Analysis and Research of Blockchain Technology in Audit System

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Abstract. Blockchain technology has attracted widespread attention from all walks of life due to its decentralization, openness and transparency, and data that cannot be tampered with. At the same time, it has a good development prospect in the accounting and auditing industries. This article is based on the consensus algorithm research experiment. In the network environment, computers will be attacked in many situations, which may cause unexpected behaviors of the computer and the network. The consensus algorithm can deal with these unpredictable behaviors. The experiment uses a questionnaire survey method, and the survey objects rank the importance of accounting informatization, the necessity and feasibility of applying blockchain technology and other related issues, and different scores form different results. The experimental data shows that it is necessary to analyze and build a credibility guarantee mechanism for audit information systems based on blockchain technology. Each aspect includes its own specific content and details, and an average score is obtained for each category of options. Let's compare the importance levels of the four factors. The experimental results show that, overall, the average scores of the four factors are between 3.9-4.4 points, with little difference in importance levels. Audit information quality issues scored the highest at 4.37 points, followed by management control issues and security issues at 4.24 and 4.21 points respectively. Although blockchain technology in the audit system is still in the research and development stage, the application of blockchain in the audit industry is a major trend. Researchers are working hard to solve the problems of blockchain storage and confidentiality.

Keywords: Blockchain Technology, Audit System, Storage and Confidentiality

1. Introduction
In recent years, Bitcoin has become an important issue of people's attention today. As a basic technology, blockchain technology has also attracted people's attention [1-2]. Due to the obvious characteristics of "information decentralization, transparency, and tamper-proof modification", blockchain technology is being used in more and more fields, which not only improves work efficiency, but also reduces transaction costs. At the same time, blockchain technology the application of technology in the audit industry also brings opportunities and challenges to the traditional audit business [3-4].
Mir R and others pointed out that as a new way of applying cryptography, blockchain technology can be used to record financial information. Such changes will have a breakthrough impact on corporate governance [5]. Then, a comprehensive assessment of these impacts was made, pointing out that these changes not only have a significant impact on the company's management, but also have hidden dangers for the departments involved in corporate governance. Pet al. studied the characteristics of blockchain technology, and focused on blockchain technology can reduce verification and network costs, which the biggest advantage is brought by blockchain technology [6]. It is pointed out that companies and organizations need to perform different types of transactions and check and confirm vouchers, but these related audit processes are expensive and labor intensive. The blockchain records all these attributes. When verification is required, verification can be performed without any cost. The blockchain greatly reduces verification costs and network costs.

Financial audit is an effective way to prevent financial risks and strengthen financial supervision. Financial auditing can help improve the efficiency of financial supervision, enhance the ability of financial supervision, timely discover problems in the financial system and find out the reasons, especially when the national audit level is reached, and it is conducive to the control and prevention of financial risks [7-8]. With features such as distributed decentralization, trustless mechanisms, and encryption security, blockchain technology plays a key role in auditing and has a devastating impact on auditing, accounting, and other industries. Through blockchain technology, an open and transparent financial big data disclosure "big account book" has been established, the social credit system has been improved, and audit information acquisition channels have been expanded and improved, and audit evidence will not be easily tampered with. Promoting the internal control of financial institutions, reducing the risk of fraud, realizing real-time audits, discovering problems in time, issuing early warnings and finding entry points for risk management, will help establish a long-term financial risk prevention mechanism [9-10].

2. Analysis and Research of Blockchain Technology in Audit System

2.1 Analysis of Applicable Characteristics of Blockchain Technology

(1) Distributed decentralization guarantees the realization of national accounting and public account books

At present, the trust-based centralized ledger system adopted by financial institutions has problems such as opacity and easy operation, and the existence of third-party brokers will bring great problems to transactions. The blockchain is basically a decentralized ledger system. Each block is a data unit in the entire blockchain, that is, a record in the database; related personnel participate in bookkeeping, joint maintenance, and information writing needs to be verified by multiple parties to ensure the openness, transparency and tamper-proof of the ledger. Through the real-time collection and processing of big data of financial institutions, a public "big account book" can be established. When every business transaction occurs, it can be automatically collected through the blockchain and entered into the account book system through the blockchain, or every person Business personnel can easily record economic business, view and maintain it.

(2) Trust-free mechanism to ensure openness, transparency and immutability of data

The biggest disruptiveness of blockchain lies in its brand new credit formation mechanism. At this stage, the authenticity of financial data such as accounting books depends on the current credit mechanism, and the de-trust mechanism of the blockchain does not rely on the certification and credit endorsement of an authoritative institution. It only needs to trust the common algorithm of the blockchain, through technology to establish credit and establish a network of trust between machines, without the need for third-party endorsements and guarantees; this fundamentally changes the centralized credit creation method. Before entering the distributed ledger, the economic business records will undergo strict audits in accordance with public standards to achieve real-time transaction verification. After entry, everyone can monitor them. All participating nodes in the system will jointly determine whether the records are true and resolve information asymmetry. It eliminates the risk of
fraud by personnel in a single position, and ensures that no one can falsify, thereby realizing real-time audit trail; any economic business record has a permanent time stamp—the time stamp function, which cannot be tampered with by anyone. It is irreversible and guaranteed the data is open and transparent.

3) Encryption security ensures system security and data integrity

The application of blockchain in finance has transformed trusted authorities into trusted machine smart contracts, and its system security has been widely recognized by people. Computer technology such as encryption packs data into blocks and encrypts them, and then forms an encrypted chain structure. The encryption mechanism specified in the protocol is used for identity verification; distributed storage and self-maintenance can also ensure password security. In order to launch a large-scale attack on the system, it is necessary to control more than half of the entire block to achieve the purpose of tampering with the entire system. Therefore, the security and data integrity of the system can be ensured.

2.2 The Advantages of Blockchain Technology in Auditing

1) Reduce audit costs and improve audit efficiency

One of the difficulties faced by the current audit is that due to the limitations of audit technology, the audit cost remains high. Under the pressure of competition, firms will try to reduce audit fees as much as possible in order to be able to accept audit services.

Therefore, in order to save audit costs, firms often simplify the audit process and narrow the scope of the audit, leading to increased audit risks. The decentralization of blockchain technology can realize distributed accounting. At the same time, the irreversibility of the time stamp of the blockchain can effectively reduce the financial fraud of the audited unit, make information more open and transparent, and reduce the construction of off-site audits. The cost of the storage system and all transaction information can be recorded in the blockchain, which can be queried in real time, reducing the cost of collecting the underlying data and conducting the letter verification.

2) Reduce the possibility of data loss caused by central database failure

In the traditional database model, all data is stored in a central database. If the central database is hacked or the system is interrupted, all data will be destroyed and cannot be retrieved. The importance of historical data to the accounting and auditing industry is self-evident. Therefore, a large amount of human resources and funds must be invested in the central database model to ensure the security of the database.

2.3 Research on Consensus Algorithm

In an untrusted network environment, computer hardware failures, network congestion or disconnection, and hacker attacks may cause unexpected behaviors in computers and networks. A consensus protocol must be fault-tolerant and able to handle these unexpected behaviors.

1) Proof of Work Agreement

In a distributed network, a certain node must be selected to record transactions. The simplest method is random selection, but random selection is vulnerable to attacks. The core algorithm formula of the workload proof protocol is shown in formula (1):

\[ RAND(h, n) \leq M / d \]  

RAND is a proof-of-work algorithm and h and n are the input values of the algorithm, representing the block hash value and random number respectively. M is a constant, and d is the difficulty value of the current blockchain network.

2) Proof of Stake

Proof of Stake (Proof of Stake) is a new agreement created to solve the problem of huge energy consumption in proof of work. One solution is to calculate equity based on currency age, and its core algorithm formula is shown in formula (2)

\[ S = F(\sum_{1}^{n} An) \]
Among them, n represents the amount of currency held by the user, and \( A_n \) is the time for absenteeism to hold a certain currency, with days as the counting unit. S is the representative value of the currency age of the currency held by the user.

3. Experiment of Blockchain Technology in Audit System

3.1 Experimental Investigation

The experiment adopts a questionnaire design method, and related options are designed in the questionnaire in order to screen the survey subjects who can guarantee professionalism. The subject of the survey must be a person who has been in contact with accounting informatization or has a certain understanding of accounting informatization. The content of the questionnaire will require the subject to investigate the importance of accounting informatization, the necessity and feasibility of applying blockchain technology and other related issues. Scoring and sorting, different scores form different results, so the surveyed objects need to have certain theoretical or practical experience.

3.2 Experimental Procedure

Every computer connected to the blockchain network system is the bookkeeper in the bookkeeping system. They are responsible for recording transaction data in the data block, and each computer connected to it is a node. However, not every node can keep accounts at will. The nodes need to participate in the computing power competition through the consensus algorithm, and the winning node can keep accounts. In order to encourage all nodes to participate in the computing power competition, the system will reward the nodes that win and keep accounts in accordance with the rules.

3.3 Credit Authentication Method of Blockchain

The credit authentication of the blockchain is realized by applying the digital signature of the key system in cryptography. The specific authentication methods are shown in Table 1:

| The way                  | Explanation                                                   |
|-------------------------|---------------------------------------------------------------|
| Use anonymous mode      | The credit verification of the subject is completed by the transaction record in the blockchain |
| Real-name system        | Bind the actual identity to the client                        |
| Identity Anonymous Mode | Assets need to be authenticated and registered in the blockchain, which can be automatically paid when default occurs |

4. Discussion of Blockchain Technology in Audit System

(1) The questionnaire first analyzes the biggest problem categories that restrict the current development of audit informationization from four aspects, so as to analyze the necessity of building a credibility guarantee mechanism for audit information systems based on blockchain technology. Each aspect includes its own for specific content items, the surveyed scores the importance of each item. After the questionnaire is collected, the scores of each item are summed to obtain the scores of the four factors, and then the total value is divided by the questionnaire collected. In this paper, 188 are collected, and an average score is obtained for each category of the options to compare the importance levels of the four factors, as shown in Table 2.
Table 2. Ranking of the problem categories that restrict the current development of accounting informationization

| Project                          | Total Score | Number of sub-items | Total sample size | Mean  | Sort |
|----------------------------------|-------------|---------------------|-------------------|-------|------|
| Audit information quality issues | 4288        | 4                   | 198               | 4.37  | 1    |
| Control issues                   | 3325        | 3                   | 198               | 4.24  | 2    |
| Security issues                  | 2390        | 2                   | 198               | 4.21  | 3    |
| Cost issue                       | 2288        | 2                   | 198               | 3.98  | 4    |

Figure 1. Ranking of the problem categories that restrict the current development of accounting informationization

(2) Overall, the average scores of the four factors are between 3.9-4.4 points, and the importance levels are not much different. The order according to the level of importance is: audit information quality issues> control issues> security issues> cost issues. Audit information quality issues scored the highest at 4.37 points, followed by management control issues and security issues at 4.24 and 4.21 points, respectively. It can be seen that the current quality issues such as untrustworthy audit information are the biggest constraints on the development of audit informatization. The problem. The data analysis of the four aspects is shown in Figure 2:

Figure 2. Four aspects of factor data analysis
5. Conclusion
Blockchain technology has outstanding characteristics such as "decentralization, openness and transparency, and information that cannot be tampered with". It has been widely used in more and more fields, not only improving work efficiency, but also effectively reducing transaction costs. This paper adopts the questionnaire survey method, and the survey objects rank the importance of accounting informationization, the necessity and feasibility of applying blockchain technology and other related issues. The experimental results show that, overall, the average scores of the four factors are between 3.9-4.4 points, with little difference in importance levels. Audit information quality issues scored the highest at 4.37 points, followed by management control issues and security issues at 4.24 and 4.21 points respectively.

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