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# Application of Financial Technology in the Risk Management in Agricultural Supply Chain Finance

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***ABSTRACT.*** *Recent years has witnessed burgeoning financial technology as breakthroughs have been made in the progress and application of big data, Internet of things, artificial intelligence and blockchain. All this has brought fresh opportunities for the development of supply chain finance, promoting the supply chain finance to transform from original online platform-based model to a more intelligent one. This paper studies and analyzes various problems shown in agricultural supply chain finance from the perspective of risk management, such as moral hazard, the risk of price change of agricultural products, the risk caused by deficiencies of credit system and operational risk. To cope with these issues, this paper expounds how financial technology, including big data, blockchain and artificial intelligence, may be applied, so as to mitigate the risk and boost the development of agricultural supply chain finance.*

***KEYWORDS:*** *financial, technology, agriculture, supply chain finance, risk*

## 1. Introduction

At present, supply chain finance is in its full swing on an unprecedented scale. At the policy level, in 2019, the General Office of the CPC Central Committee and the General Office of the State Council emphasized the importance of supply chain finance for small and medium-sized enterprises fund raising as reported in *Guideline on Strengthening Financial Support to Private Enterprises* and *Guideline on Promoting the Healthy Development of Small and Micro Enterprises*. In July 2019, the China Banking Regulatory Commission issued *Guideline on Promoting Supply Chain Financial Services for Real Economy*, which means that supply chain finance has become part of strategic policies in China.

Scholars at home and abroad holds a common idea on the definition of supply chain finance. It refers to a self-reimbursing trade financing process that regards the core enterprises and the related upstream and downstream enterprises in the supply chain as a whole and relies on the core enterprises to provide comprehensive

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products and services to the upstream and downstream enterprises through real trade. Therefore, supply chain finance is a new financing mode aimed to solve the financing difficulties at small and medium-sized enterprises. Compared with industrial enterprises, agricultural small and medium-sized enterprises are facing more prominent problems in financing. They are indicated in traditional financial infiltration being insufficient and financial institutions facing greater challenges in risk control due to their poor ability to ward off risks, high degree of information asymmetry between financial institutions and enterprises, lack of effective collateral and deficiencies in credit guarantee system, etc. As a result, agricultural enterprises are struggling in financing [2], and supply chain finance is set to solve most of these problems.

At present, research by domestic scholars on agricultural supply chain finance is in its infancy, mainly focusing on the operation mode and risk control. The early model is typical offline "1+N" model, in which 1 refers to the core enterprise, and N represents the upstream and downstream participants of the core enterprise. This model completely depends on the credit spillover of the core enterprise [17]. As the “Internet Plus” strategy was promoted, it began to go online. With the help of Internet innovative business model, "O2O" and "F2F" are introduced into the field of agricultural supply chain circulation [8]. In recent few years, with the rapid growth of financial technology such as Internet of things, blockchain, big data, artificial intelligence and so on, the original model of online supply chain finance platforms is becoming more and more intelligent [9]. With regard to the financial risk of agricultural supply chain, most of the studies point out its characteristics, such as prominent moral hazard, hard identification of the overall risk, and the potential to cause regional and industry-wide systemic risk [3], but as to how to avoid risk, most of them only give suggestions from the macro-theoretical level. Even the effective countermeasures to control the financial credit risk of agricultural supply chain, such as innovating credit risk dispersion mechanism and establishing early warning mechanism of credit risk, are mainly based on the early supply chain financial model. We need to, therefore, adopt new ideas in studying the financial risk of agricultural supply chain as the surge in financial technology has changed the risk facing the market in the recent years.

## 2. Principle risks in agricultural supply chain finance

From the previous practice of agricultural supply chain finance, we have concluded that the main risks appear and hide in the following areas:

### *2.1 Moral hazard*

#### *2.1.1 Misreporting Trade*

In one case, there is misreporting trade between core enterprises and upstream and downstream small and medium-sized enterprises; and in the other case, both

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parties, in pursuit for their respective interests and needs, defraud financial institutions to provide them with supply chain financial business by signing false contracts based on false warehouse receipts and accounts receivable. However, these issues can hardly be discovered immediately since in traditional agricultural industry, low concentration, scattered locations and non-centralized transactions make it difficult for financial institutions to adjust on the spot, along with the limitation of audit cost. As a result, supply chain financial risk mount up.

#### *2.1.2 Repeated pledge of a single business or asset*

Supply chain financing is different from actual asset mortgage and securities pledge fund raising. With the latter one, activities are always clearly recorded by financial institutions with a smooth and convenient information sharing between institutions, while the former deals with the whole ecological chain, where information is difficult to record and share in a traditional way. Taking advantage of this, duplicated financing happens as small and medium-sized enterprises carry on more than one funding activities with one single supply chain business or a single asset, thus multiplies the financial risk.

#### *2.1.3 Misappropriation of funds*

Supply chain finance is in its nature a closed and self-reimbursing way of trade financing, that is, special funds are dedicated and repaid exclusively. However, in actual business of agricultural industry, the long cycle enhances the difficulty of supervision and regulation by financial institutions. In addition, the relatively low investment-profit ratio of agricultural industry business may also fuel the risk of funds being diverted for other uses.

### *2.2 Price risk of the subject matter of agricultural products*

Volatile price fluctuation of the subject matter of agricultural products also increases the financial risk of the supply chain. The price of the subject matter naturally affects the repayment ability of all the borrowers in the supply chain, which is self-reimbursing as mentioned before, thus becomes one of the main sources of risk. The price of agricultural products is not only affected by supply and demand, but also wave even more violently along with the changes in resident consumption structure, nature, seasons, and the international market price of agricultural products. Therefore, effective prediction on the price movement of agricultural products is necessary in the view to reducing the supply chain financial risk.

### *2.3 Risks caused by the credit system deficiencies*

Credibility must be improved in the present agriculture industry. Failings in the

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credit system of small and medium-sized enterprises may lead to information asymmetry between financial institutions and borrowers in the supply chain, which tend to trigger adverse selection and moral hazard. In the peasant economy model, the standardization of financial statements made by agricultural small and medium-sized enterprises is a low level, and farmers do not fully understand the importance of credit, which is the very foundation that and supply chain finance relies on nevertheless. If risk mitigation is to be done, we must promote the construction of the rural credit system. The Ministry of Agriculture attaches great importance to this issue, and in 2017 it proposed a guideline on speeding up the construction of the credit system for the quality and safety of agricultural products and pledged to complete this mission by 2020.

### *2.4 Operational risks*

Operational risks emerge during online platform operation and offline warehousing and transportation process. In supply chain finance which is operated on platform and dominated by financial institutions, information storage is highly centralized. Any malicious attacks by hackers or operational errors may result in information damage and loss, thus leading to more severe consequences. As to offline business operation, agricultural products require higher conditions for preservation and transportation, and faulty operation will lead to the decline of the quality or breakage of agricultural products, but many financial institutions lacking in risk warning are often late to reckon with such issues.

## 3. FinTech Measures to Prevent Risks in Agricultural Supply Chain Finance.

Various types of risks in agricultural supply chain finance can be solved with the help of financial technology. According to the 2019 China Supply Chain Finance Report released by Wanlian supply chain Research Institute, 55% of the surveyed enterprises applied big data and artificial intelligence technology, 44% applied cloud computing, 39% and 29% used block chain and Internet of things technology. Only 13% of the surveyed show no signs of applying any financial technology means.

### *3.1 Application of Blockchain technology*

The biggest characteristic of blockchain is that its historical data cannot be tampered with but traceable, which is fit for the business environment of supply chain finance. It can identify misreporting trade and leave data in record during business activities. That means every sum of money can be traced back, which simplifies the recording process. It also reduces the information asymmetry between financial institutions and agricultural supply chain enterprises, effectively preventing funds from being misappropriated. Moreover, the decentralization of the blockchain can also ensure the data security of financial institutions and significantly reduce online operation risk.

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### *3.2 Application of the Internet of things technology*

The Internet of things can play a role in agricultural supply chain finance before, during and after the loan. By improving the transparency of transactions between parties in the agricultural supply chain finance, the Internet of everything can cope with the existing problems of bill fraud and repeated pledge. While reducing moral hazard, it can greatly reduce the cost of supervision and audit of financial institutions. Its visual tracking technology is used to control warehousing and freight transportation in real time so that the financial institutions are able to detect the damage or quality decline of agricultural products as soon as possible, in which way it provides early warning of risks and mitigate operational risks.

### *3.3 Application of Big data & artificial intelligence*

As rising big data and artificial intelligence is upgrading information collection and analysis methods, we are able to give more reliable prediction on the price movement of agricultural products. For one thing, this can promote the development of agricultural futures market, whose hedging function will reduce the risk of agricultural supply chain finance; for another, financial institutions can adjust their loan amounts and interest rate according to price forecasts in order to control the supply chain financial risk within a reasonable range. The development of big data and artificial intelligence can also improve customer portrait ability, facilitate the construction of rural credit system, and consolidate the relationship between core enterprises and upstream and downstream enterprises to evaluate the risk of agricultural supply chain finance on a wider and deeper level.

## 4. Conclusion

Studies have shown that agriculture is expected to be the first industry to widely embrace supply chain finance, but risk warning and management must be underlined as the top priority. The progress of financial technology including blockchain, Internet of things, artificial intelligence and big data we see today provides us new approaches to financial risk in agricultural supply chain, and its promising future will promote agricultural supply chain finance to grow more and more intelligent.

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