

Challenges Faced by Agricultural Supply Chain Finance under Blockchain Application

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Abstract. With the rise of Internet finance and big data, blockchain technology is expected to propose solutions to the challenges faced by agricultural supply chain finance in recent years. This paper will study the problems of food and safety and the low level of technology in rural areas through literature research. There is a gap between China's grain production rate and that of developed countries. Because of its decentralization and precise traceability characteristics, blockchain technology helps to build a distinctive regulatory and accountability system for food and agricultural safety in China. At the same time, blockchain technology with intelligent contract can effectively simplify the business process of agricultural supply chain finance, and reduce the threshold and cost of rural technology promotion, and increase security because of its features that cannot be changed artificially. It can be seen that the blockchain has practical significance to the challenges faced agricultural supply chain finance.

Keywords: Agricultural supply chain finance' blockchain, decentralization.

1. Introduction

Agriculture is the backbone of China's national economy, and finance is an indispensable link to achieve an increase in agricultural production and farmers' income. At this stage, the primary problem of China's agricultural development is the lack of financial support, especially for farmers and agricultural SMEs. On this basis, the emergence of supply chain finance provides an effective way to solve this problem [1]. In recent years, with the promotion of agricultural supply chain finance, China's rural areas have initially formed a financial system with wide coverage and diversified business. But on the whole, there are still many problems, such as the high threshold of rural lending due to the small number of relevant financial service institutions; The innovation of ineffective financial model brought by information asymmetry cannot meet the actual needs of farmers; The development of rural financial institutions is backward, and the investment risk caused by insufficient supervision power is high. In this context, the application of new financial technologies represented by blockchain in agricultural supply chain finance has brought new ideas to solve the above problems. This paper will use the method of literature research to analyze the challenges faced by the agricultural supply chain financial model under the application of blockchain, and focus on issues such as the difficulty in ensuring the safety of food and agricultural products and the difficulty in promoting the supply chain financial model caused by the low level of technology of agricultural cooperatives.

2. Literature review

Supply chain finance can be defined as the financial services of SME enterprises and core enterprises with banks as the intermediary and is an important financing channel for the SMEs [2]. Agricultural supply chain finance is a complete system that combines core enterprises or high-quality agricultural products with their downstream consumer interests or SMEs. It promotes the coordinated operation of the whole supply chain through scientific and precise product design while meeting the demand of each link of the supply chain [3]. Agricultural supply chain finance has attracted more and more attention in recent years. It improves the recognition of each other's goals by building a trusted platform between each stakeholder in the agricultural product industry chain [4]. At present, supply chain finance is highly dependent on the coordination of all links of enterprises. The transaction

relationship of the market is relatively complex. The traditional supply chain is generally faced with the problem of information asymmetry. In this context, the introduction of blockchain technology can help all supply chain participants build trust. It can build a digital value system and ensure the traceability of transactions related to agricultural product finance. The core of blockchain technology is decentralization. Each block that completely records time and data is automatically recorded and connected to the main chain according to the time sequence of transactions. It is a new technology that integrates many professional disciplines such as cryptography and computer science [5]. However, there is little research on the challenges faced by agricultural supply chain finance under the application of blockchain. The research framework of this paper is as follows: Through reading relevant literature, summarize and explain the concept of agricultural supply chain finance. Next, analyze and summarize the characteristics of agricultural supply chain finance and the problems encountered in the development process. In this context, introduce the relevant concepts of blockchain and explain why blockchain can help solve the core problems faced by agricultural supply and finance. This is the core content of this article - the challenges faced by agricultural supply chain finance under the application of blockchain. The purpose of this article is to help readers establish a basic understanding by combing the relevant definitions of agricultural supply chain finance and blockchain, so as to understand what problems need to be solved in the development of agricultural supply chain finance in China. This paper only takes how the blockchain plays a role in agricultural supply chain finance as an example to seek solutions to the problems of high loan threshold, few related institutions, and difficult supervision in China's rural financial business.

3. Blockchain and agricultural supply chain finance

In China, the lack of investment from formal financial institutions in rural areas, especially in remote areas, is generally due to the following reasons: The first is the low risk of large-scale rural production and operation caused by high credit costs. The second is that it is easy to fall into a vicious circle of financial investment exclusion caused by lack of professionals and information asymmetry. On the one hand, the application of agricultural supply chain finance in agriculture can effectively solve the problem of the scarcity of special loans for farmers, help to build a closed-loop industrial chain of rural credit, break through the traditional credit model and reduce the possibility of resource allocation errors. On the other hand, agricultural supply chain finance can further focus on the handover with farmers, avoid dishonesty and moral problems caused by information asymmetry, and effectively monitor the chaos of agricultural production. With the popularization of Internet finance and big data finance, agricultural supply chain finance has become one of the most effective solutions for rural finance. Among them, the rise of blockchain technology has brought new opportunities for agricultural supply chain finance. In recent years, the rise of big data, cloud computing and 5G has provided strong technical support for core issues in blockchain finance such as risk control and cost control. Blockchain is widely recognized in supply chain finance by virtue of its openness and transparency, decentralized distributed storage, encryption algorithm and other characteristics [6]. The application of blockchain technology in agricultural supply chain finance can help break the two-way bottleneck of financing difficulties for financial institutions and SMEs caused by information asymmetry. The supply chain finance platform is responsible for connecting core enterprises and SMEs, and sharing transparent information on the chain with the help of blockchain intelligent contracts. While reducing the cost of risk prevention and control, operation difficulty and operation time, it also avoids the vicious competition of core enterprises caused by information asymmetry. It has changed the existing transaction mode and also helped to stimulate the construction of the underlying infrastructure of supply chain finance in rural areas. The use of blockchain technology can also build a high-quality supply chain financial ecosystem based on the supply chain participants, government regulators and financial institutions. It improves the speed and flexibility of capital flow. The participation of intelligent contracts can ensure the security and transparency of transactions on the chain, and digitize the entire transaction process by setting the amount and time of automatic

delivery. While simplifying business processes, it can also improve accuracy. This paper will study the challenges faced by agricultural supply chain under the application of blockchain.

3.1. Food and agricultural security issues

The most important thing for food and agricultural safety is reasonable and strict standards. There are still some differences between China's food and agricultural safety standardization policies and international standards. The first is the conflict of law enforcement caused by the disunity of standards at the grass-roots and leadership levels [7]. In the past, China had implemented a separate supervision policy, so the departments responsible for specific food and agricultural safety had their own independent supervision standards. Now even if there is a unified standard delegated by the leadership, the standard of each department at the grass-roots level still exists, which inevitably brings a series of law enforcement conflicts. In addition, the lag of standards caused by the failure to keep pace with the progress of food production materials will also lead to the vacancy of law enforcement standards in the management of emerging food and agricultural products. China's grain yield is about 6 t/(hm²·a). The proportion of countries at the same level in the world is 42%. The grain output is about half of the total, and the production rate of developed countries such as the United States is about 8t/(hm²·a) , accounting for only 1% of the world's total output [8]. It can be seen that there is a gap between China's grain production rate and that of developed countries. The positioning of food and agricultural security should not blindly follow international standards. The introduction of blockchain technology will help improve the transparency of regulatory standards under agricultural supply chain finance, building a risk regulatory system that is most suitable for China's national conditions. The second is the loophole of the results-oriented accountability mechanism: the absence of an exemption mechanism affects the enthusiasm of regulators. Even if there are exemption clauses in a few regions, they are not explained in detail which is very difficult to implement in practice. In addition, the regulatory method based on qualification rate has some defects in the accountability of the overall operation of supply chain finance. In recent years, the government has faced great pressure in the face of exposed security problems. In the process of accountability, the trend of only paying attention to the results of mistakes and ignoring which specific link of the agricultural supply chain went wrong is increasingly serious. In this context, the unique decentralization of blockchain technology can accurately view every step of the operation process because of its characteristics of packaging layer by layer according to time, avoiding the problems of accountability omission and even the error of accountability objects.

3.2. The low level of technology of agricultural cooperatives

In recent years, the Internet is still gradually popularized. For more remote areas, the complex contract process of supply chain finance may have obstacles to the promotion of the system. For example, the separation between different regions and institutions is serious, and information asymmetry has brought high management costs and low transaction efficiency. In addition, the bank has limited background knowledge of all participants in the agricultural supply chain especially SMEs. This leads to the wrong judgment of the bank on the value of the goods that may be used by the enterprise as collateral. Generally, in order to avoid this problem, banks will monitor the entire supply chain. This solution is not only high in monitoring cost, but also prone to the occurrence of blind spots. More importantly, it is difficult to detect and report emergencies in the first time under such large-scale monitoring. The new model of digital supply chain finance represented by blockchain can well solve the above problems. The intelligent contract is a digital computer protocol, which is widely used in blockchain technology. The blockchain technology with intelligent contracts removes middlemen, thus reducing the cost of trust and speeding up the process of contracts. The intelligent contract is fully automatic and unchangeable, which greatly improves the convenience and security of agricultural supply chain finance [9]. The blockchain can record the goods in and out of the warehouse in real-time to ensure that all participants in the supply chain can understand the real situation of the supply chain. In this way, the authenticity of the relevant enterprise background can

be ensured. It can effectively alleviate the problem of regional and market segmentation, expand the coverage of rural finance through the joint role of the main chain and branches, and help the real implementation of "data mortgage". Intelligent contracts can reduce costs while simplifying the financial process of the agricultural supply chain. While speeding up the flow of funds, it can also make transactions transparent, reducing the probability of non-performing loans and moral hazards. The sequential execution model, parallel execution model and non-blocking execution model are tested, and the results show that the Intelligent contract in blockchain technology can perform relevant work [10].

4. Conclusion

This paper adopts the method of literature research, starting from the concepts of agricultural supply chain finance and blockchain, studying and analyzing the challenges faced by the agricultural supply chain financial model under the application of blockchain, and focusing on the application of blockchain to food and agricultural security and the low level of agricultural cooperatives' technology. The first conclusion is that the application of blockchain technology can help improve the regulatory transparency of agricultural supply chain finance and the establishment of relevant exemption measures, thus improving the enthusiasm of regulators. The second conclusion is that blockchain technology with intelligent contracts can effectively alleviate the situation of banks monitoring the supply chain on a large scale. It accelerates the speed of capital flow and reduces the probability of non-performing loans and moral hazard. The limitations of this study are as follows: only reading relevant literature to obtain theoretical support, lacking experiments and relevant data. This paper only studies the opportunities that blockchain applications may bring to agricultural supply chain finance, and weakens the related concept of finance, focusing on blockchain and supply chain. This paper believes that future research directions can be continued from the following aspects: The first point is how to solve the problem that the scarcity of professionals in remote areas leads to the inability of blockchain to be applied to agricultural supply chain finance on a large scale. The existing research lacks in-depth discussion of relevant schemes and actual data to verify the feasibility. At present, the construction of rural infrastructure is still in progress, especially in remote areas, and the infrastructure supporting facilities are relatively backward. Blockchain technology has high requirements for financial facilities, technological development level and network security in the region. In addition, the general financial knowledge reserve of Chinese farmers is insufficient to ensure the transmission of information related to supply chain finance. The only local financial practitioners also lack the expertise of blockchain, which is difficult to promote the financial development of the region. Secondly, blockchain technology still has the risk of large-scale data leakage, and the setting of data-related permissions and the measures to ensure data security lack more in-depth research. Rural financial institutions are more vulnerable to hackers, which is very likely to lead to user privacy disclosure caused by hackers. And because of the characteristics of blockchain technology itself, while sharing more information, it also faces the risk of disclosing shared information, even core information. How to share data while ensuring its security is a problem that needs continuous attention. The third point is how to improve data processing on the blockchain. Most rural financial institutions do not have professional risk supervision measures for blockchain. The unique decentralization of blockchain leads to its different regulatory model from that required by the traditional supply chain financial model, and it is more necessary to build a comprehensive regulatory agency. The existing regulatory force is relatively weak, and relevant regulatory measures and laws and regulations lack specific content for blockchain. The application of blockchain in agricultural supply chain finance still has great risks. How to ensure the high quality of blockchain data in the context of big data and cloud computing to avoid judgment errors caused by invalid data. Relevant departments need to introduce relevant policies for the application of blockchain in agricultural supply chain finance as soon as possible, especially technical specifications and risk control issues. Local financial regulators should work with the government to eliminate potential

problems and gradually reduce the incidence of risks in the process of blockchain application. Finally, an effective risk assessment system is essential, which is mainly used to assess the problems that may arise in the practical application of blockchain. And make adaptive adjustments according to possible risks to ensure that blockchain technology can be safely and stably applied to agricultural supply chain finance.

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