong, and the efficiency is low. At the same time, based on the research on the implementation and deployment of cloud computing in foreign countries, the cloud deployment plan of the agricultural product information service platform is clarified. On sunny days, the short-wave radiation of the sun is dominant, and the transmittance of the covering material to the short-wave radiation is high, and the changes in the illuminance of the indoor and outdoor are synchronous and obvious. On cloudy days, there are more long-wave radiation between the clouds and the ground. It is blocked by the covering material outside the greenhouse, so the illuminance change in the greenhouse is slower than the outdoor, and the variation is small. The upstream of the fresh agricultural product supply chain is production and aquaculture, and it is necessary to rely on information networks and technologies to conduct research and forecast on market demand. However, in the real trading environment, due to the asymmetric information and risk aversion behavior of enterprises in each node of the supply chain, the operation performance of the whole service supply chain is low, which seriously hinders the effective development of cloud computing

service mode. It also analyses the cruel strategic model in the infinite repeated game, and proves that as long as enterprises cooperate for a long time, sharing information can bring higher benefits and achieve win-win situation. Then, considering the adverse selection and moral hazard of the producer's efforts, the impact of the two situations on the incentive contract and the optimal benefit of the agricultural supply chain participating in the enterprise is analyzed.

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