

Financial Data Sharing Mechanism Based on Blockchain Technology

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Abstract—Continuous breakthroughs in IT (Internet information technology) have added new momentum to the development of the financial industry. As one of the information technologies with great development potential in recent years, BT (blockchain technology) has the characteristics of immutability, traceability, decentralization, and complete distribution, which are different from other IT. The important reason for the rapid development of the application of BT is that it can establish trust transfer between peers without relying on third-party trusted institutions, which helps the various problems faced in the process of data exchange. BT has subverted the traditional model of finance, medical and other industries to a certain extent. At present, in the financial industry, there are often problems such as untimely updating of information and mutual trust between inter-departmental departments. BT can easily complete the construction and maintenance of financial information databases. Therefore, this article is mainly based on the research of FD(financial data) sharing mechanism based on BT. First, the data reliable connection mechanism of the BIZi network is analyzed. The results show that the three technologies that make up the BIZi network have their own characteristics. Blockchain has the strongest fault tolerance, with a fault tolerance rate of 87%. IPFS and Zigzag have advantages in storage capacity and scalability respectively. Secondly, the effect of the establishment of the FD sharing mechanism of BT is analyzed. The survey data shows that nearly half of the people believe that the establishment of the financial industry data sharing mechanism is conducive to reducing cooperation costs, 26% of people pointed out that the establishment of a sharing mechanism helps to strengthen communication between departments, and 21 people also pointed out that the data sharing mechanism can improve the efficiency of financial capital operations.

Keywords-blockchain technology; financial data; sharing mechanism; blockchain architecture

1 INTRODUCTION

BT has been widely used in many emerging fields of society with its unique technical advantages and innovative ideas. Blockchain can solve the problem of trust mechanism. BT has broken the centralization characteristics of the traditional Internet, and has resolved the crisis of trust that plagued the modern economy to a certain extent. At the same time, blockchain can solve the problem of data authenticity. The phenomenon that a large amount of data is only in the hands of departmental organizations and individuals exists in the financial industry, and the degree of information sharing in the entire industry is much lower than that of other industries. In the era of big data, information is money, but the phenomenon of "data silos" seriously

hinders the conversion of data into actual value. Therefore, the FD sharing mechanism of BT is a topic worthy of our in-depth study.

There are not a few researches on the application of BT in FD sharing mechanisms. Starting from the basic structure of the blockchain, Liu L established the basic structure model and specific optimization path of the financial sharing model, and finally designed the internal and external "dual chain" structure of the financial sharing model[1]. Wu S pointed out that BT has triggered disruptive technological changes in finance, medical and other industries, and this technology has a particularly large impact on the initial development and application of data sharing[2]. Li J tries to solve the problems in the technology financial service scenario. Since it is difficult to share cross-departmental information in a timely manner, financial institutions often have difficulties in providing multi-party data sources to other companies in their investment business[3].

This article mainly studies the financial data sharing mechanism of BT. The experiment is mainly divided into two parts. In view of the fact that the data connection mechanism is one of the important components of the data sharing mechanism, the first half of the experiment mainly involves the study of the data connection mechanism of the BIZI network. In the second half of the experiment, the effect of the establishment of the FD sharing mechanism of BT was analyzed.

2 THEORETICAL BASIS OF FINANCIAL DATA SHARING MECHANISM BASED ON BLOCKCHAIN TECHNOLOGY

2.1 Blockchain technology

Different perspectives have different definitions of BT[4]. From a technical point of view, blockchain can be seen as a distributed public database composed of multiple key elements. It can meet the needs of tamper resistance and scalability. From the perspective of stakeholders, blockchains include private blockchains, public blockchains and shared blockchains. The application prospect of BT is extremely broad, and it is widely used in different fields such as finance, the Internet, and medical treatment. Blockchain can be divided into two data structures: block and chain. Blockchain can solve the problem of trust mechanism, so that the trust crisis that plagues the modern economy can be solved to a certain extent. Blockchain can guarantee the security and credibility of data. Through the combination of BT and other technologies, many problems that were previously considered difficult to be resolved can be solved. BT is a major innovation in human history. Under the premise of decentralized organization, BT still achieves the unity of action. In BT, all Bitcoin nodes are at the same level, and there is no phenomenon that high-power nodes are responsible for organization and command. All nodes coordinate and work together to produce a highly consistent blockchain [5-6].

2.2 Blockchain

Blockchain is an important part of the construction of virtual economy market. Blockchain is essentially a database technology, and the database is the data information stored in the computer system[7]. Blockchain has brought tremendous changes to the advent of the digital economy era. A key difference between traditional databases and blockchains is the way the data is structured. The blockchain collects information in the form of blocks. The data

information of these blocks includes amount, transaction information. The block has storage capacity, and when saved, it will be connected to the previous block to form a data chain called "blockchain". When the newly added block information is saved, a new block will be formed and added to the existing chain, and so on. When the blockchain is implemented in a decentralized manner, no one has the main control of the system, and the blockchain system forms an irreversible data schedule. Blockchain is mainly used to solve production problems. Decentralization is one of the core technologies of blockchain. Blockchain stores all data in each node. The main principle of blockchain application is to keep the data of each node consistent[8]. As an open database, the blockchain allows any server to join and become one of the nodes. Each node stores all the data of the blockchain.

2.3 Data sharing

We have reached an era where data can create value [9]. But not all data has value, it is often processed data that is really valuable. Data fusion helps data realize its core value. In the transformation process of the financial industry, the circulation and sharing of data is of great significance[10]. The sharing of data between the entire financial industry may lead to huge changes in global finance. DS(Data sharing) is bound to affect banks, fintech companies and individuals. For banks, the non-sharing of data is only a temporary protection for their own business, although unnecessary customer loss can be avoided in a short period of time. However, the closure of data may result in the loss of the opportunity to use shared data, and it is difficult for banks to provide customers with more complete products and services if they lack data. For fintech companies, if they cannot achieve information sharing like banks, fintech companies will always be at a disadvantage, and their future development will definitely be restricted. For individuals, this loss is multifaceted [11-12]. On the one hand, users cannot choose financial products that are more suitable for them after comparing services and charges. On the other hand, due to the lack of comprehensive financial data, they do not know how to reasonably allocate and plan effective assets. DS across departments plays a positive role in optimizing the convenience of enterprises and citizens in doing things. DS often highlights the effect that 1+1 is far greater than 2. Take the health code as an example. During the epidemic, the health code can identify the health of everyone. This is the result of open DS, Through the data cooperation of highway, railway, aviation, telecommunications and other departments, through positioning and other technologies, tracking the user's trajectory, it is easy to get the user's activity. We also need to understand the difference between data development and sharing [13-14]. Data development and sharing are two completely different concepts. The openness of data is open from the source of the data. Others can obtain the most primitive data and process the original data, which is open without any concealment. The DS is to open the data after processing, and selectively share the data needed by the other party to the other party.

Financial data sharing will involve the interests of all parties. Therefore, financial DS is not as simple as ours. There will be many challenges and difficulties in the sharing process. From the perspective of banks, customer resources are the most valuable asset[15]. Financial DS is likely to lead to the loss of its own customers and the reduction of profits, and even further seriously threaten the survival of the bank. From a personal point of view, financial DS may leak the privacy of customers. Once the data is shared, these customers may worry about their information being leaked by the bank. In order to eliminate all parties' doubts about DS, it is

particularly important to develop a financial DS mechanism based on BT. The following formulas are mainly used in the formulation of the DS mechanism:

$$f(x) = \sum_{i=1}^{n-1} \left[100(x_{i+1} - x_i^2)^2 + (x_i - 1)^2 \right] \quad (1)$$

$$f(x) = \text{sgn} \left(\sum_{i=1}^h a_i y_i(x_i, x_j) + b \right) \quad (2)$$

3 EXPERIMENT OF FINANCIAL DATA SHARING MECHANISM BASED ON BLOCKCHAIN TECHNOLOGY

3.1 Experimental background

BT is becoming more and more popular, this technology greatly improves the security and reliability of data. The low degree of DS will seriously hinder the conversion of data into actual value. And because the BT has the characteristics of non-tampering, asymmetric encryption, etc., the BT can break the centralization characteristics of the traditional Internet and resolve the crisis of trust to a certain extent. Therefore, this article mainly studies the financial DS mechanism of BT.

3.2 Experimental process steps

The key to the big DS mechanism includes research data connection, data access control, and data service customization. This experiment is first based on the research of the reliable data connection mechanism of the BIZi network. Blockchain, Interplanetary File System (IPFS) and Zigzag code together form a BIZi network to realize reliable data connection. By studying the fault tolerance, storage space saving ability, and scalability of these three technologies respectively, this experiment comprehensively reflects the reliability of the data connection mechanism of the BIZi network. Secondly, 100 questionnaires were issued to investigate the help of the establishment of the financial DS mechanism of BT.

4 EXPERIMENTAL ANALYSIS OF FINANCIAL DATA SHARING MECHANISM BASED ON BLOCKCHAIN TECHNOLOGY

Key mechanisms for DS include data connection mechanism, data access mechanism, and data service formulation mechanism. In order to facilitate experimental research, the main mechanism involved in this experiment is the data connection mechanism of the BIZi network.

4.1 Analysis of reliable data connection mechanism based on BIZi network

The BIZi network is composed of the blockchain, the Interplanetary File System (IPFS) and Zigzag code proposed in this article, in order to explore the reliability of the data connection

mechanism of the BISi network, experiments were carried out on the fault tolerance rate, storage space saving ability, and scalability of these three technologies, the results obtained are shown in the following table:

TABLE 1. FINANCIAL DS MECHANISM OF BT

	<i>Blockchain</i>	<i>IPFS</i>	<i>Zigzag</i>
Fault tolerance	87%	52%	36%
Save storage space	34%	44%	89%
Scalability	56%	79%	45%

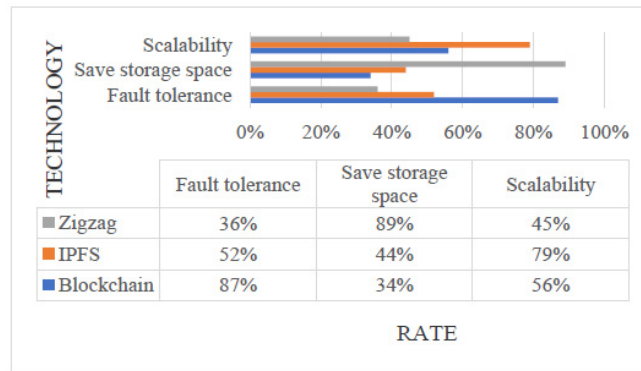


Figure 1. Financial DS mechanism of BT

It can be seen from Table 1 and Figure 1 that the three technologies that make up the BISi network have their own characteristics. Blockchain's fault tolerance is the strongest among the three technologies, with a fault tolerance rate as high as 87%, but the information storage capacity of this technology is worse than the other two technologies. IPFS is characterized by relatively strong scalability, but the fault tolerance rate of this technology is not high, only 52%, which is much lower than the fault tolerance rate of Blockchain. Zigzag's ability to save storage space is the strongest among the three technologies. Under the same fault tolerance rate, Zigzag can effectively save storage space. On the whole, the data connection mechanism of the BIZi network is relatively reliable. The fault tolerance, storage and expansion capabilities of this mechanism are all pretty good.

4.2 Effect analysis of the establishment of the financial data sharing mechanism of blockchain technology

The first half of the experiment analyzes the financial DS mechanism of BT, and the second half mainly studies the effect of the establishment of this mechanism? The results of the questionnaire survey are organized as follows:

TABLE 2. THE EFFECT OF THE ESTABLISHMENT OF THE DATA SHARING MECHANISM

	<i>Number</i>	<i>Proportion</i>
lower the cost	45	45%
Improve efficiency	21	21%
Strengthen communication	26	26%
other	8	8%

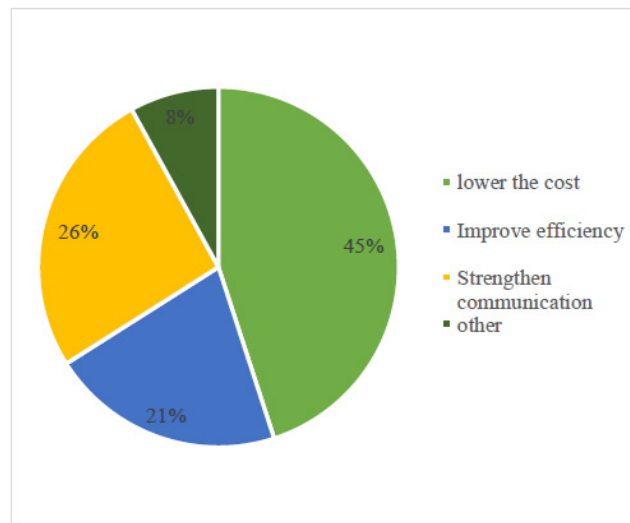


Figure 2. The effect of the establishment of the data sharing mechanism

It can be seen from Table 2 and Figure 2 that 45% of people believe that the establishment of a DS mechanism in the financial industry can reduce the cost of cooperation between commercial banks, insurance companies and other financial companies, and is conducive to achieving economies of scale. 26% pointed out that the financial DS mechanism of BT can strengthen communication within and outside the department, which is conducive to the smooth development of work. 21 people think that the establishment of this mechanism can improve the efficiency of financial capital operation and save enterprises unnecessary links. The remaining 8% also feel that the financial DS mechanism of BT can break the barriers within the organization and strengthen the risk early warning mechanism.

5 CONCLUSION

The non-tamperable characteristics of the blockchain help to solve the various problems faced in the data exchange process. The use of BT can reduce the cost of cooperation between commercial banks and other financial institutions, while also helping to break the barriers within the organization. The widespread use of blockchain helps to establish a DS mechanism in the financial industry and solve the problem of information sharing between industries. Therefore, this article is mainly based on the research of the financial DS mechanism of blockchain technology, which will help promote the vigorous development of the financial industry.

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