



The Research on Innovative Application of Blockchain Technology in Sharing Economy

Bin Zhong^(✉)

Gannan University of Science and Technology, Ganzhou, Jiangxi, China
475591200@qq.com

Abstract. In the era of information technology, the sharing economy has become the norm, and the generation of artificial intelligence is inseparable from the synthesis of blockchain technology. Correctly understanding and mastering blockchain technology has a strong practical guiding significance for industrial upgrading and transformation. First of all, the paper briefly describes the domestic and foreign development status of the application of blockchain in the financial field, and analyzes the defects faced by the blockchain industry economy. Secondly, the innovative development and application of blockchain technology in the clearing of financial institutions, cross-border payment, capital financing and leasing, asset securitization and asset custody innovation and development application. Then, a blockchain-based securities trading model is proposed, and the advantages of the method are proved through experimental comparative analysis. Finally, the economic development of the blockchain industry is prospected.

Keywords: Blockchain · Sharing Economy · Innovative Development · Securities Trading

1 Introduction

With the rapid development of information technology, blockchain has been incorporated into the new infrastructure. In the future, the development and application scenarios of blockchain technology will be more impressive. At present, the blockchain has changed from virtual to reality, extending from a single cryptocurrency application to a multi industry scenario, such as manufacturing, agriculture, service industry, etc., and the cooperation trust among industries is increasingly enhanced. In order to promote the integration of blockchain and industrial economy, a large number of small and medium-sized entrepreneurs are required to participate in the implementation of the demand of blockchain technology combined with industrial application and the transformation of industrial production relations [2]. In response to the requirements of blockchain related policies, the implementation speed of blockchain industrial economy will continue to accelerate, and truly serve the development of digital transformation of industrial economy and industrial Internet.

Blockchain is an important underlying technical concept of Bitcoin, which is essentially a decentralized database that records all transactions that occur on it like a ledger,

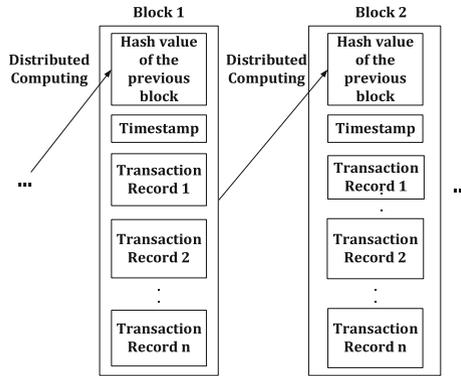


Fig. 1. Blockchain structure diagram

as shown in Fig. 1. A blockchain is a series of associated data blocks generated using cryptographic algorithms, each block containing information used to authenticate the validity of the information and information used to generate online transaction credentials in the next block. Users can query the blockchain in each offline terminal, and the blockchain is publicly owned and transparent on the network. The realization of terminal functions requires blockchain verification, and each verification test is called a one-time confirmation. Each transaction requires multiple confirmations to complete. Therefore, due to its security and convenience, blockchain technology is concerned and used by most Internet financial enterprises. It can be widely used in securities trading, Internet of Things, social communication, proof of existence and identity verification, etc.

2 The Defects Faced by the Application of Blockchain in the Economic Field

2.1 The Development of Blockchain Industry is in Infancy

In China, the rise of blockchain technology is relatively late. First of all, the combination of blockchain technology and real economy is not deep, and most of the technologies applied to various industries are superficial and small in scope. Secondly, blockchain technology is distributed in the application of maintaining data security and preventing data theft. The underlying infrastructure and other industrial tools have not been fully excavated, and the innovative application of big data, artificial intelligence and other technologies is insufficient [3]. There are delays in the handover and processing of industry information. Finally, based on the limited space for further expansion and benefit of blockchain system, the potential of market development can be further stimulated.

2.2 Blockchain Industry Technology Needs to Be Improved

Security is the most important element that hinders the development and extension of blockchain. On the one hand, the innovation and R&D capabilities of domestic enterprises are weakening. Most of the hardware equipment and core application technologies

are borrowed from or purchased from other countries. There are still large uncertainties about the purchase price and practical reliability of the equipment. On the other hand, blockchain technology itself needs to be further improved. For example, Kang (2020) [4] proposed in the aspect of algorithm operation, the algorithm using blockchain technology is relatively safe. However, if there is a hacker intrusion system, its weak protection system will appear to be weak single. Liu (2017) [5] proposed in terms of management and operation, consumers can jointly bind their ID card and password management technology and hand them over to the blockchain industry operation company for safe-keeping. But if consumers encounter illegal businesses, the privacy of consumers is easy to be disclosed. Therefore, the conditions for blockchain technology to be applied in the fields of service, employment, medical care, education, catering and other people's livelihood involving personal information are not yet mature.

2.3 Blockchain Technology and Management System Integration is Insufficient

Blockchain technology, such as distributed and multi node, has been used in daily life, such as transportation, shopping, consumption, transaction payment and so on. Many management methods have been derived from it. However, there may be many problems in the management system. One is the uncertainty of the application of the provisions. Although the relevant laws and regulations for the use of blockchain are being formulated, due to some possible factors, there are bound to be some barriers. The second is the blind area and absence of supervision. There are still deficiencies in how to strictly control and crack down on the application of blockchain technology to illegal fund-raising, fraud and other violations. Some industries have limited understanding of blockchain and are in the regulatory blind area.

2.4 There Are Deficiencies in the Supply of Resources

At present, the industrial economic system of blockchain in China is not perfect enough to meet the supply and demand of resources in a real sense. In terms of quantity, although the number of talents with blockchain related skills has increased by nearly 20 times, the demand for talents is still in short supply. From the domestic situation, the recruitment of talents with blockchain related skills still can not meet the actual demand. From the perspective of structure, the talent structure of blockchain is unbalanced. Although China is rich in human resources, there is a large gap in cross field talents. Secondly, there is a lack of high-end talents, especially those for basic theory innovation and top-level architecture design, which hinders the innovation of blockchain technology application.

3 Application of Blockchain Industrial Technology in Economic Innovative Development Scenarios

3.1 Liquidation and Application of Blockchain Industrial Technology to Financial Institutions

Import and export trade transactions need to rely on the bank's letter of credit settlement system, which requires both import and export sides to pass the documents between

their banks and customers. Rijanto (2021) [7] proposed through the blockchain industry technology, the documents can be encrypted and easily transmitted, which can solve the problem of efficiency and save the cost. Blockchain technology has been widely used in the service of financial institutions. From the initial application of letter of credit and bill business to the field of cross-border financial services, it can be seen that the development of blockchain technology tends to be better development.

3.2 Blockchain Industry Technology for Cross Border Institutions Payment Services

When cross-border payment settlement, the intermediate link of remittance not only requires time cost, but also needs to pay service charge, so its cost and efficiency become two major difficulties in cross-border payment. Bayram (2020) [1] proposed through the upgrading of blockchain industry technology, skipping the transit stations (transit multinational banks), reducing the intermediary fees, which can improve the feasibility and security of cross-border transactions, accelerate the liquidation speed to a certain extent, and improve the liquidity of funds.

3.3 Financing and Leasing Services of Capital Provided by Blockchain Industry Technology

Blockchain industry technology can provide a good trading environment for financing business, provide data authenticity and integrity, do not need for centralized system certification; reflect the continuity of financing in operation, Effective use of funds, long turnover period, ensure the feasibility and authenticity of financing; the regulatory agency in risk control, monitor data processing, no interference factors, improve regulatory efficiency and reduce the cost.

Based on the era of sharing information of the Internet of Things, it has advantages with blockchain technology in some fields. Looking for enterprises that often use the Internet of Things office, apply blockchain technology to the operation of enterprises, provide power for the development of the physical network industry, and open up a new development path. Taking leasing as an example, Zhu (2020) et al. [8] proposed a leasing time-sharing model is established, and different types of terminal equipment are bound to connect the blockchain technology and the Internet of Things terminal port, and the Internet of Things port serves as the node of the blockchain, for control. While enterprises use leasing services, blockchain technology will provide more high-quality leasing services as shown in the Fig. 2.

The blockchain technology serves the leasing activities, the whole process does not need the background time tracking, the whole data source is reliable, high security, it is easy to supervise the whole process, and the system optimizes the whole leasing structure.

3.4 Transaction Application of Blockchain Industry Technology to Asset Securitization

Relying on the characteristics of blockchain openness and sharing, blockchain technology can improve the registration, issuance and settlement efficiency of securities

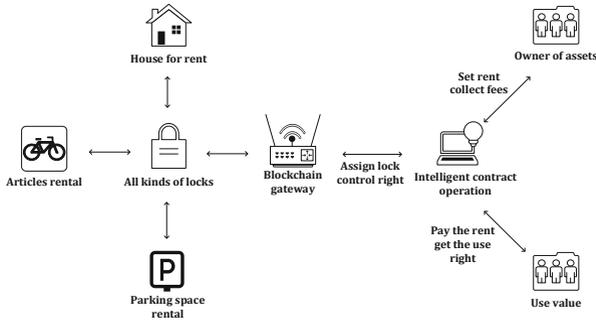


Fig. 2. Financial lease structure diagram

products in the securities trading system, and effectively ensure the information security of individuals and securities companies. Pan (2020) et al. [6] proposed the application of blockchain technology can improve the efficiency, security and traceability of the asset securitization. At the same time, the combination of blockchain technology with Internet, artificial intelligence and other technologies can realize the life cycle management of asset securitization.

3.5 The Trusteeship and Application of Blockchain Industry Technology to Assets

Because of the large amount of transactions designed for each transaction, and the two sides of the custody business almost take the traditional transaction methods such as telephone and mail, etc., which increase the time cost, economic cost and handling fee cost and so on. Zhu (2020) et al. [9] proposed the blockchain industry technology is applied to the asset management business to achieve economic sharing, and blockchain technology is tamper-proof to ensure the security of transaction information.

4 A Securities Trading Model Based on Blockchain Technology

With the development of Internet technology, the securities trading model has undergone tremendous changes. The traditional securities trading model has problems such as complex trading procedures and excessive intermediary links, resulting in excessively long trading times. As an emerging technology of Internet technology, blockchain, with its features of decentralization, security and transparency, can be used in securities trading applications, which can effectively improve transaction execution efficiency, significantly reduce transaction time and ensure its security. Based on the above, this paper proposes a securities transaction model based on blockchain technology, which can effectively ensure the security of the entire network transaction, reduce the burden of transaction costs, and improve transaction efficiency.

4.1 Securities Trading System

Securities trading refers to the transfer of securities to securities holders according to the trading rules. It is usually divided into two forms: on-exchange and over-the-counter. In terms of on-exchange trading, as a centralized trading market organized by the stock exchange, it has a fixed trading venue. The stock exchange accepts and handles the listing and trading of securities that comply with securities regulations, and investors need to invest in securities on the stock exchange through securities dealer seats. On-exchange transactions involve complex time-sequential logical relationships and anonymous counterparties. In the clearing part, it involves the central and counterparty net guarantee settlement system, and also faces complex real-time market disclosures to ensure liquidity. At the same time, real-time requirements are high, and the tolerance for systemic risks is extremely low. In terms of over-the-counter transactions, there is no need for a specific centralized trading venue. As an open transaction, the securities involved are more diverse, and securities transactions are mostly conducted in the form of over-the-counter transactions. At present, there are still many controversies in over-the-counter transactions, mainly due to low liquidity, low security, high risk and insufficient legal regulations for the time being.

4.2 New Online Securities Trading Model

With the rapid development of my country's securities market, new changes have taken place in the business model of securities trading. In order to promote the transformation of the securities trading business management model and reduce financial risks, it is an effective method to establish a new securities trading network securities trading model. Online securities transactions are generally conducted through Internet Service Providers, and are usually divided into two modes. One is to directly connect the securities business with the Internet, customers can receive various real-time quotation information from the network, directly place orders, inquiries and account access through the website, and all other services that securities traders can provide to meet customer needs. There is also an online trading model, that is, securities traders provide relevant Internet services through network service providers, online customer needs will be transmitted to the brokerage business department through the ISP website for entrusted transactions, and customers can also obtain real-time market prices and trading results from the ISP website.

This paper reorganizes these two models and proposes a new network securities trading model, as shown in Fig. 3. In this mode, users have the right to control, can fully enjoy network service resources through professional technical support, and can conduct securities transactions through the online trading system. The network information management center and communication system are the core of the securities trading system. The network information management center is composed of a large database and each transaction network through a high-speed data link network. It centrally manages customer transaction data, and securities companies can monitor the transaction status in time. This trading model can save a lot of money, reduce risk, and minimize the chance of potential mistakes.

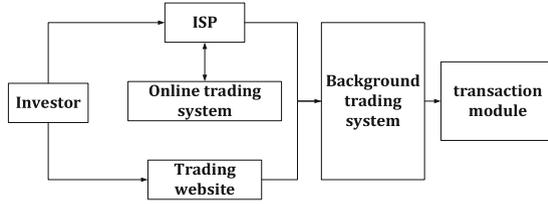


Fig. 3. New online securities trading model.

4.3 Credit Scoring Mechanism

In the process of online securities trading, due to the lengthened credit chain and complex structure, credit risk and moral hazard will occur. Most of these risks are caused by the low cost of default and the imperfect credit supervision system. Therefore, this paper establishes a credit scoring mechanism to ensure the uniqueness and authenticity of transactions in the entire network, and to reduce the credit risk in the process of securities trading. The introduction of credit scoring mechanism is a commonly used credit solution in Internet financial services. This paper will evaluate the credit status of traders from the aspects of credit history, transaction relationship, asset stock, and transaction flow.

The credit scoring mechanism relies on a large distributed database, and its central idea is to compare customer credit history information with customer credit habits in the database to determine whether the behavioral development trend is toward bad behavior. The main references include reimbursement history and the number of credit accounts. Since the scoring value needs to consider traversing the entire blockchain, in order to avoid too long calculation time and too much resource consumption, this paper designs a formula for scoring calculation. At the same time, only the blockchain from the beginning of the transaction to the end of the transaction is calculated to avoid excessive time consumption, and the transaction information is obtained through this process, and the new credit score and all other statistical values are obtained after the calculation. The calculation formula is as follows:

$$V = H(s, f) + R + HCS \tag{1}$$

where V refers to the credit score of the trader, and $H(s, f)$ refers to the blockchain hash value from the s th transaction to the f th transaction. R is the trader’s current personal credit account number, and HCS is the trader’s historical credit score. This paper sorts all entries in descending order based on credit score, rate of return, and trading volume, and uses credit scores to implement some ranking and penalty mechanisms to help brokers choose the right securities traders to trade (Fig. 4).

4.4 Analysis of Experimental Results

The integration of blockchain technology into securities transactions does not require the intervention of third-party institutions, allowing securities companies and traders to complete transactions by themselves and realize automated transactions, which can save labor costs and reduce transaction costs. The experimental part of this paper will compare

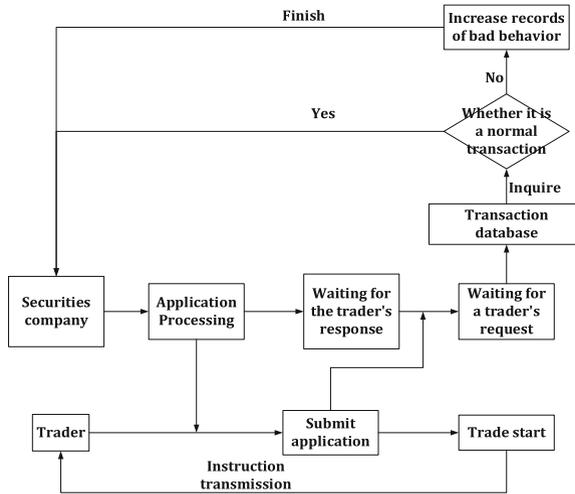


Fig. 4. Blockchain Securities Trading Process.

the traditional securities trading model with the securities trading model proposed in this paper, and conduct experimental analysis from the perspective of safety and operation efficiency.

1. Security

This paper compares the security of the traditional securities trading model and the number of bad behaviors in the securities trading model proposed in this paper. The experimental results are shown in Fig. 5. As can be seen from Fig. 5, with the increase of the number of transactions in the traditional securities trading model, the number of bad behaviors is significantly higher than that of the securities trading model proposed in this paper, and the number of times increases faster. Although the number of bad behaviors in the securities trading model proposed in this paper is also increasing, the growth rate is relatively slow. This is because the model adds a credit scoring mechanism, which can effectively suppress the appearance of traders' bad behavior, while the traditional securities trading model does not have such a mechanism, so the way to detect bad behavior is not fast and comprehensive enough. This experiment shows that the model proposed in this paper can ensure the security of its securities trading process (Fig. 5).

2. Operational Efficiency

This paper compares the transaction processing time of the traditional securities model and the securities model proposed in this paper during the transaction process. The experimental results are shown in Fig. 6. It can be seen from Fig. 6 that both the two securities transaction models increase the transaction processing time as the number of transactions increases. However, the traditional securities trading model requires more time to process transactions, because the services of brokers and traders in the traditional securities trading model will go through middlemen, resulting in increased costs and time-consuming. The new securities transaction mode proposed in this paper conducts

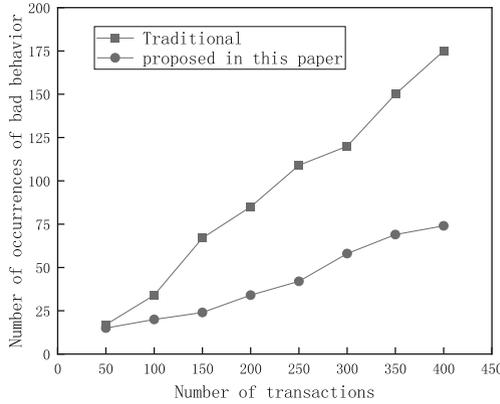


Fig. 5. Comparison of the number of occurrences of bad behavior.

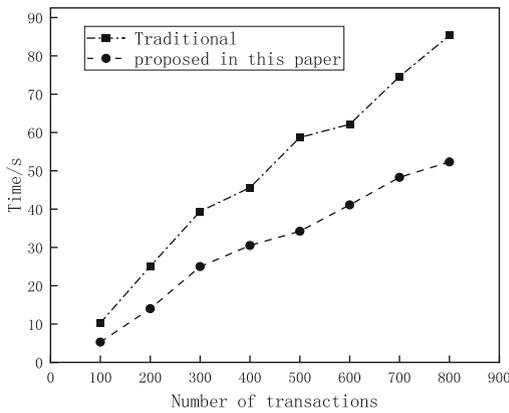


Fig. 6. Comparison of the number of occurrences of bad behavior.

transaction processing through online self-service, securities companies can monitor the transaction status in real time, and users can also see the transaction process in real time, which can save a lot of money and time.

5 The Future Development Trend of the Blockchain Industrial Economy

5.1 Blockchain Integrates with New Technologies for Artificial Intelligence

Artificial intelligence, Internet and other electronic communication technologies are productivity, which can improve production efficiency. Blockchain is a production relationship, which is about how to allocate, and it can be used to maximize efficiency. The information blockchain which emerged as the times require can provide a good data for AI. The data can be written in consensus mechanism, traceable and tampered. At the

same time, the distributed accounting method of blockchain ensures the backup of data. On the premise of low cost, there is no need to worry about the security of data.

5.2 Blockchain Drives the Rapid Development of the Real Economy

First, promote the upgrading and transformation of service industry. For example, in the medical industry, some existing network information cannot be highly integrated. If cross hospital treatment, it is necessary to conduct repeated inspection to increase medical costs and patient burden. Relying on blockchain technology, the cases of the same patient in different hospitals will be integrated to form electronic cases embedded in the nodes of the blockchain, thus reducing the safety risk and treatment cost. Second, the tourism industry is booming. The use of blockchain technology in the tourism industry can bring about at least three major changes that reduce travel costs and risks, prevent the starting price of sitting and reduce traffic congestion. The third development prospects of the electronic communication industry are considerable. Blockchain based research and development has the characteristics of security, distributed information transmission and so on which provides a solution to the speed and security problems facing the communications industry. In secure communications, people are worried that their private data will be discovered by media platform, and the blockchain technology can provide solutions. The integration of blockchain technology can encrypt the user's data and protect user's privacy.

5.3 Blockchain Users in a New Era of the Sharing Economy

Compared with the application of big data technology to the sharing economy, blockchain technology has the advantage of being able to create higher credit value, reduce transaction costs, promote the development of shared economy, can play the advantages of blockchain decentralization, break the regional restrictions on users, eliminate the monopoly of oligarchy on the industry economy, realize the sharing of resources in various industries, and balance supply and demand. Establishing a network trading system can accelerate the normal economic sharing on a larger global level.

5.4 Blockchain Drives Financial “De-Virtualization” to Serve the Economy

For the banking industry, blockchain technology is mainly used for payment clearing between currencies, credit insurance, cross-border trade, etc. The both sides of transaction can directly share data and the procedures for processing accounts are clear and simple, so that the remittance agencies can query transaction flow and other information. The attention and investment of major banks and some urban commercial banks on blockchain technology has shown an explosive growth trend. In cross-border trade, blockchain technology can improve the level of risk management. When analyzing data, more perfect system equipment can solve the problem of high cost of information inspection.

For the insurance industry, with the wide use and maturity of blockchain technology, it can solve the problems of security, performance and storage, which is conducive to the comprehensive development of the insurance industry. It can prevent the data from being tampered, not saved, and low authenticity.

5.5 Blockchain Technology System Will Be Further Improved

Even though blockchain technology is widely accepted, it has its own disadvantages, such as non-tampering, the transaction ledger must be made public, the transaction process is delayed, etc. If the password is lost, it is irreparable; if the transfer address is wrongly filled, it cannot be revoked; the transaction data is open and transparent, and there is no privacy to speak of; the transactions generated with bitcoin are easily affected by the network; the blockchain economy will produce branch nodes, and delay the cycle. These problems are unavoidable. In order to develop blockchain technology in the future, we can establish a controllable blockchain system, establish the ecological advantages of blockchain, strengthen supervision, prevent financial risks, promote the integration of blockchain theory and core technology, and be able to effectively independently research and develop to build industrial economic integration.

6 Conclusion

Blockchain has opened a new chapter of digital economy, the real industry and the information industry have been combined, blockchain has become a key technology for the development of digital economy, and the artificial intelligence industry has realized the deep integration of traditional industries and the Internet of Things, making the economy from the virtual to the real, and realizing transformation and upgrading. The embedding of blockchain technology improves the cross-bank efficiency. The integration of blockchain technology and industrial economy will enhance the effectiveness of the sharing economy, continuously accelerate the innovative development of blockchain technology and industry, and promote the development of China's economy towards high-quality development.

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