Enterprise Blockchain Network Audit Mode and Application

Xiang Li[1,*], Yujia Bai[2]

[1]School of Management, Northwest University of Political Science and Law, Xi'an 710122, China
[2]School of Economics, Northwest University of Political Science and Law, Xi'an 710122, China
*Corresponding author

Abstract: In recent years, the continuous development of blockchain has not only spawned many emerging industries, but also changed the development mode of many original industries, but also had a certain impact on the audit work. This paper attempts to collide the unique characteristics of blockchain with the traditional online audit work. Based on the existing online audit mode of Zhiyuan technology company, this paper puts forward the idea of building a new blockchain online audit platform, which is based on four modules: blockchain technical support module, auditee basic data module, blockchain audit application service module and audit access module, Complete the four steps of audit information operation process: data collection, data preprocessing, collection of audit data and formation of audit report. Finally, it puts forward optimization suggestions for the existing blockchain online audit mode, such as improving the audit early warning mechanism, establishing a comprehensive and high-quality blockchain online audit talent training system, and improving relevant systems and laws, in order to provide reference for subsequent development and application.

Keywords: blockchain technology, networking audit, audit process

1. Introduction

As an independent economic supervision activity, audit aims to improve the trust of expected users of financial statements on financial statements. It has a long history and plays an important role[1]. In recent years, with the rapid development of economy and the continuous progress of society, the traditional business model has become increasingly complex. The advanced environment puts forward higher requirements for audit work. Therefore, innovating audit technology and methods, improving audit ability and exploring the establishment of an information audit supervision system have gradually become the direction and trend of audit development. In this context, the network audit characterized by high efficiency and low cost has been widely concerned and studied. Although the online audit eliminates seven major audit wastes, such as high audit cost, weak independence of auditors and long audit time, its high implementation cost, high technology risk and high audit risk are still the main factors that the online audit has not been widely used. Therefore, how to effectively use emerging technologies to solve the problems in the development of online audit has become the research focus and hotspot in the current audit field [2].In recent years, blockchain technology, known as the fourth milestone in the history of human credit evolution, has developed rapidly. As a decentralized, tamper proof, traceable and multi-party jointly maintained distributed database, it can establish multi-party trust in the case of disintermediation, and epoch-making realize trusted data sharing and point-to-point value transmission. Zhiyuan Technology Co., Ltd. combines blockchain technology with online audit, turns the information system from traditional centralized to multi node, data distributed storage and dynamic load balancing architecture, and speeds up the transformation of architecture informatization. Taking this as an example, although blockchain online audit is conducive to the transformation and development of enterprises, there are also many risks in the development process. Therefore, it is necessary to propose a new enterprise blockchain online audit information platform to make the enterprise development and transformation process safer, standardized and orderly.

2. Design of enterprise blockchain network audit information platform

2.1 Blockchain technical support module

The framework of the whole information platform is shown in Figure 1. The beginning of the platform is based on the blockchain technology support module. According to the technical characteristics of blockchain, the module is divided into five layers, namely data layer, network layer, consensus layer, contract layer and audit access layer. These five layers correspond to different technical elements and mechanism principles and play a role in supporting and coordinating the normal operation of subsequent modules [1].
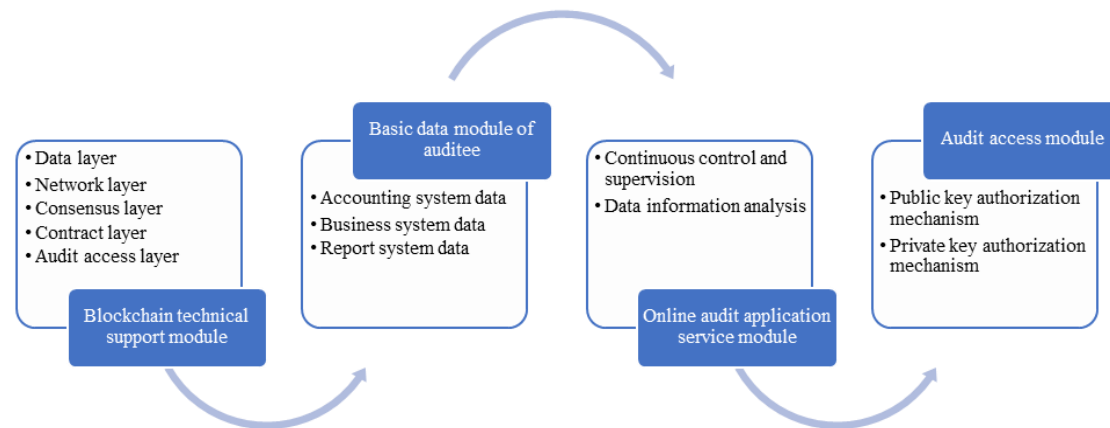

Figure 1. Blockchain network audit information platform framework

2.2 Basic data module of auditee

The basic data module of the auditee is equivalent to the data receiver of the platform. Its main function is to receive the data generated by the auditee's business system, accounting system and report system. The business system includes all business activities related to the production and operation of the enterprise, such as sales and a / R activities, purchase and a / P activities, inventory and inventory management activities, etc. the accounting system includes general ledger, Sub Ledger, bookkeeping vouchers, etc. The report system includes income statement, cash flow statement, balance sheet, etc. For each transaction of the audited entity, the module will process it in the corresponding system. The "data layer" in the basic module will ensure the integrity of the data with the help of timestamp, hash function and other technologies, and then the "network layer" uses asymmetric encryption technology to transmit the processed transaction data to the online audit application service module. Once the corresponding cost blocks are different, Then the block cannot be "linked", the audit early warning mechanism in the module can detect abnormal data in time, and the other effective blocks enter the data information analysis link. Data information analysis mainly includes audit doubt analysis, enterprise contract agreement analysis and transaction data query analysis. The data analysis function is at the "contract layer", that is, using the smart contract in the blockchain, compared with the traditional audit of finding problems, applying, checking and correcting errors, the smart contract truly realizes the automatic processing of abnormal information, reduces the waiting time of traditional audit early warning, and realizes the transformation from post prevention to in-process control and pre-warning [3].

2.3 Blockchain audit application service module

The online audit application service module is the key part of the information platform. It is mainly based on the "consensus layer" and "contract layer" for control and supervision, data information analysis and audit early warning. When the "network layer" transmits the data of the "data layer" to the audit application service module, the "consensus layer" uses different consensus mechanisms, such as workload, certification mechanism, equity certification mechanism and authorized share certification mechanism, so that each node can efficiently reach a consensus on the effectiveness of data in a highly decentralized system. The "contract layer" carries out data analysis through various script codes and algorithm mechanisms, such as the judgment conditions of doubtful data and the generation judgment of contract agreement. Once the application scenario occurs, the blockchain system will automatically

execute the contract of the participants without the intervention of any intermediary.

2.4 Audit access module

Blockchain has three types: public chain, private chain and alliance chain. The public chain is a completely open blockchain, and everyone can participate in the maintenance of the system. Private chain is a closed blockchain network, which is limited to the internal use of a single organization. The alliance chain between the two is most suitable for commercial applications. Since the participants are in the same industry or related business organizations, they can realize the real name system of digital identity with each other, so as to ensure that the digital transactions on the blockchain correspond to the actual legal subjects and ensure the effectiveness of the law [1].When an external third-party auditor visits the auditee, based on the idea of alliance chain, a more secure and efficient "public key encryption and private key decryption" technology can be adopted at the audit access layer. Auditors can access the blockchain application platform by using different devices and assign different private keys according to their login roles, So as to obtain different permissions and browse content.

3. Enterprise blockchain online audit information operation process

3.1 Data collection and screening

Blockchain audit data center is the basic information storage module of blockchain information platform. The establishment of blockchain audit data center can provide data support for the implementation of audit work and ensure the safety and reliability of data information. Under the blockchain distributed storage structure, various information related to production and value changes will be transmitted to the blockchain network, and auditors can obtain the required information and data in real time. Sensors and detection probes are installed in the production workshop and warehouse, which can classify and summarize the production, output and loss of assets in real time and send them back to the blockchain online audit data center. Among them, the cost data sub module stores the production cost. The delivery area sub module stores the transportation range and positioning information of enterprise products. The market information sub module includes the market price, supply and demand information, preferential policies, etc. of relevant products to assist auditors to reasonably estimate the value of enterprise assets [4].

3.2 Data preprocessing

The data preprocessing stage is to intelligently and quickly verify the bookkeeping content, that is, verify it by using the unique intelligent audit contract of blockchain technology, and directly enter the online audit process. The audit intelligence record layer covers two aspects: the external audit test procedure of the company's external economic activity information under the public chain and alliance chain and the internal audit test procedure of the enterprise's internal event information. The transaction pool collects and stores the business data information broadcast by the audit platform layer and the attached vouchers, extracts the key data information from it, and directly enters the recording and verification process for packaging and uplink. Focus on recording the company's external economic activity information. Before bookkeeping, it is necessary to clarify the bookkeeper of transaction activities, which is reflected in the public chain, which is a node on the chain. The specific work includes converting the plaintext language into the language recognized by the system or machine, and then using the blockchain to complete data packaging [5].

3.3 Collect audit evidence

In this step, the audit smart contract of computer protocol is embedded into the audit application platform. The smart contract stipulates that the premise of audit test is that all nodes of the blockchain must pass the verification, so as to stimulate the internal and external audit smart auditors of the company and third-party accounting firms to automatically carry out corresponding audit procedures, Moreover, the external audit intelligent auditor is more independent than other node intelligent auditors, and the third-party accounting firm shall be responsible for the audit report and report users issued by itself. The intelligent audit contract guides and puts forward deep-seated requirements for internal and external intelligent auditors, integrates the existing accounting information system and audit evidence of the enterprise, and publishes audit reports in different periods [6].

3.4 Form audit report

The audit intelligent report layer is the final link of the audit workflow based on the blockchain platform, that is, issuing the audit report, which is issued by the intelligent auditor combined with the experience and feedback of the manual audit engineer, and referring to the periodic audit test results and audit materials [5].The audit unit can confirm, measure and record each sales link in the sales process and form a real-time report based on the consensus of relevant documents among nodes in the whole network. If the purchasing unit issues the acceptance certificate after receiving the goods, the audited unit will use the acceptance certificate and sales invoice to account for the main business income. Based on the joint observation and verification of blockchain nodes in the whole sales link, the audit unit can audit and verify the event while the auditee keeps accounts without waiting until the end of the period, so as to form an uninterrupted online audit. It can be seen that the online audit under the blockchain environment will advance the implementation process from the completion of year-end financial report preparation to the public announcement to the occurrence of various economic businesses, and because all parties have realized the connectivity of blockchain technology, the audit unit does not need to formulate an audit plan in advance, reducing unnecessary audit costs.

4. Case analysis of blockchain networking audit of Zhiyuan technology company

4.1 Application of blockchain networking audit of Zhiyuan technology company

4.1.1 Introduction to Zhiyuan technology company

Shenzhen Zhiyuan Technology Co, Ltd. was established on September 16, 2015.The business scope of the company includes: computer network software and hardware development, computer network information technology development, computer software development, technical services and information technology consulting（Excluding restricted items；Operate e-commerce, domestic trade, etc.

4.1.2 Network audit of Zhiyuan technology company based on blockchain technology application

When Zhiyuan technology company applies online audit, the implementation of online audit procedures mainly includes data analysis, establishment of intermediate table and acquisition of audit doubts. In these three audit procedures, data analysis is the means, the intermediate table is the audit evidence in the audit process, and the audit doubts are the phased results produced in the implementation of the audit process. Through various network audit technologies, combined with the corresponding audit models, the online executive auditors audit the obtained audit information after cleaning and screening, check the relationship in the audit information, look for audit clues between the logical relationship of articulation, and finally get the corresponding audit evidence [7].

4.2 Advantages of blockchain technology in project audit

4.2.1 Blockchain technology improves the data recording method of online audit

Blockchain technology not only realizes the decentralization of accounting, but also has the characteristics of de management. In principle, it strives to realize the automation of accounting work. Traditional accounting work has designed cumbersome accounting norms and management systems. Its principle is to assume that people are irrational and immoral, so it can only be constrained by complex management systems and accounting norms to ensure the reliability of accounting information. In the blockchain working environment, due to the decentralization and management of the accounting information system, the distributed account book can eliminate the risk of accounting fraud and error to a great extent. It is conceivable that if the blockchain accounting information system is combined with the enterprise Internet of things system, RIFD and management information system, the accounting data can be processed automatically to a certain extent (through scanning documents, transmission of management information system, automatic processing of artificial intelligence system, etc.), and the financial personnel do not need to invest a lot of energy in the process of accounting and generating account books, Instead, it assists and supervises the information system to complete the traditional accounting processing. Blockchain technology helps to realize the independent bookkeeping mode [8].

4.2.2 Blockchain technology improves the data storage mode of online audit

The company deeply combines the Internet of things with blockchain accounting. By scanning the Internet of things labels on the company's products, the network auditors can automatically log in to the

company's blockchain network to quickly obtain the important date records related to the products, such as raw material procurement, production and operation process, inventory storage and delivery, plus the actual inventory, Check and check the relevant audit data collected with the company's account books and statements, so as to quickly find the fraud and omission in the inventory link. The online audit can even be carried out through the blockchain system application outside the company. For example, the blockchain accounting system can be built through the company's customers, consumers, affiliated external financial institutions, affiliated companies and suppliers to upload the transaction information to the external blockchain system and automatically compare it with the data in the company's internal blockchain system, Find out possible fraud doubts and clues through blockchain technology. After receiving the company's goods, consumers can record the value, specifications and other parameters of the goods through the blockchain system, so that the online audit can audit whether there is fraud in the revenue business through the comparison between the company's internal and external blockchain systems. Similarly, the banking system can also be connected with the blockchain system within the company through the blockchain system, so that auditors can review the status of accounts, loans, signing rights and even guarantee business, greatly saving costs [8].

4.3 Difficulties in the company's online audit project

4.3.1 System level

The internal risks based on the blockchain system level come from "51% attacks". A more accurate understanding of 51% attacks is to compete for the longest chain through superior computing power. When the blockchain is faced with data changes, if more than 51% of participants agree, the change will be confirmed and added to the chain, that is, some monopoly institutions may have the computing power exceeding the system threshold, so they have the ability to manipulate account book data. Although there is a possibility of "51% attack" in theory, in reality, the blockchain system represented by bitcoin has not encountered such an attack so far, because mastering more than 51% of the computing power of the whole network requires huge technology and resource costs, and the attack cost increases exponentially with the expansion of the network scale, It may not pay off economically. Once 51% of the attacks are completed, a chain will be destroyed and both the attacker and the defender will get nothing. For the online audit system using blockchain technology, its participants are object-oriented alliance chain. The characteristic of alliance chain is that the audit subject can access the data for audit verification, and the auditee needs the consent of the audit subject to attempt to manipulate the account book data. There are also many external risks to the general information system, such as floods, fires, earthquakes and other natural disasters, which usually bring devastating blows to the information system. Therefore, the general information management system will consider the disaster recovery plan and business continuity plan. However, due to its unique distributed storage characteristics, the blockchain system does not need to consider DRP and BCP. Therefore, compared with the operation and application level, the system level of blockchain networking audit is less difficult.

4.3.2 Operational level

The encryption method adopted by blockchain is asymmetric key encryption system, and the generation, storage, injection and use of keys are common risk sources. In the generation link, there is no third-party supervision to generate the key; In the custody link, the three keys are not kept separately and there is no custody record; In the injection process, the violation of transmitting the key through SMS often occurs. In order to deal with the audit risk of blockchain networking caused by encryption, auditors should focus on the generation, handover, injection, replacement, destruction, sealing and safekeeping of key operation records to prevent the audit risk of networking [9].

4.3.3 Application level

At present, with the rapid development of information technology, it is difficult for enterprise auditors to find potential security risks in time with their own professional knowledge in the face of sudden vulnerabilities and error codes. On June 17, 2016, the Dao, which just set the world's highest crowdfunding record in May, was attacked by hackers due to loopholes in its smart contract, resulting in the hijacking of more than 3.6 million ether coins worth US $60 million, which attracted extensive attention in the industry. The cause of this famous risk event based on blockchain system is that the enterprise did not conduct security audit on the code in the smart contract. At present, the blockchain based on POW consensus mechanism is vulnerable to attack under the conditions of limited participating nodes in the early stage and concentrated computing power in the later stage. In addition, although blockchain technology can automate transactions and exchanges, and encryption and software can

replace information transmitters, it still needs the actions and capabilities of the centralized platform. The technology development level of the global blockchain industry is still in a relatively primary stage, and decentralized smart contracts are still difficult to replace centralized contracts until the technology is mature.

5. Suggestions on Optimization of enterprise blockchain networking audit

5.1 Continue to improve the early warning mechanism and improve audit efficiency

Blockchain has reached the peak of inflation expectations. However, there are still many problems that are difficult to ignore in this technology. Therefore, research institutions should increase investment, closely communicate and cooperate, deeply study blockchain technology, strive to solve the problems of slow data processing, blockchain block expansion and 51% attack on the blockchain, and actively promote the implementation of blockchain technology.

Reducing the audit risk of blockchain networking mainly starts from two aspects: physical risk and network risk. The physical risk is that when the data acquisition module collects data online with the audited unit, it needs to use a single pole double position switch for physical isolation, which reduces the efficiency of audit data acquisition; Network risk is that the cost of collecting data using separate data acquisition module is high. It is necessary to set up data front-end processor and relevant supporting facilities, which will greatly increase the audit cost [10].

For the blockchain online audit at this stage, continuous improvement of the early warning mechanism can effectively reduce the audit risk. Compared with the traditional audit early warning mechanism, the difference of the new audit early warning mechanism lies in whether the processing of new transaction information or abnormal information needs manual intervention. At the same time, the initial formation of the new area block has been stamped with a time stamp, so that the time function of the changed data is added on the basis of quantity and amount, which not only realizes the database with the nature of time axis, but also ensures that the audit institutions are orderly in the face of large-scale original audit data. In addition, the automatic backup function of blockchain automatically helps all participants to form copies when new blocks are formed, which ensures the timeliness of audit data to a certain extent. All node users in the chain structure can freely access the data information recorded in the block, and even the staff in the audit terminal can directly access the block information. Therefore, improving the audit early warning process based on the blockchain technology can not only improve the collection efficiency of audit data, but also realize a truly efficient online audit mode.

5.2 Establish a comprehensive and high-quality blockchain online audit talent training system

The key to the application of blockchain online audit in practice is to cultivate high-quality online audit professionals. Firstly, according to the talent quality and ability needs, put forward the corresponding talent standard requirements, formulate the training and assessment outline, and compile high-level teaching materials for reference; Secondly, blockchain online audit courses are set up in Colleges and universities with accounting, audit and other related majors to cultivate professionals. Finally, we will cooperate with colleges and universities, training institutions, audit society and other departments to carry out skill training for the existing audit practitioners, expand the learning of professional theories and skills, constantly strengthen the knowledge literacy of business personnel, and build the first line of defense for risk prevention. Take this as an opportunity to organize more front-line business personnel to participate, urge the participants to actively understand and be familiar with the latest policies and regulations of the industry, learn advanced experience and knowledge points, master new process flow and quota application, improve risk prevention ability, and make them have the ability to use knowledge base and professional technology to quickly and accurately find out enterprise problems, Put forward practical suggestions while issuing high-level audit reports [11].

5.3 Formulate and improve the legal system of blockchain online audit

The former blockchain online audit technology is not mature as a whole, and enterprises cannot avoid problems such as objective technical risks and subjective moral risks. Therefore, it is necessary to formulate relevant laws and regulatory systems and improve the investor protection mechanism for the application of blockchain technology. Relevant regulatory authorities should formulate and improve the management norms based on blockchain technology, conduct in-depth research in formulating standards

and improving the level of regulatory informatization, and make continuous efforts in guiding listed companies and accounting firms to strengthen informatization construction, promoting relevant departments to issue supporting systems and cultivating compound talents. The further development of blockchain networking audit needs the protection of relevant systems and laws to improve standardization. Only when the conditions are met can the application of blockchain networking audit be comprehensively promoted in a timely manner [12].

6. Conclusion

At present, with the rapid development of information technology, the content of audit work has gradually shifted to online audit characterized by off-site audit, but its shortcomings such as distorted data transmission and extensive data analysis still restrict the development of online audit. Whether blockchain technology as the underlying technology can promote online audit is a research hotspot in the field of audit, Taking the application of blockchain online audit of Zhiyuan company as an example, this paper puts forward the idea of a new blockchain online audit platform, and constructs an audit platform based on four modules: blockchain technical support module, auditee basic data module, blockchain audit application service module and audit access module to complete data collection, data preprocessing, audit data collection Form a four-step audit information operation process of the audit report, in order to make a new exploration for the online audit application of blockchain technology, and further promote the theoretical research and relevant practice of the online audit application of blockchain technology.

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