

# Research on Supply Chain Finance Financing Mode in China under Digitalization

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**Abstract:** Digital empowerment may help businesses manage their supply networks more effectively, improve the efficiency and quality of supply chain financing, broaden equity financing channels, and encourage sustainable and healthy growth. Against this backdrop, new requirements have been raised for supply chain finance, making the transformation to digital empowerment in supply chain finance imperative. The effective application of supply chain finance financing methods aids enterprises in achieving innovative development and improving their core competitiveness. Based on this, the article studies the supply chain finance financing mode under the digital economy, starting from traditional supply chain financing modes in China. It examines supply chain finance's innovation and growth in the context of digitalization, thoroughly examines the current state of supply chain finance's integration with digital technology, and suggests methods of optimization for digital empowerment within the framework of Chinese supply chain finance financing.

**Keywords:** Digitalization, Supply Chain Finance, Financing Mode, Financing.

## 1. Introduction

### 1.1. Research Background and Motivation

A financial service model known as supply chain finance centers on businesses and their partners both upstream and downstream. By effectively controlling information flow, logistics, and cash flow or bundling responsibilities of related parties, it provides comprehensive financial services to enterprises. This service model aims to help enterprises activate their current assets, control financing risks, and offer new financing concepts and solutions.

Digital empowerment supply chain finance refers to applying digital and intelligent technologies to supply chain finance, enhancing efficiency, security, and transparency. Technologies involved in digital empowerment supply chain finance include big data, blockchain, and cloud computing. These technologies can address a variety of issues in conventional supply chain finance, including information asymmetry, high trust costs, and financing challenges. Digital empowerment in supply chain finance helps enterprises collect, analyze, and process a vast amount of supply chain data in real-time, providing more accurate risk assessments and credit decision bases. Therefore, most enterprises are actively promoting digital transformation to upgrade their supply chain finance.

### 1.2. Literature Review

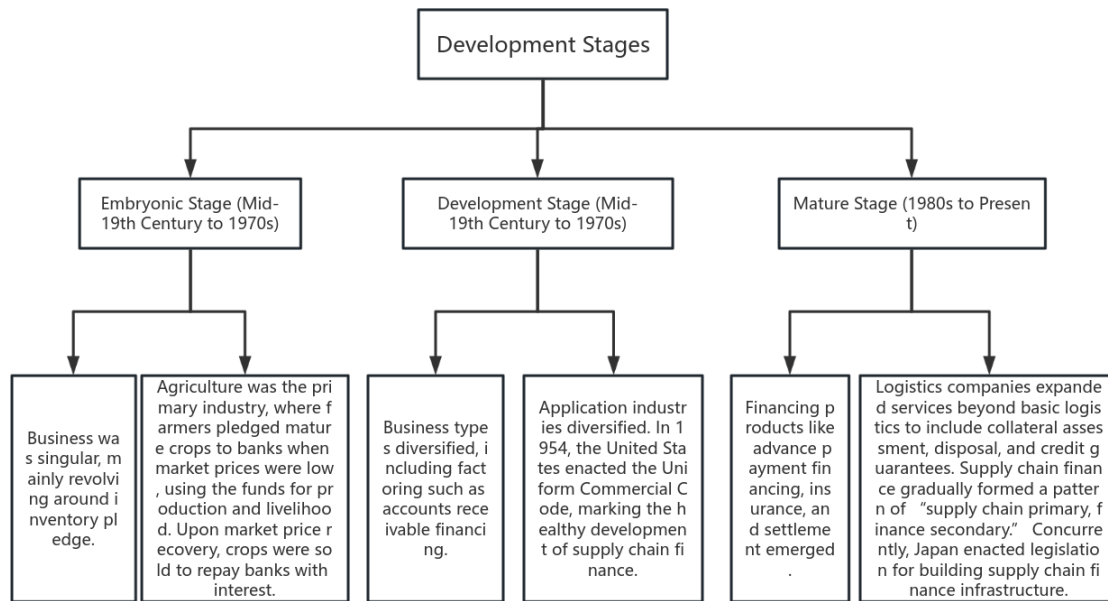
Caniato et al. (2019) hypothesized on the evolution of supply chain finance in theory and practice as new digital technologies and big data analysis emerged, providing the groundwork for future supply chain finance research and conceptualization [1]. Moretto et al. (2019) investigated credit ratings in supply chain financing, integrating financial and supplier ratings into a supply chain credit rating model from the viewpoint of stakeholder theory, and analyzing the benefits and challenges for all stakeholders [6]. Jia et al. (2020) constructed an integrated conceptual framework from an information processing perspective to address uncertainties,

enhance capabilities, and integrate the entire financial supply chain [4]. Ma et al. (2020) discussed the importance of supply chain collaboration factors in supply chain finance from the perspective of Chinese financial service providers [5]. Recent study has focused on a wide range of topics in supply chain finance, but there has been little investigation into the effects of digital technology upon supply chain finance, particularly in China. The purpose of this study is to investigate how China's supply chain finance has changed as a result of digitalization.

In the area of supply chain finance financing, Wuttke et al. (2019) established a research framework from the perspective of organizational motivation to reveal key driving factors influencing the adoption speed of supply chain finance by suppliers [8]. Du (2020) mainly discussed how blockchain technology addresses issues such as information asymmetry and financial fraud in traditional supply chain finance but did not go into great detail on blockchain technologies for financing supply chains [2]. Huang et al. (2020) discussed equilibrium strategies and bank decisions under three financing modes, analyzing financing mode decisions under a general financing framework [3]. Currently, there is limited study on supply chain financing methods, especially the exploration of modern digital technologies in supply chain finance financing modes. This study aims to fill this gap by exploring the changes in Chinese supply chain finance financing modes under digitalization.

## 2. Comparison of China's Supply Chain Finance Development with the United States, Japan, and Other Countries

The supply chain finance industries in the US, Japan, and other nations started off as emerging in the 19th century, went through a period of expansion from the middle of the century to the 1970s, and are currently in a mature stage (as shown in Fig. 1).



**Figure 1.** Development Stages of Supply Chain Finance in the United States and Japan

With the policy orientation of financial empowerment for supply chains, evolving financial demands in segmented industries, and changing development strategies, finance and

supply chains have entered a stage of deep integration, exhibiting characteristics of a new era. Its development can be roughly divided into four stages (as shown in Table 1).

**Table 1.** Development Stages of Supply Chain Finance in China.

Development Stages	Characteristics	Providers of Supply Chain Finance	Forms
First Stage	Centralization	Banks	Offline mode, supported by the credit of the core enterprise
Second Stage	Onlineization	Banks and supply chain participants	Online mode, integrating core enterprise data with financial institutions
Third Stage	Platformization	Banks, supply chain participants, and platform builders	Deep integration via internet technologies to create a comprehensive service platform
Fourth Stage	Smartization	Banks, supply chain participants, and internet finance	Big data, IoT, cloud computing, and blockchain are the most common financial technologies used by supply chain finance platforms to collect information and perform cross-validation.

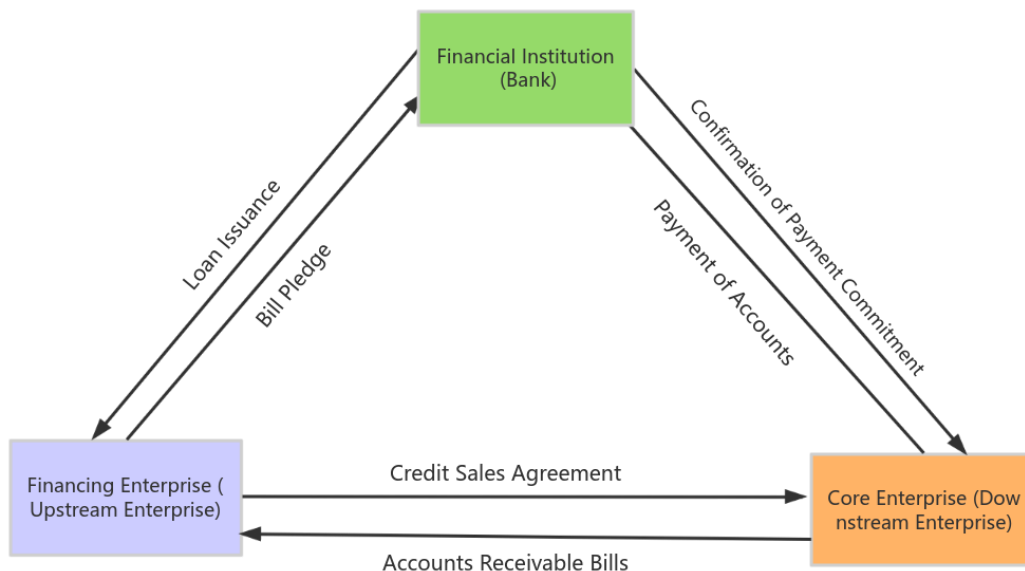
Currently, supply chain finance in China has entered the fourth stage, characterized by intelligence and digitization. The entities involved in supply chain finance have undergone significant changes, with commercial banks, core enterprises, and other financial institutions actively participating, thereby greatly altering enterprise financing methods. Additionally, advanced digital technologies and AI have been widely applied and developed, establishing an ecosystem for supply chain finance with enhanced visibility and control over risks.

### 3. Traditional Modes of Supply Chain Finance Financing

China has three key supply chain finance financing methods: accounts receivable, financing warehouse, and confirmation warehouse. By using a variety of financial instruments and services, these modes maximize cash flows for upstream and downstream supply chain enterprises, reduce financial constraints, and improve efficiency and stability. Following section will expand on various financing methods:

#### 3.1. Accounts Receivable Financing Mode

Accounts receivable financing mode primarily occurs in the production link of the industrial chain, targeting upstream raw material enterprises (as shown in Fig. 2). The products of upstream raw material enterprises are mainly raw materials or processed raw material products. These enterprises prioritize expanding sales channels to ensure sales volume, investing significant resources to open sales channels, thus facing financial pressures and easily forming debt relationships with upstream, downstream, and core enterprises. As repayment guarantees, downstream distributors can use unexpired accounts receivable to secure funding. Once banks verify accounts receivable, core firms can borrow at reduced rates using contracts or agreements and their own strong credit ratings. At the same time, core enterprises can profit from deferred payment periods. However, if problems arise with the borrowing party, core enterprises are responsible for the guarantees. Core organizations must do research and evaluations on small and medium-sized enterprises (SMEs) both upstream and downstream, especially examining their operational and financial conditions to reduce guarantee risks.



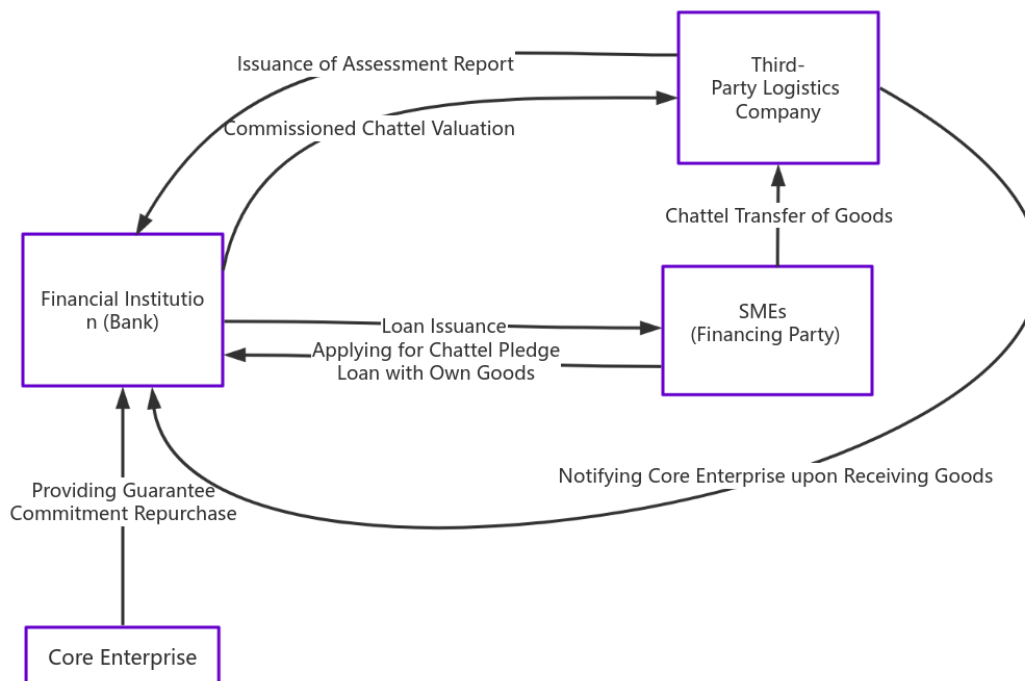
**Figure 2.** Accounts Receivable Financing Mode

### 3.2. Financing Warehouse Financing Mode

Financing warehouse financing mode requires the core enterprise to provide debt guarantees or sign repurchase agreements [7]. It is supervised by third-party logistics for the storage, assessment, and management of collateral. For commercial banks, this reduces assessment operations and speeds up the establishment of credit relationships with SMEs, making credit operations more convenient and efficient. Under the inventory financing mode, leveraging the core enterprise's guarantee, commercial banks can lower credit risks and actively reduce loan thresholds, thereby providing financial services to SMEs with insufficient credit or poorer

qualifications (as shown in Fig. 3).

In financing warehouse financing mode, third-party logistics companies need to establish a financing warehouse as the commercial bank's agent for supervising the liquidity and asset goods of SMEs upstream and downstream of the supply chain. Various enterprises in the supply chain store raw materials, semi-finished goods, and finished goods in different areas of the financing warehouse. Third-party logistics companies assess the value of these goods and assets and submit valuation reports to commercial banks as the basis for issuing loans. After guaranteeing by logistics companies, commercial banks provide loans to SMEs cooperating with logistics companies.



**Figure 3.** Financing Warehouse Financing Mode

### 3.3. Confirmation Warehouse Financing Mode

Confirmation warehouse financing mode involves four-party cooperation: commercial banks, logistics companies, financing enterprises, and producers and underwriters, primarily targeting distributors downstream in the supply chain. In this mode, distributors need to establish effective

cooperation with the core enterprise and sign contracts. Subsequently, distributors apply for loans from commercial banks based on these contracts to secure stable cash flow. Commercial banks hold the right to release goods, assessing SMEs' deposit payment status and core enterprises repurchase guarantees to decide whether to allow SMEs to

release goods. Logistics companies act as guarantors for bank acceptance bills. This confirmation warehouse financing mode helps reduce commercial banks' risks and provides

stable financial support to all parties involved (as shown in Fig. 4).

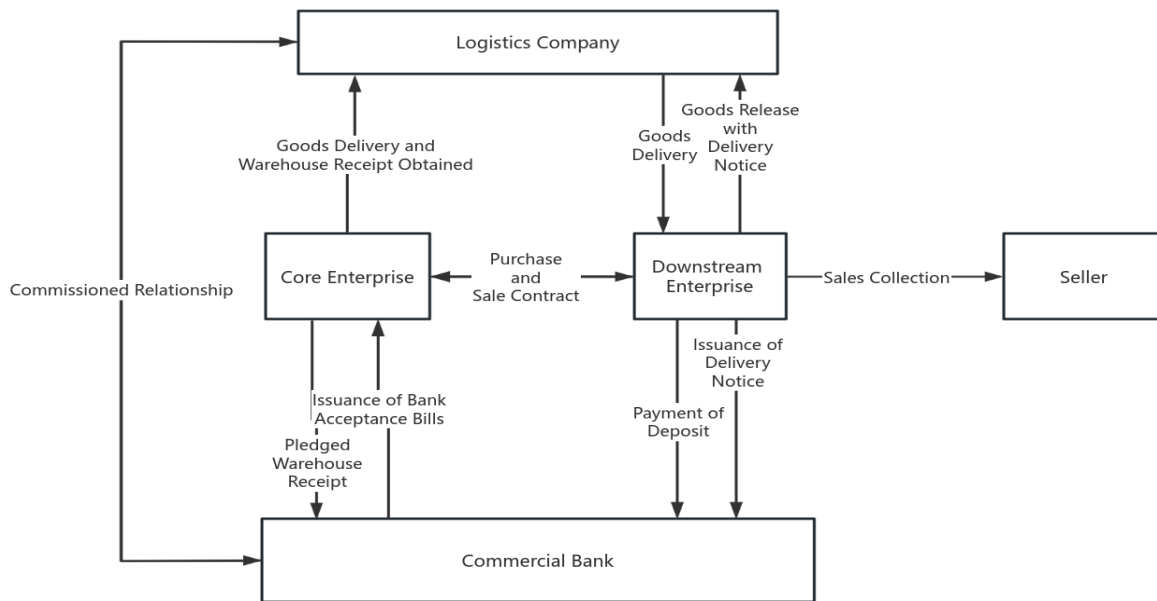


Figure 4. Confirmation Warehouse Financing Mode

#### 4. Development of Digital Empowerment Supply Chain Financing Mode

With the continuous advancement of modern digital information technology, supply chain finance models are deeply integrated, promoting the development of “1+N” or even “N+N” supply chain finance models. Various cutting-edge technologies are introduced into supply chain finance, highlighting the characteristics of financial technology in supply chain finance. Currently, online supply chain finance, digital supply chain finance modes, and blockchain + supply chain finance are some of the most creative and popular supply chain finance models.

##### 4.1. Blockchain + Supply Chain Finance Financing Mode

In traditional supply chain finance models, the amount of intermediary structures and links results in information asymmetry and increases the cost of trust. Blockchain technology, due to its decentralized structure, directly connects multiple supply chain actors, facilitating information sharing and the building of trust mechanisms, reducing financing costs. The immutability and transparency of blockchain ensure that each transaction is recorded in real-time and accurately visible externally, thus reducing information asymmetry and risks, and enhancing transaction transparency and trust [9].

Moreover, blockchain technology ensures data security and privacy. Through cryptography and distributed storage, enterprises can encrypt and securely store data on the blockchain, accessible only to authorized participants. Additionally, blockchain technology establishes a shared data network, enabling seamless integration between financial institutions and enterprises, accelerating financing application and approval processes, and improving financial service efficiency. Smart contracts enable automated settlement and payment, while asset securitization promotes

the digital handling of assets such as accounts receivable, facilitating pledging and financing.

For MSMEs, the application of these technologies significantly lowers financing thresholds, addressing financing challenges caused by information asymmetry and insufficient collateral in traditional models, thereby promoting the growth of these enterprises. Blockchain technology enhances supply chain visibility and traceability, optimizes supply chain efficiency, reduces resource wastage, lowers costs, and improves overall economic benefits. The increased global supply chain information sharing and data exchange reduces geographical barriers, facilitates international trade, and boosts firm competitiveness. These innovative solutions promote supply chain finance and industrial upgrading, supporting financial innovation and industrial transformation.

##### 4.2. Online Supply Chain Finance Financing Mode

The essence of supply chain finance is to firmly integrate SMEs upstream and downstream via credit guarantees from core firms to ensure seamless cash flow, while banks provide loans and financing arrangements to these supply chain enterprises. Pledge financing, prepayment and advance financing, and accounts receivable and payable financing are now the main financing techniques used in online supply chain finance. The focus is on integrating enterprise circulation resources to provide financial services to long-term cooperative suppliers and distributors. Supply chain finance conducts comprehensive analysis of transaction structures, utilizes self-liquidating trade finance credit models, and combines logistics supervision and fund guidance to control financial risks.

In online supply chain finance, participants include commercial banks, logistics companies, core enterprises, and SMEs. Through online platform integration, all management information can be provided and utilized online, achieving online intelligence in various stages of enterprise operations. This collection and processing of information promote

business interoperability and information transparency. Key features of online supply chain finance include lower financing amounts, short cycles with high-frequency financing, standardized financing processes, and lower financing costs. Its online operations and interconnected processes link funds flow, information flow, and physical flow closely, simplifying traditional loan approval processes, enhancing operational convenience, and reducing labor and material costs.

Online supply chain finance models rely on the internet for major transaction processes, including funds flow and information flow, while connecting offline physical logistics. Online platforms comprehensively display all information in the supply chain, facilitating banks' access to information without the need for multiple visits to banks or mailing documents, greatly enhancing operational convenience. The system automatically detects errors and shortens the loan approval process through internet information transmission, and the establishment of online payment platforms makes repayment more convenient. This approach reduces expenses while also strengthening the financial stability and efficacy of the whole supply chain through increased information transparency and streamlined procedures.

### **4.3. Digital Supply Chain Finance Financing Mode**

With the advancement of digital technologies like big data, blockchain, cloud computing, and the Internet of Things, a new paradigm known as "digital supply chain finance" is beginning to take shape. It significantly expands the number of actors on the supply chain finance platform, leading in a clustered and layered networked organizational structure. This structure's platforms can effectively manage businesses' cash flow, logistics, information flow, and commercial flow, helping financially stressed businesses on time and boosting the competitiveness of the entire supply chain.

Compared to traditional supply chain finance models dominated by manual and paper-based processes, digital supply chain finance achieves comprehensive monitoring and management of enterprise production and trade processes through informatization means. Leveraging intelligent technologies enables real-time processing and value assessment of business operations, as well as the application of smart contracts, thereby enhancing the efficiency, cost-effectiveness, and precision of financial services. Additionally, the application of new technologies promotes the networked transfer of credit resources, allowing high-quality credit resources of key enterprises to penetrate the entire supply chain, particularly benefiting small and medium-sized technology companies, thereby supporting innovation and growth in high-tech industries.

Intelligent risk management is another important aspect of digital supply chain finance. Platforms can collect and analyze business data from manufacturers using technologies including the internet, cloud computing, big data, Internet of Things (IoT), and artificial AI, monitor real-time logistics dynamics, inventory values, and effectively prevent and manage risks. The application of digital technologies also enhances the transparency and efficiency of asset and debt management. By using smart contracts, it mitigates risks associated with moral hazards and speculation. Moreover, closed-loop self-compensation mechanisms prevent investment and liquidity risks, thereby enhancing the overall platform's risk management capabilities.

## **5. Optimization Strategies for Supply Chain Finance Financing Modes Under the Digital Economy Background**

### **5.1. Enhancing Risk Control Capabilities Using Big Data Analytics**

In the context of the digital economy, big data technology provides the capability to handle massive amounts of information. Supply chain finance institutions can conduct more accurate credit assessments and risk analyses of enterprises within the supply chain through big data analysis. Specifically, institutions can gather and analyze data on production, sales, logistics, market dynamics, and industry trends to construct more precise credit scoring models. Real-time data monitoring and analysis help financial institutions promptly identify potential risk factors such as transaction anomalies and cash flow disruptions, enabling swift responses and risk prevention measures. This data-driven risk management approach not only enhances the security of financing but also improves the timeliness and predictability of financial services.

### **5.2. Integrating Blockchain Technology to Optimize Trust Mechanisms**

Blockchain technology, with its characteristics of immutability and decentralization, offers an opportunity to reconstruct trust mechanisms in supply chain finance. By establishing a blockchain-based distributed ledger, all transaction records can be made transparent and traceable. The use and repayment of loans will be reliably recorded on the blockchain, significantly reducing information asymmetry issues. Financial institutions can thereby provide financing services with greater confidence. Furthermore, the application of smart contracts automates the execution of contract terms, such as payment and transfer of claims, further streamlining the financing process and reducing operational costs and credit risks.

### **5.3. Implementing Intelligent Financial Services through Artificial Intelligence**

The integration of artificial intelligence, especially machine learning and natural language processing, makes financial services more intelligent. AI can assist financial institutions in achieving automated approval and risk assessment in supply chain finance. For instance, through machine learning algorithms analyzing historical transaction data, AI can predict a company's future financial performance and recommend corresponding financing solutions. Natural language processing can parse contract content, extract key information, and support automated approval processes. These intelligent financial services not only shorten loan approval times but also enhance decision-making accuracy, providing enterprises with more efficient and personalized financing experiences.

### **5.4. Enhancement of Regulatory Framework and Supervisory Technology**

As digital transformation in supply chain finance deepens, the refinement of laws and regulations and the upgrade of supervisory technology become crucial. Regulatory authorities should formulate corresponding regulations to

clarify the legality and norms of digital financial services, protecting the legitimate rights and interests of participants, especially concerning data privacy and information security. Simultaneously, the use of supervisory technology enhances regulatory efficiency and effectiveness by monitoring market dynamics and compliance in real time, ensuring the stable operation of financial markets. This promotes financial innovation while safeguarding fair and healthy market development.

## 6. Conclusion

The central argument of this study is to explore how digitalization enhances the efficiency, transparency, and intelligence of supply chain finance through the analysis of big data analytics, blockchain technology, artificial intelligence, and other emerging technologies, aiming to better support the actual economy, specifically the financial needs of SMEs.

This study demonstrates that under the influence of digitization, China's supply chain finance modes are gradually transforming into an efficient, transparent, and intelligent modern financial services system. The success of this transformation will depend on the deep integration of technological innovation, institutional innovation, and collaboration among various stakeholders. Future research should look into how issues like law, regulation, and culture might work along with technical innovation to accomplish long-term supply chain finance development.

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