

Research on the Risk Avoidance of Cold Chain Logistics Financial Credit Based on Block Chain Technology

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Abstract: Cold chain logistics finance, as a new financial means, has been integrated into the development of "agriculture, farmer and rural area" and has injected new impetus into it. From the current form of financial operation of cold chain logistics, the cold chain logistics finance, influenced by many factors, such as many subjects, asymmetric information, etc., is faced with the risks of market, guarantee and operation and all kinds of risks can ultimately be attributed to the credit risk of enterprises and participating entities. It was explored to the block chain technology to prevent financial risks from the perspective of information technology on the basis of various risks. It was first analyzed to the evolution of cold chain logistics financial credit, analyzed the characteristics of block chain technology, and then cold chain logistics financial credit system framework was proposed based on the block chain technology, finally a solution was given to the credit problem based on the framework in this paper.

Keywords: Block chain; Cold chain logistics finance; Credit system; Intelligent contracts.

1. Foreword

The development of agriculture, rural areas and farmers is closely related to the links of supply and marketing of agricultural products. The supply of agricultural products is inseparable from cold chain logistics, and the development of cold chain logistics is more dependent on financial support. At present, the main problems the development of cold chain logistics face in our country lie in the participants including the enterprises, the professional cooperative organizations, and the farmers are faced with the problems of financing and risk on the various nodes of the cold chain logistics, and the lack of credit of these participants of the financing leads to the difficulty of effective financing. To deal with these problems, financial credit system should be established for each participant on the node of cold chain logistics, to enhance the credit level of each participant in cold chain logistics, and effectively deal with the difficulties of cold chain logistics financing. The financial credit system is aimed at the credit of the various participants on the entire supply chain, credit rating and core enterprise credit is closely related. The credit rating of each participant is the support of the whole supply chain financial credit grade, while the cold chain logistics real trade is the core foundation of the supply chain credit system. A lot of research on the cold chain logistics finance problem have been done by domestic scholars including Yifu Lin^[1], a famous economist in China, who put forward the financing mode of "peasant household+ leading enterprise+ bank+ guarantee company", Jinzhao Shi and Ju'e Guo^[2], who put forward the supply chain finance model from the angle of Internet finance, Xinchao^[3] Liu, who formulated the connotation and basic operation theory of rural circulation service supply chain in our country and discussed the innovative approaches to the operation of rural circulation supply chain from the angle of contract coordination of service supply chain and the integrated operation of the fourth-party logistics, etc. Li Wen^[4], put forward the feasible countermeasures such as optimizing the operation mechanism of agricultural products cold chain logistics financial market, perfecting the mechanism of preventing and controlling the financial risk of agricultural products cold chain logistics and innovating financial products of the agricultural products cold chain logistics, etc. Xu Peng^[5], who put forward the risk structure of online cold chain logistics finance by composed of credit risk, supply chain operation stability risk, agricultural product risk, network information technology risk and legal risk, and then the evaluation system of financial risk index of cold chain logistics is constructed on the basis of this risk structure. Ju'e Guo^[6] et al, who

analyzed the online cold chain logistics financial model, and gave some suggestions on financial risk control from five aspects.

Although our scholars from the cold chain logistics financial model and process, online financing and other models of innovative design research, as well as risk control and other aspects of a large number of research. From these research results and the research process, we can find that the essence of cold chain logistics finance is that the cold chain logistics financial problem is the credit problem of cold chain logistics participants. Although some scholars have carried on the research to the cold chain logistics finance credit system, but these credit system implementation process is very difficult to control, mainly based on the related system. Therefore, in the implementation of the process often appear unsatisfactory problems. The current popularity of Internet technology applications, more information frontier technologies such as big data, the Internet, block chain technology and so on. These technologies would provide a good foundation for solving the credit problem of cold chain logistics finance if they are applied to cold chain logistics financial credit.

2. The evolution of the cold chain logistics financial credit and the block chain technology

2.1 The evolution of the cold chain logistics financial credit

Finance has experienced the process from barter to currency trading and then to platform payment, its evolution process is also the inevitable product of Pareto improvement, thus, the emergence of finance is a product based on trust. In order to give full play to the important role of finance and its derivatives to the development of human society and industry and balance all aspects of development, A credit institution in all aspects-- financial institutions represented by banks, have created.

As an intermediary, banks earn the interest difference between borrowers and lenders as a means of profit, because asymmetric information leads to the transmission of information by multiple media, the whole process of information transmission needs to go through many links, resulting in errors or even loss of information. In order to verify credit, banks need to keep a variety of relevant information in the central database, leading to a rising cost of and low efficiency of banks. From the investigation results , the agency can ' t completely solve the credit problem , and the intermediary also has many limitations to solve the credit problem through credit endorsement, because the scope of their radiation can only be in certain institutions , regions and countries .

With the development of information technology , big data can solve some credit problems , but big data can lead to another problem , such as data monopoly and information ownership . The core value of the block chain is the decentralization that is credit problem, the block chain may solve the problem of trust between participants in the whole cold chain logistics finance by constructing a set of algorithms , that is , the occurrence of the block chain technology , effectively solves the transaction cost problem of the multi - body information sharing and the multi - body complex transaction .

2.2 Block Chain Technical System

Block chain technology was originally proposed by Nakamoto. It is a information database technology system with decentralized, distributed sharing algorithm, digital encryption currency. So the block chain is not a single innovation technology, but a combination of many cross-domain technologies, including cryptography, mathematics, algorithms and economic models, as well as point-to-point network relations. It becomes a decentralized system that does not need to be based on each other's trust base and does not rely on a single central institution by using the mathematical foundation to build a trust effect. therefore , this system has five basic characteristics that : (1) the system is provided with a de - centralization function ; (2) the system has an open characteristic ; (3) the system is norms and protocol based on a consensus ; (4) the system data is not tamper - proof ; (5) the system data exchange process does not need to be regarded as trust ; and the function provided by the block chain technology can solve the problem of double payment and the trust problem faced by Byzantine general.[7]

The block chain system is composed of five parts, namely: (1) data layer. The data layer is composed of three parts ,including data blocks involved in data exchange by cold chain logistics, the encryption means required by the participants to exchange data and the system automatically adds timestamp the time for exchanging information; (2) network layer. The network layer is composed of three mechanisms, including the cold chain logistics system network mechanism, the system participating

in the data transmission mechanism between the subjects and the verification of the authenticity of the data;(3) Consensus layer . Consensus layer consists of various consensus algorithms of the main body in cold chain logistics ;(4) Contract layer. The contract layer is mainly consists of all kinds of scripts that are requisite in the cold chain logistics information system development, all kinds of intelligent algorithms that conform to the rules of the system, and the intelligent contracts that the system participants must abide by. Smart contracts mean that in real life or in practice, some assets are given some code and run in the block chain. Make it become the consensus algorithm in the network alliance and become the common resource of the whole network, trigger the content of the contract automatically according to the external information data. The corresponding assets in the network are allocated or transferred intelligently according to the content of the contract. (5) Application layer. Application layer is consists of cold chain logistics application scenario and case[8]. Block chain has a broad application prospect in the future. For example ,in the decentralized areas such as WeChat, rental, taxi; in the field of data encryption such as digital currency, transfer payment, electronic exchange; in the field of smart contracts, such as stocks, smart contracts and other non-monetary; even in the future of health, registration, confirmed rights, intelligent contracts and other aspects of wide application.

2.3 Integration of cold chain logistics financial credit and block chain technology

Take the block chain as a kind of idea should be more important than it is taken as a kind of technology , traditional finance as an intermediary , its credit often depends on the " centralization " market mechanism to run , rely on the relevant national laws and administrative regulations , its credit is not completely trustworthy in some way. The theory of block chain technology can completely replace the traditional " centralization " management mode , fully realize the platform management from the traditional " financial intermediary " management mode , abandon the human intervention factor in the traditional financial management , and the degree of trust is much higher than that of the traditional financial intermediary , and the transaction cost is far lower than that of the traditional financial intermediary , so that the organization form of the traditional financial medium can be changed , and the operation efficiency of the financial can be improved .

At present, cold-chain logistics finance is at the forefront of the life cycle (gestation period), and is related to the development of "agriculture, countryside and farmers". Therefore , building a reliable cold chain logistics financial system is one of the most important issues for enterprises and experts in the field of cold chain logistics finance . The current level of scientific and technological development, especially the application and development of block chain technology, provides a strong supporting condition and foundation for the cold-chain logistics finance to build a new credit system.

2.3.1 Both of cold chain logistics financial and block chain have the basis of integration from cold chain logistics financial credit demand and the characteristics of block chain. Cold chain logistics finance is done by people to participate in the end ,because Cold chain logistics finance mainly expressed in the form of the real economy, which is composed of the enterprise, society, financial institutions, government system, and so on ,so It is difficult to avoid the credit problem caused by human intervention , and the block chain is a kind of intelligent contract that can automatically execute the intelligent agreement of the system without human intervention , so as to avoid the credit problem caused by human intervention .

2.3.2 The two have the necessity of merging from the point of view of the cost and risk of cold-chain logistics financial operation. It is well known that the cold chain logistics has the characteristics of complexity , seasonal and high cost , and it is bound to increase the cost of cold chain logistics finance (such as financing , loan , etc .) , so as to increase the credit risk of cold chain logistics participants .

The block chain platform can automatically confirm the transaction process according to the intelligent contract of the system by using block chain technology in cold chain logistics. The transaction process is also the traceability and certification process of financial clearing and auditing in the future system. Compared with the traditional supply chain operation process, it not only saves people, money and material, but also optimizes the system process and improves the system operation

efficiency. In addition, the open characteristics of the block chain system enable the participants of the system to participate freely according to the prior system rules, broadcast the participating events as blocks and link them to the chain of the system, and the time stamp is capped to form a distributed ledger, which record the event true and complete, protected by encryption and timestamp, the data in the ledger cannot be tampered with, unless more than 51% of the nodes ledger data within the system to be modified (reality cannot do), otherwise the data is true and complete, the parties to the transaction cannot be denied.

2.3.3 The credit crisis, which caused by information asymmetry, can be reduced by the combination of cold chain logistics financial and block chain from the point of view of cold chain logistics financial sharing and the flexible structure of block chain. From the perspective of social development, shared finance is conducive to reduce the transaction costs of cold chain logistics, realize the reasonable flow of finance and its derivatives, and enhance the scientific and optimal allocation of cold chain logistics resources, and enhance the development ability of cold chain logistics.

The application of block chain in cold chain logistics is the process of transferring financial information from cold chain logistics to value. At the same time, the flexible structure of the block chain provides different application requirements for main participants in the cold chain logistics, and different types such as public block chain, the private block chain and the alliance block chain can be realized, main participants may select types according to different requirements.

3. Design of innovative model of cold chain logistics financial credit system

The supply chain of agricultural products is the integration of logistics, capital flow and information flow involved in each link of agricultural products from production to consumption by a core enterprise, links all parties, such as manufacturers, distributors, wholesalers and retailers, into a network of overall functions and is also the value-added chain of agricultural products in the supply chain. From the definition of cold chain logistics, the participants in cold chain logistics include suppliers, farmers, professional cooperatives, logistics providers, processing enterprises, wholesalers, retailers and consumers. From a deeper perspective, the various participants and core enterprises and financial institutions have inextricably linked, even among the participants have business or financial exchanges. Leading to a more complex system of cold chain logistics. As shown in Figure 1.

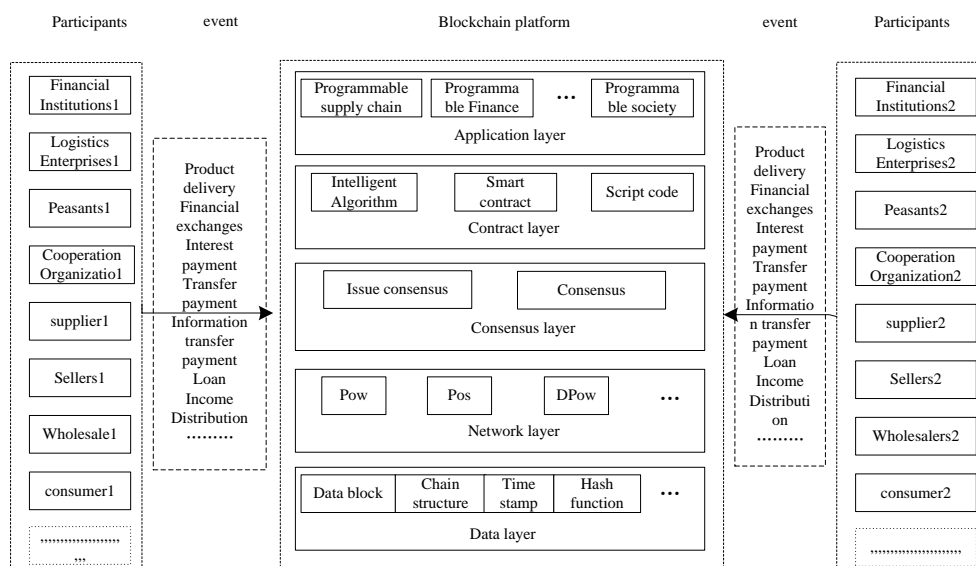


Figure 1 integration of cold chain logistics finance and block chain

3.1 Elements of the cold chain logistics financial credit System

3.1.1 Financial institutions. The constituent elements of the cold chain logistics financial credit system are mainly composed of the participants in Figure 1. Financial institutions refer to institutions (such as banks, civil credit and entrepreneurship markets, etc.) that provide primarily financial

services to participants in the supply chain (not including themselves) . Financial institutions play a leading role in the whole cold-chain logistics financial participants,. They can develop multi-channel financing model with other participants and develop a variety of financial services products (such as pledge loans) to obtain related benefits, but they also face a variety of risks, for example, the loan cannot be recovered in time, the price of pledge is low, so in order to reduce their own risk, financial institutions often take certain risk prevention measures to grasp the flow direction and the flow rate of the fund flow , the logistics and the information flow of the cold chain logistics in a timely manner ,in order to adjust the corresponding policies for bringing money back.

3.1.2 Core enterprise. As the core leader of cold chain logistics, the core enterprise is the highest position among the participants of cold chain logistics, it is the largest financial scale and in the whole cold chain logistics financial system, its power of production ,processing and radiation range is the strongest, providing financial guarantee, logistics control and other support for other participants in the whole cold chain logistics.

3.1.3 Logistics enterprises . As the master of the logistics information , the logistics enterprises should carry out service and establish bridges between the carrier and the demand customers according to the information they have mastered ; In addition, the logistics enterprises can provide information services such as the origin, flow direction, quantity and grade of the agricultural products in the cold chain logistics for realizing the traceability of agricultural products.

3.2 Application of cold chain logistics financial credit system based on block chain technology

Take supplier 1 borrow money from financial institution 2 in figure 1 as example, in order to minimize the risk of both sides in the event, the both sides must abide by intelligent contract in the block chain platform and event information must be completely open and transparent to both sides. If the financial institution 2 submits the loan ' s intelligent contract index include that (1) whether the main cold chain logistics macro - economic situation of the supplier 1 meets the loan demand,(2) the fungibility of the main product on the cold chain logistics ,(3) the stability of the cooperation relationship between the supplier 1 and the core enterprise of the cold chain logistics ,(4) the performance record of the supplier 1 in the historical loan event ,(5) receivable ratio in the history sales record of the supplier1; 6) The actual background of the loan event of the supplier 1 ; (7) whether the supplier 1 loan is listed according to the contract amount ,(8) the legality of the loan application of the supplier 1 ,(9) the average profit margin of the supplier 1 ; (10) whether the supplier 1 mortgaged materials can compensate the financial risk ; and (11) whether the fluctuation of the price of the mortgaged material is violent or not, etc., then the block chain platform, according to the minimum standard value of all the indicators of the intelligent contract issued by the financial institution, evaluates whether the supplier 1 meets the loan requirement by using the intelligent algorithm, and the block chain platform will feedback according to the result of the intelligent algorithm calculation. if that evaluation allow the supplier 1 to borrow , then the block chain platform automatically packages the event (the supplier 1 borrow from the financial institution 2) in block fashion and automatically broadcasts the encapsulated block over the entire network to all the participants on the cold chain stream , which is valid only on the basis of the participant ' s consent on the cold chain logistics , and automatically stamps the time stamp on the chain of the platform to form a permanent and transparent transaction record , the loan event is completed. It can be seen that block chain is a basic technology - it has the potential to create a new technical basis for the economic and trading systems of the cold chain logistics industry. It is certain that the block chain technology will profoundly change the commercial operation of the cold chain logistics financial industry , which is far greater than that of the cold chain logistics industry. The application of block chain is not only a challenge to the traditional business model, but also an important opportunity to create new business and simplify the internal process.

4. Countermeasures

At present , some developed countries or enterprises abroad are concentrating on the development and application of smart contracts . Although some enterprises in our country are committed to the research of block chain (such as the People ' s Bank of China , Wanxiang Block Chain , etc .) , but there are relatively few research in universities and scientific research departments in China ,it is

suggested that China ' s scientific research and universities pay attention to and attach importance to the development and research of block chain technology , master the latest development of block chain technology , construct the block chain framework of different industry applications with independent knowledge by using the results of foreign block chain technology research, and study the function of mutual recognition of intelligent contracts in different industries, finally promote the application of finance, logistics, transportation and other fields in China.

First of all, the application of block chain technology and its concept in cold-chain logistics finance should be studied. At present, the bank owners in the foreign financial field are taking up the research of the block chain in the financial and related fields. The people's Bank of China is also carrying out relevant research, so it is suggested that local governments, related industries and research institutes should pay close attention to the research and application of block chain technology in related fields, master the latest research progress and experience of block chain technology in time. In addition, local governments and related departments should be project approval in the block chain research field, and strive for national funding support.

Secondly, it is suggested to use prospective research results to develop the credit system of block chain in the financial sector of cold chain logistics and form the basis of credit system. Cold-chain logistics financial credit system construction should be carried out in accordance with the technical standard of block chain technology, draw lessons from the latest research achievements in the field of international and related, develop cold chain logistics financial credit system standard based on the block chain technology by uniting with related fields such as local government, finance, law, industry, technology and other senior researchers, standardize the responsibilities and obligations of the relevant parties in the cold chain logistics financial market and promote the application and development of the block chain technology in the cold chain logistics finance.

Third, strengthen cross field training of technical talents of block chain. It is suggested that domestic colleges and universities should set up the disciplines of block chain technology in the field of information technology specialty, and combine relevant professional (such as legal , financial and supply chain management) to carry out the joint training of relevant talents , and absorb top talent abroad through studying , talent introduction and so on , and solve the current situation of lack of relevant domestic talent .

5.conclusion

Above all, block chain technology applied in the field of cold chain logistics financial, the whole process does not need artificial participation by block chain platform automatically, that can improve the efficiency of the whole cold chain logistics trade and regulatory, reduce transaction cost of the cold chain logistics participants , reduce credit costs between people because the credit of the cold chain logistics participants is based on the platform decision.

With the popularization and application of technology chain block, block chain technology may be free credible deal in cold chain logistics warehousing, distribution, trading and other business transactions, at the same time, it Play an important role. an important role in improving the efficiency of the agricultural products market, reducing the transaction costs of each section of cold chain logistics, enhancing trust between participants in cold-chain logistics.

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7. References

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