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ARTICLE

RESEARCH ON THE INFLUENCING FACTORS OF BLOCK CHAIN TECHNOLOGY ADOPTION IN SUPPLY CHAIN FINANCE OF SMALL AND MEDIUM-SIZED ENTERPRISES

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ARTICLE DETAILS

ABSTRACT

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In order to explore the influencing factors of the adoption of blockchain technology in SME supply chain finance, this paper analyzes the enabling mechanism of blockchain technology in SME financing from the problems faced by SMEs in financing. The paper puts forward four influencing factors of supply chain equity, sharing mechanism, legal dimension and network characteristics. The results show that in order to promote the supply chain financing of SMEs, we should further explore the application of blockchain technology.

KEY WORDS

Small and Medium-sized Enterprises; Supply Chain Finance; Blockchain; Influence Factor

1. INTRODUCTION

On March 28, 2019, in order to alleviate the difficulty and high cost of financing for small and medium-sized enterprises, the Guiding Opinions on Promoting the Healthy Development of Small and Medium-sized Enterprises proposed to strengthen the support of financial policies and let more small and medium-sized enterprises enjoy the results of financial innovation. We should innovate and enrich the financial product system to meet diversified financial needs; We should use a variety of tools as a whole to solve the problems of information asymmetry and imperfect incentive mechanism and reduce the financing costs of enterprises, especially small and micro enterprises and private enterprises [1]. Supply chain finance (SCF) is a new financial model that has emerged in recent years to help SMEs get out of their financing difficulties. SCF integrates capital flows into the supply chain to provide financing services for SMEs, making up for the lack of financing for SMEs. The supply chain can use the advantages of modern technology to gain the company's competitive advantage. The digitalization of the supply chain has become a key development trend in the past decades, namely, the transformation to a knowledge-based economy, and the transformation from traditional manufacturing to the global intelligent and sustainable manufacturing era [2]. In supply chain transactions, blockchain technology (BCT) can bring better transparency and visibility [3]. It is possible to solve the trust problem in the supply chain network by using the tamper-proof and traceability brought by BCT's ledger accounting architecture [4].

2. CURRENT SITUATION OF PROBLEMS FACED BY SMES IN SUPPLY CHAIN FINANCING

At present, the difficulty and high cost of financing of SMEs in China have been highly concerned by the government, enterprises and academia

[5]. The low success rate of obtaining financing, information asymmetry, their own financial situation and external financing environment affect their financing channels and quotas. In the context of supply chain, banks have innovatively expanded financing channels for SMEs and developed SCF financing mode [6]. This financing mode enables SMEs to rely on their trade related industrial chain through logistics, information flow and capital flow, reduce financing costs, enhance their own credit, and provide comprehensive financial services for enterprises within the supply chain [7-8]. Supply chain finance no longer focuses on single SMEs, but considers the whole industry supply chain, and takes the business contract between the core enterprise and upstream and downstream SMEs as the guarantee, so as to ensure the safety of the bank's loan funds to SMEs and strengthen the stable cooperation between banks and enterprises. With the continuous enrichment of economic activities, the complex supply chain network with nonlinear, large-scale and high dimensional characteristics is gradually replacing the simple traditional supply chain network structure. In a complex supply chain network, the vertical supply chain network and the horizontal supply chain network are intertwined. A flat enterprise may cooperate with other enterprises within the supply chain network. The supply chain financing business will also change with the complexity of the supply chain. It not only involves a long chain link, but also the participants at each node have the characteristics of dynamic changes. Therefore, under the background of this complex network, SMEs' supply chain financing has certain problems.

3. ANALYSIS OF THE FUNCTION MECHANISM OF BLOCKCHAIN TECHNOLOGY IN SME SUPPLY CHAIN FINANCING

The concept of BCT originated from a groundbreaking paper published by Satoshi Nakamoto at the Bitcoin Forum in 2008 [9]. BCT is defined as a new application mode such as point-to-point transmission, distributed data storage, encryption algorithm, consensus mechanism, etc. It is a kind

of infrastructure, decentralized and distributed computing paradigm [10]. Blockchain is an integrated solution of asymmetric encryption, consensus mechanism, smart contract and other technologies. These technologies ensure the realization of its value, rebuild the trust mechanism, reduce the cost of online transaction information and rebuild the incentive mechanism, and improve the organizational collaboration efficiency [11-12]. In terms of supply chain application, BCT helps to speed up and make the process within the supply chain more reliable; It is conducive to the integration of supply chain functions; It is helpful to organize the supply chain network to listen to all stakeholders' transaction realization and real-time digital ledger [13]. BCT can help supply chain network organizations obtain accurate demand forecasts, efficiently manage resources and reduce costs; Helps to track the scale and scope of the system; It helps to improve the visibility and transparency of the supply chain [14]. In terms of supply chain finance, with the growing maturity of the supply chain industry ecology, the trend of SCF innovation is gradually emerging. It is highlighted in the integrated application of supply chain finance and the Internet of Things, big data and BCT. BCT's information traceability can solve the supply chain guarantee problem; BCT can promote the promotion of SCF business and help banks break through existing business bottlenecks.

The function mechanism of blockchain in SME supply chain financing is mainly reflected in three aspects. First, in terms of data elements, the blockchain can ensure the interconnection, authenticity and transparency of information on the supply chain, enhance the willingness of all parties to share information, thus effectively improving the quality of financing information and reducing information asymmetry among financing parties; Second, in terms of business process, the innovative information mechanism based on blockchain technology has realized the automation and synchronization of the transaction process of financing parties; Third, in terms of transaction structure, the self-organization of the blockchain makes the connection between the participants and their resources more independent and flexible, and the network evolves into a loose coupling structure, thus enhancing the synergy of the financing ecology. Fourth, in terms of technology collaboration, the blockchain can effectively solve some of the pain points of information fraud and low efficiency in SME financing. However, it is difficult to solve many pain points in the supply chain financing model of SMEs through a single technology, and BC needs to be combined with other digital technologies such as big data, cloud computing, the Internet of Things and artificial intelligence.

4. ANALYSIS OF FACTORS INFLUENCING THE ADOPTION OF BLOCKCHAIN TECHNOLOGY IN SME SUPPLY CHAIN FINANCING

4.1 Supply chain equity

Supply chain equity refers to the behavior of supply chain members to treat each other. Due to the imperfect competitive environment, some relationship members may take advantage of their position or environment to gain excessive advantages over others in the supply chain financing of SMEs. The transparent, traceable and tamper proof feature of blockchain technology makes the transaction information real and tamper proof. The distributed accounting self-organization and distributed verification data of the blockchain circumvent the excessive advantages of supply chain members to others by taking advantage of their positions. The smart contract feature of the blockchain also enables the automatic processing of transactions between members of the supply chain network, reducing human intervention. Therefore, supply chain equity is a factor that affects the adoption of blockchain technology in SME supply chain financing [15].

With the globalization of enterprises' supply chain, supply chain equity is the key issue of SMEs' financing. In the whole supply chain network, trade partner employees and government regulations operate in different geographical locations and economic environments. The diversity of this environment and the complexity of the supply chain have brought about many potential unfair practices.

In the context of supply chain, fairness involves the way one supply chain entity treats other entities. In the financing of SMEs, focus on the core stakeholders and connect their suppliers, customers and employees. The fairness of the supply chain to customers is reflected in the fairness of their pricing; Fair trade between suppliers; For employees,

it is reflected in their fair remuneration. Therefore, in the supply chain financing of SMEs, supply chain equity, that is, fair price, fair trade and fair remuneration, is one of the key factors affecting the core enterprises to adopt blockchain technology.

4.2 Sharing mechanism

Information is an important basis for SME supply chain financing, and also an important factor affecting the effectiveness and efficiency of SME financing. Node enterprises have or can easily obtain more information about themselves. Real information sharing among enterprises is conducive to better financing. Blockchain technology uses its unique security encryption mechanism and decentralized information exchange mode to ensure the information sharing efficiency of all participants in the supply chain of SMEs, providing technical support for the establishment of trust mechanism. In order to ensure the security and fairness of the transaction process and improve the efficiency and transparency of information sharing, it is necessary to build an open and transparent information sharing mechanism under the decentralized, unchangeable and revocable credit mechanism. The function of consensus mechanism is to ensure the consistency and security of information resources and the stable operation of information resource sharing platform. The core is the consensus algorithm, or adjust the consensus mechanism to speed up the consensus, so as to improve the operating efficiency of the information source sharing platform [16].

Supply chain information sharing subjects form a sharing network through information flow. In this network, the closeness of each node enterprise connection, as the relationship strength, ensures the cooperation degree of supply chain enterprises, and can establish a long-term stable strategic cooperation relationship based on information sharing, risk sharing and benefit sharing. When sharing information resources, it needs to consume the energy and resources of node enterprises in the supply chain to participate, and it is unable to balance the interests of each node enterprise. In this way, node enterprises are unwilling to participate in the sharing of information resources. At the same time, when sharing information resources, it also faces the problem of information security, which leads to the risk of privacy disclosure when node enterprises participate in resource sharing. At this time, an appropriate incentive mechanism is needed to solve the problem of resource sharing. The digital currency based on the blockchain is used as a reward to encourage node enterprises to share information, which can ensure that node enterprises in the supply chain are more secure and efficient in information sharing.

4.3 Legal dimension

Smart contract is an important stage in the development of blockchain. Smart contract has three characteristics: automaticity, enforceability and anonymity. Its function is to seek to make up for the shortcomings of traditional contract law, increase the security and efficiency of transactions, and eliminate the necessity of legal enforcement. Compared with the traditional legal framework of contracts, smart contracts trade flexibility for efficiency. Uncertainties have less impact on smart contracts. They can avoid multiple interpretations and repeated negotiations. More importantly, they can effectively protect privacy and security. In the digital revolution, the encryption algorithm, consensus mechanism, distributed storage and other functions used by the blockchain technology enable the digital to transmit information and value, so as to better use the contract mechanism, shorten the formation and performance of the contract, and make the contract more economical and fast. The contract law should respond to smart contracts accordingly, and improve the contract system to adapt to the development of smart contracts. In the process of contract formulation, we will make the contract technical and quantifiable, limit the interpretation space of the contract, and use the blockchain smart contract to improve the system of contract interpretation rules [17].

4.4 Network characteristics

The financial performance of the supply chain of small and medium-sized enterprises needs not only to consider their own operation and capital flow, but also to strengthen the construction of the quality of cooperation among members. With the help of blockchain technology, all members have established a digital credit co-governance system governed by multilateral platforms. Network embeddedness accurately

describes the cooperative network quality of enterprises in the operation process from two dimensions of structure embeddedness and relationship embeddedness. The digital credit co governance system based on blockchain technology can effectively improve enterprise network embeddedness [18].

By virtue of the information transparency, irreversibility and tamper proof characteristics of blockchain block-chain technology, enterprises with backward development ideas and low credit can be eliminated in a certain procedure to ensure the enterprise density and stability of the supply chain financial network. Small and medium-sized enterprises can quickly adapt to new business environment or fields and improve their competitive advantage by virtue of the characteristics of fast, agile and accurate transmission of blockchain technology. Blockchain support can promote the authenticity and transparency of enterprise information in the supply chain financial network system, and improve the trust, cooperation quality and stability of cooperation between enterprises. The greater the supply chain network density between SMEs, the greater the opportunities for mutual cooperation between enterprises. By virtue of digital credit co governance, credit supervision can improve the quality of cooperation between enterprises. Enterprises can accurately position market demand, improve their own core competitiveness, and to a certain extent, increase the amount of financing.

5. CONCLUSIONS

Blockchain technology has triggered supply chain finance reform, making it truly serve small and medium-sized enterprises and reshaping the supply chain financing structure of small and medium-sized enterprises. Based on the characteristics of blockchain technology, this paper analyzes the function mechanism of blockchain technology in the supply chain financing of small and medium-sized enterprises, and expounds the four major factors affecting the adoption of blockchain technology, namely supply chain equity, sharing mechanism, legal dimension and network characteristics.

In view of the factors affecting supply chain equity, when adopting blockchain technology, it is necessary to combine industry characteristics, establish a consortium, improve the transparency of the supply chain, and strengthen the competitive environment and social awareness. As for the influencing factors of sharing mechanism, the adoption of SME blockchain technology is closely related to the efficiency of supply chain network information sharing, and more efficient supply chain financing performance is the key to SME financing. To meet the challenges of smart contract technology, strengthening the supervision of blockchain and smart contract is the scope of social governance. Based on existing theories, smart contracts should be incorporated into the legal framework of contracts to seek common ground while reserving differences. Study the application of smart contracts under blockchain in contract law, reflect modern contract theory, and reserve legal regulation space for these new types of anonymous contracts. We will improve the formation rules, performance mechanisms, and default and relief mechanisms of smart contracts. For the influencing factors of network characteristics, SMEs should make full use of the characteristics of blockchain to build closer, strengthen the leading role of core enterprises and financial institutions in the network, and explore the application of blockchain technology in complex networks.

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REFERENCES

[1] Jiang, R., Kang, Y., Liu, Y., Liang, Z., Duan, Y., Sun, Y., & Liu, J. A trust transitivity model of small and medium-sized manufacturing enterprises under blockchain-based supply chain finance. *International Journal of*

Production Economics, 2022, 247(5): 108469.

[2] Gunasekaran, A., Lai, K. H., Cheng, T. C. E. Responsive supply chain: A competitive strategy in a networked economy. *Omega*, 2008, 36(4):549-564.

[3] Sachin, K., Angappa, G., Himanshu, A. Understanding the Blockchain technology adoption in supply chains-Indian context. *International Journal of Production Research*, 2018:1-25.

[4] Kshetri, N. Potential roles of blockchain in fighting poverty and reducing financial exclusion in the global south. *Journal of Global Information Technology Management*, 2017:1-4.

[5] Yang H, Ren W. Research on the influence mechanism and configuration path of network relationship characteristics on SMEs' innovation—The mediating effect of supply chain dynamic capability and the moderating effect of geographical proximity. *Sustainability*, 2021, 13(17): 9919.

[6] Wang, K., Yan, F., Zhang, Y., Xiao, Y., & Gu, L. Supply chain financial risk evaluation of small- and medium-sized enterprises under smart city. *Journal of Advanced Transportation*, 2020: 1-14.

[7] Yang, W., Ma, Y., Zhan, Y. The research on supply chain finance model with supplier-led. *International Journal of Advancements in Computing Technology*, 2013, 5(8):566-576.

[8] Xu, L., Yang, Y., Chu, X. Research on the influence mechanism of block chain on the credit of transportation capacity supply chain finance. *Mathematical Problems in Engineering*, 2021(1):1-11.

[9] Satoshi, N. Bitcoin: A peer-to-peer electronic cash system. Consulted, 2008: 1-30.

[10] Du, W., Ma, X., Yuan, H., Zhu, Y. Blockchain technology-based sustainable management research: the status quo and a general framework for future application. *Environmental Science and Pollution Research*, 2022, 29(39):58648-58663.

[11] Lin, S. Y., Zhang, L., Li, J., Ji, L. L., Sun, Y. A survey of application research based on blockchain smart contract. *Wireless networks*, 2022, 28(2): 635-690.

[12] Korpela, K., Hallikas, J., Dahlberg, T. Digital supply chain transformation toward blockchain integration, 2017.

[13] Dmitry, I., Alexandre, D., Boris, S. The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. *International Journal of Production Research*, 2018:1-18.

[14] Hofmann, E., Strewe, U. M., Bosia, N. Concept—Where are the opportunities of blockchain-driven supply chain finance?. *Supply Chain Finance and Blockchain Technology*. 2018.

[15] Chen, L., Lee, H. L., Tang, C. S. (2022). Supply chain fairness. *Production and Operations Management*, 31(12): 4304-4318.

[16] Zhang, L., Finance, S. O. Research on financial innovation of supply chain driven by blockchain from the perspective of game theory. *On Economic Problems*, 2019, 4:48-54.

[17] Eenmaa-Dimitrieva, H., Schmidt-Kessen, M. J. Creating markets in no-trust environments: The law and economics of smart contracts. *Computer Law & Security Report*, 2019, 35(1):69-88.

[18] Nandi, M. L., Nandi, S., Moya, H., Kaynak, H. Blockchain technology-enabled supply chain systems and supply chain performance: a resource-based view. *Supply Chain Management*, 2020, 25(6):841-862.

