

## **Research on Innovative Financing Models Empowered by Blockchain in Agricultural Supply Chain Finance: A Case Study of Hecheng Rural Commercial Bank**

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**Abstract:** *The information asymmetry between farmers and financial institutions is a major challenge that restricts the development of rural finance. Information asymmetry makes it difficult for financial institutions to accurately assess the farmers's credit status and repayment ability, and the review of farmers' loan applications is also stricter. Financial institutions' reluctance to lend has led to difficulties and high financing costs for farmers. With the development of technology, the emergence of blockchain technology has become a breakthrough point for using financial technology to implement precise lending and support the development of rural industries. In this context, Hecheng Rural Commercial Bank has taken the lead in applying blockchain to the financing model of agricultural supply chain finance, developing four new types of loans, injecting new vitality into the development of rural financial markets, providing useful reference and development for other financial institutions, and helping to promote the widespread use of blockchain in rural finance and solve the three rural issues.*

**Keywords:** *blockchain, agricultural supply chain finance, innovative financing models, the three rural issues*

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Date of Submission: 03-10-2024

Date of Acceptance: 16-10-2024

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### **I. Introduction**

In 2020, the No. 1 central document of the Central Government also specified that the application of modern information technologies such as blockchain in agriculture should be accelerated. The "Blockchain"+ "Agricultural Supply Chain Finance" project demonstration meeting in August 2021 discussed how to use blockchain technology to solve the financing problems of small and medium-sized enterprises and promote the development of agriculture, rural areas, and farmers. It was pointed out that the core of using blockchain to solve agricultural financing problems lies in improving data quality and value. In this trend, Hecheng Rural Commercial Bank conforms to the trend of technology empowering finance, seizes the opportunity, adheres to the business philosophy of "popularizing urban and rural areas, benefiting dreams", combines blockchain and agricultural supply chain finance, applies advanced theoretical technology, improves the rural financial ecological environment, grasps the risk control of agriculture, rural areas and farmers, helps the development of rural financial industry business, and launches four innovative financing models.

### **II. Overview of Blockchain and Agricultural Supply Chain**

#### **(i) Overview of blockchain technology**

In recent years, the deep integration of data technology and production factors has reshaped the agricultural value chain and continuously expanded the boundaries of the agricultural industry. Kuang et al. (2023)<sup>[1]</sup> pointed out that blockchain, as a distributed data storage technology, has the characteristics of on-chain information sharing, data immutability, and automatic contract execution. It has created a new computing paradigm and collaboration mode that establishes trust at a low cost in an untrusted competitive environment. Sun et al. (2021)<sup>[2]</sup> pointed out that blockchain securely records transactions and data and enables multiple participants to reach a consensus without the need for a central control agency. Cai et al. (2021)<sup>[3]</sup> pointed out that blockchain is composed of a series of blocks, each connected by a cryptographic hash function to form an immutable chain, ensuring the security and integrity of data.

#### **(ii) Theoretical basis of agricultural supply chain finance**

Gao (2021)<sup>[4]</sup> studied traditional and current agricultural supply chain finance models and found that the traditional agricultural supply chain finance model imposes a heavy burden on small farmers and does not match the essence of modern agriculture and agricultural product sales. Yang (2023)<sup>[5]</sup> pointed out that based on the rapid development of Internet technology and e-commerce, digital platforms have begun to integrate into agricultural supply chain finance, becoming the core point of its management.

At present, blockchain is widely used in different supply chain scenarios, and major commercial banks have successively carried out innovative practices of the "blockchain+ agricultural supply chain" financing model,

using blockchain technology to ensure the information security, traceability, and sustainability of the entire agricultural industry chain, effectively increasing the trust of agricultural supply chain finance.

### **III. Innovative Financing Models Empowered by Blockchain in Agricultural Supply Chain Finance**

#### **(i) Unsecured Loan**

Unsecured Loan of Hecheng Rural Commercial Bank is a type of small-scale credit for poverty alleviation aimed at low-income farmers, which is unsecured, mortgage-free, and fully subsidized. Its characteristic is to first conduct credit ratings on farmers and issue loans based on their credit situation. However, due to the lack of collateral, there is a significant risk involved. Therefore, Hecheng Rural Commercial Bank has established a regulatory mechanism to ensure the rational use and recovery of credit funds.

Hecheng Rural Commercial Bank adopts the method of “three meetings, three public announcements, and two reviews” to conduct rating and conduct poverty alleviation credit investigations on impoverished farmers. Firstly, the evaluation team of Hecheng Rural Commercial Bank, together with village cadres, farmers, and leaders of farmers’ cooperatives, formed a selection committee to conduct a survey and rating of poverty-stricken farmers who have been registered and registered. Secondly, Hecheng Rural Commercial Bank has established an efficient credit analysis framework based on blockchain through smart contracts and distributed consensus mechanisms, evaluating whether the farmer has credit qualifications, creating a credit profile for the farmer, actively displaying credit and risk levels, and improving the possibility of poor farmers obtaining loans without collateral. Finally, Hecheng Rural Commercial Bank has established relevant loan supervision mechanisms, including a series of regulatory regulations to standardize credit issuance, use, and risk prevention.

#### **(ii) Three-rights Mortgage**

Hecheng Rural Commercial Bank’s Three-rights Mortgage is a loan based on collateral such as rural land contracting rights, farmhouses and forest rights. It is characterized by solving the problems of farmers who do not meet the requirements of Hecheng Rural Commercial Bank in terms of effective collateral, no property or deposit certificate collateral, and no guarantor to guarantee the collateral.

Hecheng Rural Commercial Bank’s Three-rights Mortgage gives full play to the financing function of rural “three lands”, turning “sleeping resources” into “flowing assets”. Before applying for a loan, Hecheng Rural Commercial Bank will send professional staff to assess the value of the “three lands” mortgaged by farmers, and use distributed ledger technology to create a fully transparent platform. Secondly, Hecheng Rural Commercial Bank will record and store the value assessment data in a distributed manner, so that it can interact with the farmers and establish a mutual trust mechanism with them. This solves the problem of difficult loans and financing caused by the fact that farmers must have a guarantor and higher interest rates when applying for loans.

#### **(iii) Warehouse Receipt Pledge**

Warehouse Receipt Pledge is a loan model proposed by Hecheng Rural Commercial Bank for farmers who do not have traditionally recognized collateral and have a long capital flow cycle for their crops. After determining the collateral based on the valuation of the farmer’s warehoused agricultural products, Hecheng Rural Commercial Bank delivers the agricultural products to the warehouse and finally provides them with the needed funds.

First, Hecheng Rural Commercial Bank valued the warehoused agricultural products based on the comprehensive market price and uploaded the price information to “Fengshou Interconnected APP”, applying the distributed ledger technology to create a completely open and transparent platform for farmers to view and choose. Secondly, after determining the collateralized agricultural products, Hecheng Rural Commercial Bank will transport the agricultural products to several high-quality freezers with large scale, full facilities and standardized management in cooperation with it, to ensure the quality of the agricultural products to the maximum extent to prevent and control the risk of the loan. Finally, Hecheng Rural Commercial Bank approves the information and issues the loan.

#### **(iv) Special-purpose Loans**

Special-purpose Loans of Hecheng Rural Commercial Bank for dedicated use refers to farmers with specific needs who can apply for loans from it before planting. Hecheng Rural Commercial Bank evaluates whether to lend to farmers by predicting production. Hecheng Rural Commercial Bank uses remote sensing crop yield prediction technology to forecast future yields and formulate loan amounts.

In order to control the risk of Hecheng Rural Commercial Bank’s Special-purpose Loans, the lending target is the farmers with specific needs, and the loaned funds must be used in “Fengshou Interconnected APP”, such as purchasing agricultural materials and farming tools. Hecheng Rural Commercial Bank provides raw material supply for farmers, farmers can choose by themselves whether to accept the bank’s supply, if farmers accept unified farming or planting, it can ensure the quality of the supply of raw materials and production materials

to a certain extent, so that the loan through “Fengshou Interconnected APP” to form a cycle, on the one hand, both to meet the needs of the borrower, on the other hand, through “Fengshou Interconnected APP” can control the direction of funds and do a good job in risk control.

#### **IV. Conclusion**

In recent years, the application of blockchain technology in agricultural supply chain finance has been increasingly valued, especially in solving agricultural financing problems, showing great potential. Hecheng Rural Commercial Bank innovatively combines blockchain and agricultural supply chain finance, launching four financing models: Unsecured Loans, Three-rights Mortgage, Warehouse Receipt Pledges and Special-purpose Loans. This not only effectively solves the problem of farmers lacking collateral and guarantors in the loan process, but also significantly improves financing efficiency and safety. Hecheng Rural Commercial Bank has utilized blockchain technology to achieve information transparency and establish a mutual trust mechanism, further reducing the threshold for farmers to face difficulties in obtaining loans and financing, saving farmers' financing time, and ensuring that agricultural production activities are carried out on time. At the same time, through remote sensing crop yield prediction technology and other advanced means, it provides accurate financing services for farmers with specific needs, which not only meets the needs of lenders but also realizes effective control of risks. In the future, as the technology continues to mature and the application scenarios continue to expand, blockchain technology is expected to play a more important role in the field of agricultural financing, providing stronger support for promoting the innovative development of rural finance and solving the problems of the three rural issues.

#### **References**

- [1]. Kuang H. Q., Chen W. X. and Ma L. Research on Big Data Empowering the Value Implementation of Agricultural Ecological Products from the Perspective of Industrial Value Chain [J]. *Rural Economy*, 2023, (03): 1-10
- [2]. Sun Z. X., Zhang X. and Xiang F. Research Progress on Scalability of Blockchain Storage [J]. *Journal of Software*, 2021, 32 (01): 1-20
- [3]. Cai X. Q., Deng Y. and Zhang L. Principles and Core Technologies of Blockchain [J]. *Journal of Computer Science*, 2021, 44 (01): 84-131
- [4]. Gao Y. J. Analysis of Innovative Development Path of Agricultural Supply Chain Finance Model [J]. *Shanxi Agricultural Economics*, 2021 (21): 13-15
- [5]. Yang Y. X. Research on Risk Management Strategies for Agricultural Supply Chain Finance from the Perspective of E-commerce [D]. Taiyuan: Shanxi University of Finance and Economics, 2023