

Research and Practical Analysis on the Improvement Methods of Supply Chain Finance for Small and Medium-Sized Enterprises Based on Blockchain Technology

Hanyue Xu

*Mergers and Acquisitions, J.P. Morgan, San Francisco, CA, USA
hanyue0409@yahoo.com*

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Abstract: Against the backdrop of global economic integration and rapid technological development, small and medium-sized enterprises, as an indispensable component of the economic structure, have a direct impact on the overall stability and growth of the economy. Businesses categorized as small and medium-sized an important source of economic vitality, and due to their unique attributes, they often face challenges such as financing difficulties and high costs, especially in the current complex and ever-changing economic environment. With the continuous evolution of information technology, financial institutions are also constantly seeking changes to meet the financing needs pertaining to small and medium-sized enterprises. This study explores in depth the monetary pressures and challenges faced by small and medium-sized enterprises in the supply chain environment from the perspectives in blockchain and supply chain finance. On this basis, an improvement approach for supply chain financing utilizing blockchain technology was proposed, and practical analysis was conducted. To create a favorable financing atmosphere for Small to midsize businesses, promote more effective allocation of financial resources, and enhance their position in market competition.

1. Introduction

Enterprises classified as small and medium-sized possess always been an indispensable force in China's national economy, often constrained by funding shortages and insufficient competitiveness in their development process. Especially during the spread of the COVID-19, SMEs faced more serious challenges, such as overstock of goods, difficulty in capital turnover and decline in production. These problems directly affected their business efficiency, and even threatened their survival. Traditional financing methods are often difficult to apply to small and medium-sized enterprises. Bank loans require collateral and the approval process is complex. The threshold for debt or equity financing is relatively high, which makes small and medium-sized enterprises more inclined to raise funds through private lending or online financial platforms. However, this method also brings higher financing costs. Faced with this reality, the government has been striving to offer greater convenience and low-cost funding avenues for small and medium-sized enterprises, in order

to promote their sustainable development and thus promote the development of the entire national economy. In today's rapidly developing information technology, the advent of blockchain technology offers new possibilities to address the financing difficulties of small and medium-sized enterprises. This study seeks to investigate how to use blockchain technology to improve the supply chain finance of small and medium-sized enterprises, thereby creating a better funding environment targeting small to midsize businesses, promoting their healthy development, and enhancing the vitality of the national economy.

2. Related Research

With the rapid advancement of Internet technology, online supply chain financing has emerged as a crucial way for SMEs to finance. S Chen, D Wang, Z Wan, and V Sundarapandian constructed a comprehensive assessment of credit risk in online supply chain financing index system by reviewing relevant research, covering multiple dimensions such as criteria for enterprise financing, core enterprise eligibility, supply chain activities, and overall economic conditions. This study selected data from 368 small and medium-sized enterprises within four sectors, including clothing, household appliances, pharmaceuticals, and construction, as the subjects of the study. Principal component analysis alongside logistic regression methods were used to construct an internet-based supply chain finance credit risk assessment framework for the corresponding industries. The results show that when evaluating the creditworthiness risk of online financial aspects of the supply chain, attention should be paid to factors such as the financial stability, profitability, and asset composition efficiency of companies seeking financing. Owing to the particularity of different industries, when establishing an evaluation model, it is necessary to consider the differences in their production and operational characteristics^[1].

Previous studies have shown that measuring the the sustainable supply chain practices of small and medium-sized enterprises, as well as providing improvement suggestions not only helps them achieve better business performance at the economic level, but also better meets the needs of the environment and society. Although the Data Envelopment Analysis (DEA) technique is employed for distinguish the effectiveness of enterprises and provide improvement suggestions, its limitation is that it can only provide improvement methods for inefficient enterprises. To make up for this deficiency, Prasanta Kumar Dey, Guo liang Yang et al. used the Structural Equation Modeling (SEM) method to establish the relationship between sustainability performance measurement standards and sub standards, providing improvement measures for enterprises. However, SEM methods are more suitable for proposing improvement suggestions from the perspective of the overall small and medium-sized enterprise group, rather than being suitable for individual enterprises. In order to comprehensively utilize these two methods, the performance measurement method combining DEA and SEM has become a highly focused strategy. This method not only provides more accurate and robust results, but also analyzes based on more objective measurement indicators, providing more practical tools for decision-makers and enterprise managers. The method proposed in this research has been validated in various geographic regions and demonstrated the effectiveness of combining DEA and SEM methods in measuring sustainable supply chain performance. By comparing and analyzing the sustainability status of enterprises in different regions, useful references are provided for further promoting the sustainable development among small to midsize businesses^[2].

For an extended period, small to midsize manufacturing businesses have been facing financing difficulties, which have become an important factor restricting their development. The conventional supply chain financing structure has to some extent solved this problem, but there is still a problem of poor credit transmission from secondary suppliers to N-level suppliers within the niche market

segment. In recent times, the application of blockchain technology has brought new opportunities to supply chain finance, especially in addressing trust gaps and playing a positive role. This article proposes a blockchain based electronic payment voucher (EPV) scheme, which establishes a trust transitivity model by taking into account both direct trust and indirect trust. Introduced a strategy for dynamically allocating weights aimed at incentivizing and punishing the behavior among small to midsize businesses. This study aims to offer fresh insights for trust assessment pertaining to small to midsize businesses, fully utilizing the enhancement and conveyance effects of the manufacturing supply chain to alleviate the challenges in securing financing among businesses of modest size. Through case analysis, the rationality and feasibility within the framework were further verified^[3].

The financial challenges encountered by small to midsize enterprises have always been a key constraint on their development. With the advent of the information age, new technologies such as blockchain have been widely applied in various industries, but how small to midsize businesses can effectively utilize these new technologies to innovate financing models remains a challenge. Yinbin Ke selected small and medium-sized enterprises as the research object, conducted in-depth discussions on their financing problems and influencing factors, and proposed suggestions for improving enterprise financing models from macro, meso, micro, and implementation perspectives. From a financial perspective, an innovative path suitable for China's national conditions has been proposed. These efforts aim to offer additional flexible and effective funding avenues for small to midsize businesses, and promote their healthy development^[4].

3. Overcoming Supply Chain Finance Challenges

3.1 Breaking down Information Silos

The traditional supply chain model has the problem of information silos, which leads to independent operation of various participating entities and poor information exchange. The lack of unified information construction and standardized processes has led to scattered transaction information and uneven transmission quality, hindering the collaborative cooperation of various links in the value chain. To solve this problem, the decentralization and immutability of information in blockchain technology can effectively eliminate information silos, achieve collaborative sharing of information and collaboration in the realm of supply chain finance, and promote the convenience pertaining to funding for businesses of modest size and the sustainable development in the realm of supply chain finance^[5].

3.2 Liberate Businesses of Small to Midsize

Traditional value financial institutions within the supply chain often depend on the funding or creditworthiness of core enterprises, which means that only enterprises that have long-term cooperation with and recognition from core enterprises can obtain financing opportunities. On the contrary, companies that are far away from core enterprises often find it difficult to gain recognition from financial institutions due to the lack of direct transactions, thereby increasing the difficulty of financing. The current situation of excessive reliance on core enterprises will also increase uncertainty in the financing process. Through the innovation of blockchain technology, traditional financing models can be broken, making small and medium-sized enterprises more independent and flexible in the realm of supply chain financing, promoting their development and innovation.

3.3 Credit Risk Response Strategies under Blockchain Technology

In supply chain financing, credit risk manifests as an important challenge faced by financial

institutions. As a key player in the value chain, the risks and crises of core enterprises may have a ripple effect across the entirety of value chain, exacerbating the uncertainty of financial institutions. The traditional the entirety of the supply chain finance model has many limitations, such as complex offline transactions and information asymmetry, which bring regulatory pressure and credit risks to financial institutions. This article enhances the ability of financial institutions to control transaction risks by using blockchain technology to exchange transaction information transparently and securely. This paper provides more reliable financing channels for small and medium-sized enterprises, effectively responds to the challenge of credit exposure in the field of supply chain financing, and creates more opportunities for enterprise development.

4. Distributed Ledger Technology Helps the Innovative Advancement of Supply Chain Financing For Small and Medium-Sized Enterprises

4.1 Improving Control Level

Small and medium-sized enterprises should actively explore the advantages of "blockchain+value chain" in financing, deeply understand its convenience, and continuously improve their management level. This paper innovates the management concept, optimizes the organizational structure, strengthens the information construction, promotes the organizational system to be more perfect, and clarifies the responsibilities and work contents of each department. Enterprises need to objectively recognize their position in the value chain, integrate advantageous resources, enhance competitiveness, continuously improve product quality, and use blockchain technology for product promotion and promotion. In the formulation of feasible financing goals and selection of appropriate ways, combined with future development planning, this paper enhances the competitiveness of the value chain and lays the foundation for the cooperation of all parties in the "blockchain + value chain". The management should strengthen institutional construction, establish and improve operational systems, enhance transaction standardization, maintain cooperative relationships, pay attention to docking needs, promote innovative management, enhance management standardization, and lay a foundation for docking with financial institution platforms.

4.2 Promoting the Informatization Growth of Modest-Sized Businesses

Introducing blockchain technology is an inevitable choice to improve the the flow of goods finance of modest-sized businesses. As a distributed database, blockchain has put forward higher requirements for the informatization of small and medium-sized enterprises. Enterprises need a more comprehensive information configuration to facilitate the merging of business and financial matters, and to connect with the "blockchain+value chain" platform. It is urgent to promote the transformation of SMEs, combine them with "Internet plus", and obtain more value information from the Internet. This helps enterprises to better understand their own business situation and establish a trading information platform, enabling them to better participate in value chain collaboration. Deeply understanding the financing methods and paths of other enterprises, as well as the concept of "blockchain+value chain finance", will help enterprises recognize their shortcomings in informatization. By digitizing daily transaction data of enterprises and providing evaluation opportunities for other value chain entities, the stability and competitiveness of the entire value chain can be improved, the risks of the value chain can be reduced, and the informatization process pertaining to modest-sized businesses and the improvement in the realm of supply chain finance can be promoted.

5. Exploration and Analysis of Blockchain Technology on the Supply Chain Financing Framework Utilized by Modest-Sized Businesses

5.1 Exploration of Digital Procurement and Financing Models for Physical Assets Leveraging Distributed Ledger Technology

With the continuous development of blockchain technology, the procurement financing model based on digitalization of physical assets has become an emerging direction in supply chain finance. This model utilizes blockchain technology to digitize physical assets (such as inventory, raw materials, etc.) and generate unique digital identifiers on the blockchain to achieve asset traceability and tradability. Compared to traditional financing methods, this model is more efficient and convenient. Enterprises do not need to go through tedious financing application processes, but upload physical asset data to the supply chain financing platform for real-time financing and repayment, achieving timely flow of funds. The application of smart contract technology makes risk management more automated, improving the security and sustainability of financing. The introduction of insurance mechanisms further reduces financing risks, and insurance companies provide credit insurance for the digital procurement and financing of physical assets, effectively protecting the legitimate rights and interests of all parties. Overall, this procurement financial model utilizing blockchain technology provides more flexible, efficient, and secure financing channels for modest-sized businesses, bringing new development opportunities to the the flow of goods finance field.

5.2 New Supply Chain Finance Model Supported by Core Enterprise Credit

The field of the evolution of supply chain financing persists, and supply chain financing model based on blockchain technology has attracted much attention. Among them, the accounts payable financing model based on core corporate credit has great potential. This model utilizes blockchain technology to digitize accounts payable on the supply chain and convert them into financial instruments, achieving the splitting, circulation, and financing of accounts. Its advantages are obvious, which can help modest-sized businesses address funding challenges, improve financing efficiency, help core enterprises reduce financing costs, enhance collaboration with both upstream and downstream entities in the supply chain, as well as further enhance the resilience of the supply chain. This model also faces some challenges, especially in terms of trust and security. To address these challenges, the introduction of smart contract technology has become a possible solution to ensure the traceability and immutability of transactions, effectively reducing transaction risks and achieving win-win cooperation among suppliers and customers enterprises within the supply chain ecosystem. We still need to overcome technological and institutional barriers, establish sound laws, regulations, and regulatory systems, and continuously strengthen the application research and innovation of blockchain technology.

6. Conclusion

With the evolution within the realm of blockchain technology, supply chain financing model based on it has attracted much attention. This emerging model is expected to address the trust and transparency challenges in traditional supply chain finance, and enhance effectiveness and security of funding. With the help in blockchain technology, it is possible to achieve transparency throughout the entire supply chain, improve cooperation between upstream and downstream enterprises, and effectively reduce financing costs. Core enterprises can raise funds through issuing blockchain bonds and other means to promote the flow and use of funds. In the future, with the

continuous advancement of technology, the blockchain based supply chain finance model is expected to be further improved and promoted, bringing more opportunities and challenges to the financial field.

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