Research on Supply Chain Financial Ecology Optimization Driven by Blockchain Technology

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Keywords: Blockchain Technology; Supply Chain Finance; Ecology Optimization

Abstract: Supply chain finance is a highly innovative financial model with the development of the economy. Some of the characteristics of blockchain technology are well in line with the development demands of supply chain finance, thus bringing opportunities to supply chain finance. This study first introduced the background and characteristics of the blockchain, then analyzed the main problems facing the development of supply chain finance, and proposed the supply chain financial ecosystem and ecology optimization path of blockchain technology. By doing that, this study hopes to provide new solutions to solve problems.

1. Introduction

Blockchain is another major technological innovation following the Internet, cloud computing, and big data. [1] The application of blockchain has been widely envisioned by many people, and the prospects are very attractive. It will be well integrated with the financial industry because the data in the blockchain is unchangeable.[2] The blockchain is a re-writer of the rules of the banking industry. It can be expected that the blockchain will be integrated with supply chain finance (SCF)in the future. Finance is an important part of the modern economy and society.[3] The integration of blockchain and finance is conducive to expanding the impact of blockchain and it will be applied in more commercial fields. This is a natural development trend of blockchain as an emerging technology.

2. Blockchain Technology and Its Characteristics

2.1 Definition of Blockchain

Blockchain is a data structure using a specific encryption mathematical algorithm that encrypts each transaction information and records it in data block (consisting of 62 characters, 52 English lowercase letters and 10 Arabic numerals) chained in chronological order. The blockchain records and updates the data blocks in a decentralized multi-point way, ensuring the security of the data blocks with specific cryptographic algorithms.

2.2 Characteristics of Blockchain Technology

Based on the mechanisms of blockchain technology, it has characteristics as follows:

2.2.1 Decentralization and consensus mechanism

Decentralization is the most important feature of blockchain technology. [4] There is no strong central node in the blockchain to formulate rules, unify accounts and maintain account books, and the accounting rules are open (the so-called consensus mechanism). [5]All members can participate in accounting. As long as the accounting rules follow the system rules and are verified by other members, they are successfully accounted for by the system and there is no requirement for endorsement by the system or third-party intermediaries.

  DOI: 10.25236/ecomhs.2019.258

2.2.2 Unchangeable and easy to verify

The blockchain uses a hash function for data encryption. Each data block contains the data of last block, the transaction information, the transaction time, etc., and a new block is formed accordingly. Under that circumstance, verification to the function value of the final block is equivalent to verifying all the books before, so the blockchain is relatively easy to verify. Besides, each change of the input data will generate a new data block, so that verifying the data block of the longest data link is equivalent to checking all the transaction information of the entire data link, thus ensuring that all transaction record information is not tampered. Security of the information can be guaranteed.

2.3 Smart contract

Different from traditional contract, smart contract is a program that can automatically execute. As long as the conditions agreed by the program are triggered, the relevant transactions of the contract will execute automatically without manual intervention. Since the system avoids the interference of the center to the transaction, the data can only be added, but not to be tampered with or be deleted. Once the fraud is made, the record can never be eliminated and the cost is high. Smart contract makes transactions transparent, significantly lower transaction cost and prevent it from external interference.

3. Main Problems in the Development of Supply Chain Finance

3.1 Large Span and Various Information Asymmetries

Generally, supply chain finance involves dozens and hundreds of companies. It is difficult for financial institutions to fully master the logistics information flow and capital flow in the supply chain. For financial institutions, information asymmetry is a "fatal killer" and is still faced by many parties. Therefore, there are still many risks in supply chain finance. This is the bottleneck in the development of China's supply chain finance.

3.2 Improvements Need to Be Done in Laws Related to Supply Chain Finance

There are still certain legal gaps in the pledge of liquid assets such as inventory commodities, and there is a possibility of legal disputes. Besides, the various principal-agent relationships in the supply chain finance business also need to be regulated by law. The construction of China's social credit system is not perfect, which increases the operational risks of supply chain financial services. Controlling operational risks is a thorny issue faced by core companies in banking and supply chain. All those problems lead to the occurrence of non-performing loans.

4. Construction of Ecosystem of Supply Chain Finance

Supply chain finance is different from Internet finance. Through the active organizations and the ecosystem, SCF can achieve financing, and ultimately realize a sound integration of supply chain business flow, logistics, information flow and capital flow. It is not an integration of capital supply and demand simply through cutting financial intermediation. Therefore, the construction of supply chain finance ecosystem is crucial to SCF. The ecosystem of SCF consists of three levels: environmental ecology, organization ecology, and ecology of elements.

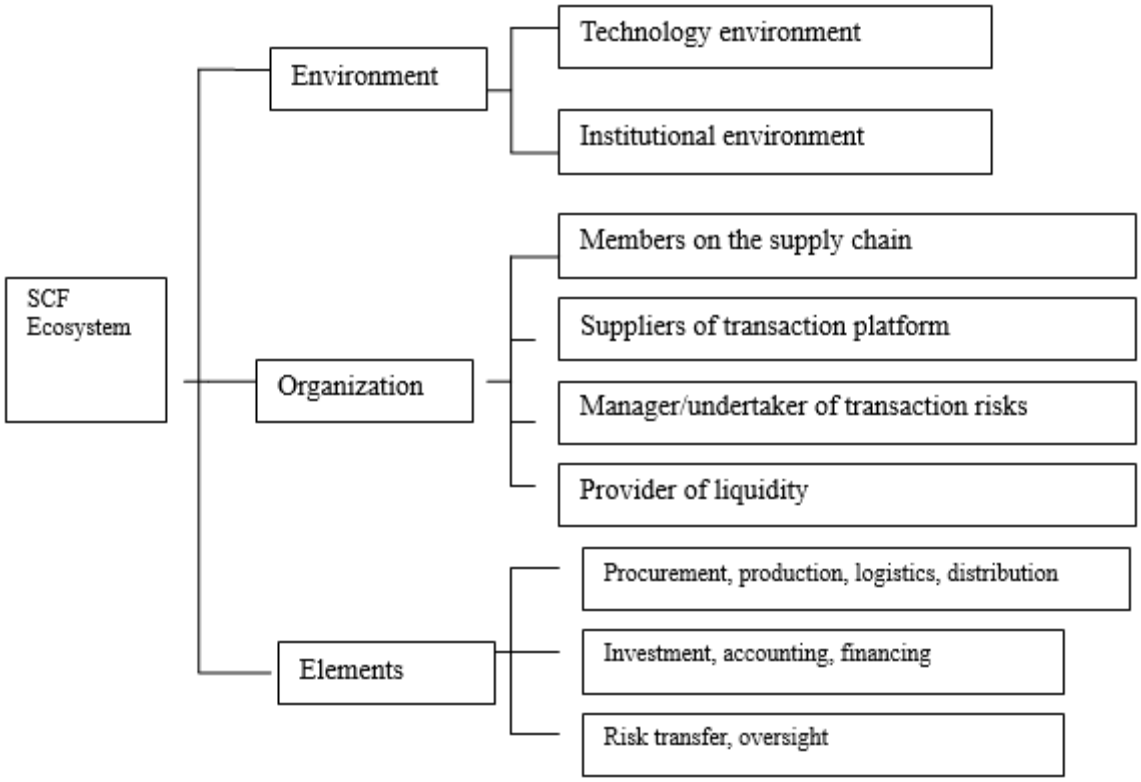

Figure 1 Construction of Ecosystem of Supply Chain Finance

4.1 Environmental Ecology

Environmental ecology refers to the maturity of environmental factors that promote supply chain finance, including institutional and technological environments. The institutional environment represents regulatory, administrative and cultural elements that regulate financial activities in the supply chain. This requires the rule makers to work with other relevant organizations to develop a sound institutional system based on the rules of supply chain finance. Another aspect of institutional environmental ecological construction is that rule makers and managers must work together to establish a standardized regulatory system. Due to the diversification of China's industrial layout and the geographical distribution of enterprises' supply chain business, the coordination, unification and standardization of the system have become the core of supply chain finance development. Without a coordinated, unified, and standardized institutional environment and policy system, there will be no smooth operation of the supply chain. Under that circumstance, financial risks can arise due to inconsistencies or conflicts in laws or policies.

4.2 Organization Ecology

Organizational ecology is very important for supply chain financial activities. It involves entities participating supply chain finance, including members of the industry chain, providers of transaction platform, trading risk managers and liquidity providers. From the perspective of theoretical study, among researches on service-oriented supply chain or enterprise service, more and more researches have shifted from dyadic relation to triad relation in terms of the structure of entities. This triad relation exists among service integrator, customer, and service provider, such as processor or partner. In recent years, it has turned to a tetradic one and even a network relation. From a practical perspective, participants in the industry chain fall into three categories: first, core stakeholders, such as upstream and downstream partners in the supply chain; second, strategic stakeholders, such as financial institutions, brands, etc.; third, environmental stakeholders, such as administrative bodies like customs, commodity inspectors, taxation departments and other social organizations. All these members are participants in the industry chain.

4.3 Ecology of Elements

Elements can be divided into three aspects. First, elements of the supply chain business activities, especially the business flow (ie, various types of trading activities) in the supply chain operation process, logistics, and a combination of the two. In the supply chain financial activities, business flow and logistics are inseparable. It is because that under incompetent credit system of SMEs and information asymmetry, only knowing one aspect will cause huge risks to the supply chain financial business. Only knowing about the transaction activity but little about logistics (ie, only knowing about purchasing or sales activity, but failed to grasp the inventory, transportation and distribution status) could hinder financial activities because of false trade. In a similar way, logistic alone but not knowing transaction information could also lead to arbitrage transaction by taking advantage of the transfer of goods in time and space. Second, financial and banking elements. This means whether all participants in supply chain finance have complete, clear and veritable financial, accounting and banking elements. Third, elements of risk control and management. This means whether there are sound systems in risks identification, monitoring and management, whether there are enough means to transfer and resolve potential risks. All of these elements together constitute the ecosystem of elements of supply chain finance. Fourth, with the development of SCF and its ecology, innovative factors have begun to penetrate the operation of the supply chain, which not only makes supply chain operations increasingly intelligent and efficient, but also promotes the expansion and upgrading of supply chain finance, thus bringing remarkable changes to the operation mode, risk management and control of supply chain finance.

5. The Role of Blockchain in SCF Ecology Optimization

5.1 Improve Corporate Credit and Reduce SCF Costs

The application of blockchain technology in supply chain finance effectively solves the problem of information asymmetry between enterprises and financial institutions, expands the influence of credit of core enterprises, promotes the information circulation of enterprises in the supply chain, and reduces the overall financing cost of the supply chain. It effectively guarantees financing security and improves business operation efficiency.

5.2 Improve Supervision of SCF Services by Regulatory Authorities

In the distributed accounting financial environment of the supply chain, the government regulatory department can set up the supervision node in any transaction procedure. Thanks to the characteristics of blockchain information, which is unchangeable, shared and can be traced, an in-depth investigation can be done to transactions or enterprises. By doing that, problems of repeated pledges, empty pledges, and misappropriation of funds in the supply chain financial business can be prevented, thus to ensure that corporate financing serves real trade and reduce the risk of financial institutions.

5.3 Empower the Real Economy

By integrating blockchain technology with traditional supply chain finance business, the credit system of enterprises is improved, the data value is utilized and the capital vitality is fully enhanced. Enterprises participating in SCF business are empowered. New technologies like the Internet of things, big data and artificial intelligence can be applied to more areas and bring benefits to more SMEs. By doing that, construction of financial ecology of the supply chain can be fulfilled, with the feature of sharing information, credit, risk and value.

6. Conclusion

The application of blockchain technology effectively solves the problems of information asymmetry and incomprehensive credit identification in supply chain financial services. With the blockchain, information transparency and credit sharing among all parties can be realized, thus

greatly reducing business risks and financing costs of enterprises in the supply chain. By doing that, the financial regulatory system can be improved and more potential can be tapped. At present, the blockchain technology is still under development. The improvement of its hardware storage capacity and the establishment of a global standard identification system will further promote SCF innovation.

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