

DIGITAL TECHNOLOGY TO SOLVE AGRICULTURAL SUPPLY CHAIN FINANCE PROBLEMS AT LONG PING HIGH-TECH

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Abstract: In recent years, the development of agricultural supply chain finance has put forward new ideas for rural inclusive finance and become an important force to promote the development of rural inclusive finance, but in practice, there are still problems such as insufficient sources of funds, information asymmetry and high transaction costs. This paper applies information asymmetry theory, transaction cost theory, supply chain finance theory and other research results, breaks through the traditional perspective from the core enterprise, and analyzes the case of Long Ping High-Tech building industrial chain financial routing platform when facing financing difficulties, pointing out that digital science and technology can effectively solve the real problems existing in agricultural supply chain finance, which can help to enrich the application scenarios of related theories and provide realistic references to the development of agricultural supply chain finance business for other core enterprises in the development. It also provides realistic reference for other core enterprises in the development of agricultural supply chain finance business, and jointly promotes the development of agricultural supply chain finance.

Keywords: Agricultural Supply Chain Finance, Digital Technologies, Information Asymmetry, Transaction Costs, Data Assets

Introduction

In recent years, despite the rapid development of rural consumer finance in China, production-oriented inclusive finance is still limited by a single product and reliance on pledges or guarantees, which fails to adequately meet the needs of rural financing, and there is an urgent need to innovate financing methods. Since 2011, the People's Bank of China (PBOC) and other regulators have put forward the concept of "agricultural supply chain finance" to promote financial model innovation and agricultural credit support through policies to facilitate the development of rural inclusive finance. The rise of digital technology has brought new opportunities for agricultural supply chain finance.

According to the China Digital Rural Development Report (2022), rural network

infrastructure has been comprehensively covered, Internet penetration has increased, the gap between urban and rural areas has narrowed, and the rate of informatization of agricultural production has increased. 2019's "Digital Agriculture and Rural Development Plan (2019-2025)" further clarifies the direction of rural digitization, proposing to strengthen the use of digital technology in agricultural finance and to strengthen the role of digital technology in agricultural finance. It proposes to strengthen the application of digital technology in agricultural finance, establish rural digital markets and trading platforms, effectively address information barriers, and promote the extension of industrial chains and the integration of primary, secondary and tertiary industries, bringing new opportunities for the development of agricultural supply chain finance.

Research Objective

Despite the gradual improvement of rural consumer finance, the development of inclusive finance in the production sector still faces challenges such as the shortage of collateral, rough financial management and asymmetric information of small and medium-sized enterprises (SMEs), which constrain the effectiveness of traditional financing. The birth of agricultural supply chain finance provides a new perspective for cracking these challenges and becomes a key force in promoting the deepening of rural inclusive finance. By analyzing agricultural supply chain finance through digital technology and combining relevant theories, this study is dedicated to revealing how technology can reshape this field, especially focusing on the role of core enterprises, responding to financing challenges in an innovative way, optimizing the strategy of science and technology application, enriching the theoretical system, and catalyzing the innovation of financial practices to respond to the diversified rural financing needs more effectively.

Taking Long Ping High-Tech as an example, as a leader in the seed industry, the problems in its agricultural supply chain finance practice are common to the industry. This study deeply analyzes the financing reality of Long Ping High-Tech and its distributors, uses the theory of composite finance to solve the financing bottleneck, and accelerates the financing of downstream small and medium-sized enterprises (SMEs), reduces costs and increases efficiency, and strengthens the supply chain management by building a digital supply chain finance platform. The platform also facilitates efficient matching of capital supply and demand, significantly reduces transaction costs, utilizes risk control models to effectively mitigate information asymmetry, and enhances financing security and efficiency, providing practical examples for the industry.

Literature Review

The application of digital technology in the field of supply chain finance is receiving increasing attention, and many scholars have conducted in-depth research on it and put forward their

own insights.

First, it improves credit assessment ability. Supply chain finance utilizes digital technology to realize dynamic real-time credit risk assessment through network data, improving the accuracy and practicality of the assessment. Compared with the traditional hierarchical analysis method, the decision model based on digital technology shows higher accuracy in credit risk assessment (Su et al., 2017).

Second, it improves the efficiency of financial services. By integrating all participants in the supply chain, such as farmers, intermediaries, new business entities and end customers, into a unified system, digital technology can realize real-time monitoring and comprehensive management of logistics, information flow and capital flow. This not only improves the transparency and efficiency of the supply chain, but also helps optimize resource allocation and achieve information sharing. By establishing a broader platform, all parties in the supply chain can collaborate more closely and jointly promote the development of the agricultural industry chain (He et al., 2019).

Third, it improves data collection and processing capabilities. In supply chain finance, digital technology collects data through the Internet of Things, sensors and other means, and processes and analyzes them through big data analysis and artificial intelligence algorithms to help financial institutions better understand the risk profile and value potential of the supply chain (Pfohl et al., 2009). Digital technology transforms all kinds of activities in the real world into digitized information, and smart devices in the Internet of Things are used to achieve instantaneous collection of data from the physical world. At the same time, web crawling techniques and other means are employed to mine large amounts of data from the vast resources of the Internet. This transformation not only enhances the accessibility and usefulness of data, but also lays a rich information foundation for in-depth data analysis and informed decision-making. Aggregating data from different sources enables us to see and analyze the whole picture of the supply chain in a more all-encompassing and thorough way (Wang et al., 2019).

Fourth, expanding the scope of financial services. The combination of digital technology and financial services breaks the limitations of inefficiency and high cost faced by traditional financial institutions in providing supply chain financial services to rural and remote areas. This cross-border integration not only expands the coverage of services, but also reduces the threshold of access to services, providing an important impetus for the development of agricultural modernization (Li, 2022).

In summary, the application of digital technology in supply chain finance not only improves the accuracy of credit risk assessment, but also promotes the efficiency and security of fund management, liquidity support and risk management. Through digital means, supply chain financial services have been made more convenient and efficient, providing more financing opportunities for

small and medium-sized enterprises (SMEs), and at the same time promoting the development of agricultural supply chain finance, which provides strong support for the realization of agricultural modernization and rural revitalization.

Methodology

This study begins with extensive collection and in-depth study of academic writings, journal articles, conference papers and other literature through resource platforms such as libraries, Internet search engines and electronic databases to understand the theory of rural inclusive finance and agricultural supply chain finance, as well as the application of digital technology in this field. This helps to grasp the theoretical foundation, understand the current state of research, and provide references for the design of the research program.

Then, by organizing the case information of Long Ping High-Tech, including enterprise information, business description, financial scheme and interview records, we gained a comprehensive understanding of how the group applies digital technology in agricultural supply chain finance. The expert interviews further deepened the understanding of the practical application.

Then, the research results of rural market theory and information asymmetry theory are used to analyze the problems faced by core enterprises, upstream and downstream enterprises, and financial institutions in agricultural supply chain finance, and to explore the role of digital science and technology in solving these problems, so as to clarify the definition and concept of agricultural supply chain finance.

Finally, through case studies, the agricultural supply chain finance business of Long Ping High-Tech is studied in depth, including the interaction with upstream and downstream enterprises and financial institutions, and how to build an industry chain finance platform through digital technology to solve practical problems. This study aims to sort out the current status of the business, problems, and explore the solutions of digital technology.

Results

Long Ping High-Tech's industrial companies are loosely managed in their cooperation with financial institutions, and problems include: first, negligent management of guarantees. Some subsidiaries bypassed the Group to provide guarantees or similar measures to financial institutions. Second, the cooperation standards are inconsistent.

The conditions for cooperation between industrial companies and various financial institutions are not uniform, the Group lacks overall standards for financial cooperation, and it is difficult to control the cooperation of various financial institutions, and the financial products introduced into Long Ping High-Tech's ecosystem are mixed, with a variety of system docking.

Third, the brand influence has not yet been realized. Long Ping High-Tech has not formed a brand influence on financial institutions and has failed to fully utilize its customer resources and industrial resources to negotiate with financial institutions in depth and strive for more rights and interests for Long Ping High-Tech itself and its dealers in terms of quota, interest rate, and fees.

Fourth, the lack of professional financial solutions. Although the industrial company introduces financial products, it lacks negotiation ability for the structural design of financial products and is unable to promote sales growth through the financial structure. Even after some dealers obtain loans through the industrial company's cooperative financial institutions, the use of the loans may not necessarily be used for payment of goods to the industrial company. Fifth, lack of data asset accumulation.

The cooperation between industrial companies and financial institutions only stays at the level of customer acquisition, and the financial data cannot be returned to Long Ping High-Tech to be retained, and it is even more difficult to understand the repayment situation of dealers after lending. Sixth, the lack of financial operations thinking. Dealers with the use of industrial companies to recommend key financial products, industrial companies cannot provide the appropriate incentives, such as sales rebates to enjoy preferential treatment. Seventh, the duplication of system construction. Various industrial companies and various financial institutions docking system, different financial institutions require different data scope, the need to repeat the docking, and docking standards are not the same, the system has been repeatedly modified to adapt to different scenarios, not only affect the production, but also a waste of research and development resources.

In recent years, Long Ping High-Tech's gearing ratio has risen from 50.8% to 63.5%, ranking first among 10 listed seed companies, indicating that Long Ping High-Tech itself has a heavy debt burden, and its own funds or equity financing account for a relatively small proportion.

Table 1: Comparison of gearing ratios of 10 listed seed companies

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Long Ping High-Tech	50.8%	51.2%	27.3%	50.4%	51.3%	55.7%	54.6%	55.3%	54.1%	63.5%
Tsuen Wan Gaoke	30.5%	29.1%	38.8%	38.7%	44.6%	62.8%	64.1%	53.3%	56.8%	61.5%
Dunhuang Seed	65.5%	51.5%	53.9%	52.9%	59.9%	72.1%	62.5%	58.3%	62.5%	59.7%
Kangnong Seed	56.3%	62.2%	52.5%	54.7%	48.3%	44.0%	33.5%	31.8%	42.4%	49.4%
Nongfa Seed	26.4%	32.7%	37.8%	40.1%	32.7%	31.5%	34.9%	33.4%	35.5%	40.5%
Wanxiang Denon	49.7%	40.7%	40.3%	33.2%	34.6%	31.6%	22.6%	23.6%	30.0%	32.4%
Fengle Seed	28.8%	26.9%	32.9%	37.1%	33.5%	32.8%	33.2%	28.4%	30.8%	30.6%
Qiule Seed	55.7%	57.0%	50.7%	49.3%	37.1%	37.4%	36.4%	40.4%	31.5%	28.9%
Denghai Seed	26.5%	25.9%	18.0%	15.4%	13.1%	14.8%	16.6%	20.4%	22.5%	19.1%
Shennong Technology	15.2%	10.0%	35.4%	17.3%	5.9%	6.9%	8.7%	16.5%	14.2%	14.5%

Source: (Annual reports of listed companies)

From the breakdown of liabilities, at the end of 2023, Long Ping High-Tech's short-term

borrowings have reached nearly 6.4 billion Yuan, far more than other listed companies in the seed industry; contractual liabilities are close to 2 billion Yuan, and long-term borrowings are more than 4 billion Yuan, all of which are the highest value among the 10 listed companies.

Table 2: Debt situation of 10 listed seed companies

	Short-term borrowings	Contractual liabilities	Long-term borrowings
Long Ping High-Tech	639,900.98	197,254.09	409,764.60
Tsuen Wan Gaoke	72,385.53	44,874.42	36,403.60
Dunhuang Seed	40,986.72	39,172.74	--
Kangnong Seed	3,302.88	1,874.09	--
Nongfa Seed	22,055.00	59,046.91	5,886.00
Wanxiang Denon	--	25,813.41	--
Fengle Seed	500.38	27,864.40	13,936.50
Qiule Seed	--	5,324.35	--
Denghai Seed	785.00	43,109.48	--
Shennong Technology	--	816.91	588.78

Source: (Annual reports of listed companies)

With rising indebtedness, Long Ping High-Tech is reluctant to provide margins or guarantees for dealer financing and prohibits its subsidiaries from bypassing the Group's unified control and providing guarantees to financial institutions in violation of the law.

Discussion

Based on the theoretical guidance of supply chain finance theory, information asymmetry theory, transaction cost theory and other theories, Long Ping High-Tech proposes to build an industry chain financial routing platform by combining the problems in the agricultural supply chain scenario. On the one hand, the platform connects with Long Ping High-Tech's ERP system, NCC system and other systems to obtain information and data about Long Ping High-Tech and its downstream, and on the other hand, it connects with financial institutions, such as banks and insurances, to bring incremental capital to the supply chain. Through the construction of financial routing platform, it can accurately solve the supply chain blockage and breakpoints caused by insufficient funds, so as to promote the operation of the supply chain, promote the synergistic development of each link, and maintain the safety and stability of the industrial chain and the supply chain. Through digital technology to build an autonomous and controllable financial service platform, downstream enterprises are grouped together on the platform to provide agricultural supply chain financial services in a unified manner, which enhances the accessibility of financing for downstream enterprises and also provides financial institutions with an accurate customer base, reducing customer acquisition costs and marketing difficulties.

Long Ping High-Tech's newly launched online platform aims to integrate and optimize the

cooperation process with financial institutions. The core advantages of the platform lie in four aspects: firstly, through the unified access mechanism, the platform carries out centralized online management of cooperative financial institutions, effectively solves the problems of multiple docking and inconsistent cooperation conditions, strengthens the group's control over financial institutions, and realizes the marketization of supply chain financial interest rates through collective bargaining, thus reducing the overall financing cost.

Secondly, by analyzing the cooperation conditions and financial product characteristics of financial institutions, the platform provides them with accurate target customer groups, which significantly improves the customer acquisition efficiency of financial institutions and reduces the cost of customer acquisition and information search. Thirdly, the platform simplifies the system docking process, avoids duplicate development of interfaces by industrial companies, improves docking efficiency and reduces system docking costs. Finally, the platform implemented centralized data management and unified data export to avoid confusion in data management and save management costs, and generated credit assessment models through data modeling to enhance the value of data assets. Together, these measures have not only improved the efficiency and effectiveness of Long Ping High-Tech's cooperation with financial institutions, but also created more value for financial institutions and the Group itself.

The platform launched by Long Ping High-Tech deeply integrates industry and finance through digital technology, realizing the comprehensive sorting and optimization of business flow, information flow, capital flow and logistics. Firstly, the platform accurately matches financing services by integrating the procurement and sales business information in the industry chain, embedding the financing services into specific money lending process scenarios, which effectively reduces the difficulty of financing for downstream enterprises, and makes the financing services more in line with the actual business needs. Secondly, the platform simplifies the operation process of dealers, greatly facilitates the loan application of dealers by collecting information at one time and reusing it several times, saves time cost and significantly improves the efficiency of financial services. Thirdly, the platform realizes closed-loop management of credit funds, closely integrates bank credit and purchase and sales business, ensures that credit funds are earmarked for commodity purchase transactions, and forms a benign interaction between business and financing. Finally, the platform promotes the mutual coordination of financial products and business management, executes differentiated financing pricing and amount, provides customized financing services according to the qualification and importance of dealers, and promotes the mutual promotion of financial business and industrial business by designing reasonable business rebate policies, realizing the common development of finance and industry.

Conclusions

1) Agricultural supply chain finance promotes rural SME financing

With the help of digital technology, agricultural supply chain finance provides SMEs with more accessible financing channels, strengthens the integration of the agricultural industry, alleviates the financing difficulties of farmers and small and micro enterprises, and promotes rural inclusive finance. Digital network synergy not only reduces costs and improves financing efficiency, but also enhances financial security through full traceability.

Taking Long Ping High-Tech as an example, its industry chain financial platform utilizes digital technology to solve the problems of insufficient credit and mismatched credit cycles for farmers and SMEs, increasing financing opportunities and reducing costs. Data analysis has optimized the credit process and ensured financial security, demonstrating the innovative potential of the "digital + agricultural supply chain finance" model.

2) Diversification of core enterprises' demand for agricultural supply chain finance

Core enterprises such as Long Ping High-Tech are seeking to unify the management of supply chain finance business. Previously, Long Ping High-Tech's subsidiaries worked independently with a number of financial institutions, but this model lacked coordination. In response, Long Ping High-Tech has established a centralized platform that optimizes cooperation with financial institutions and strengthens control over financial activities. This reflects the general need for centralized management in the industry.

The core business also emphasizes the integration of financial policies with business strategies. Sales teams' direct contact with customers makes them key players in supply chain finance, able to provide financial products based on customer needs, help solve funding problems, facilitate transactions, and improve supply chain efficiency and system stability.

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