

## **Analysis on the application status of blockchain technology in Chinese Listed Companies**

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*Abstract: With the development of technology and the increasing maturity of the market, blockchain technology is becoming more and more popular and applied to all walks of life. It has become a trend for listed companies to use blockchain technology to improve the quality and efficiency of enterprise development. Based on the analysis of the application status of blockchain technology in the main fields of listed companies, that is, from the aspects of accounting audit, product design, supply chain and finance, this paper studies the value-added of blockchain technology in listed companies. The research results show that blockchain technology, with its characteristics of transparent and open information, distributed storage, encryption algorithm, decentralization and consensus mechanism, continues to integrate and develop in listed companies, provides a key solution to the trust and security problems of transactions, improves the operation efficiency of the company and reduces the transaction and management costs of the company.*

*Keywords: Blockchain technology, listed company, Value increment, supervise.*

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### **1. INTRODUCTION**

The integrated application of blockchain technology plays an important role in new technological innovation and industrial innovation. The report of the 19th National Congress of the Communist Party of China repeatedly mentioned the need to combine blockchain technology to implement the transformation from traditional kinetic energy to new kinetic energy, so as to promote the sustained and rapid development of social economy. Blockchain is a distributed data ledger composed of blocks in a chain structure in chronological order. It has the characteristics of programmability, traceability, distributed storage and non tampering. It is particularly widely studied in the financial field [1]. As a new revolutionary technology with broad prospects, blockchain technology is gradually deeply integrated with all walks of life with the development of its technology and the continuous maturity of the market. It plays an important role in accounting audit, product design, supply chain, finance and other aspects of some listed companies.

## **2. APPLICATION STATUS**

### **2.1 Accounting audit**

Listed companies need to regularly disclose their operating conditions through financial reports, and then accept the supervision of the public, and the financial audit is the top priority in the whole link. In recent years, the non-compliance of financial audit of some listed companies has occurred frequently, which has seriously disturbed the order of China's capital market. There are many problems to be solved in the financial audit of listed companies. Looking at the main accounting and auditing problems of China's listed companies, there are mainly the following three aspects: first, the imperfection of the company's internal control and structure, which is the most important and important problem in the accounting and auditing of China's listed companies; Second, there is information asymmetry between auditors and companies; Third, the audit efficiency is low [2]. The application of blockchain technology will have a huge value-added effect on the accounting audit of Listed Companies in China, which is mainly reflected in the effectiveness of internal and external audit.

#### **2.1.1 Make up for the deficiency of enterprise internal control**

When blockchain technology is introduced into the internal audit of listed companies, blocks are linked, and all data must be authenticated by all nodes. This makes the data generated by each exchange have a basis, the openness and transparency of financial data are greatly enhanced, and the data can not be tampered with, which ensures the originality and authenticity of the data, while the data viewer can also have traces to follow. With the improvement of the transparency of financial data disclosure, the financial activities of enterprises can be effectively supervised by relevant stakeholders. Many scattered minority shareholders can also consult and supervise with the help of distributed electronic account books, which not only improves the sense of participation of minority shareholders in corporate governance, but also improves the joint participation of the company's internal control.

#### **2.1.2 Improve the quality of internal financial information**

Blockchain technology has the advantages of decentralized and distributed architecture. On this basis, the processing of accounting business will no longer be centralized, and the quality of internal financial information can be effectively improved. The blockchain is composed of interlocking nodes. Each node on the data chain is equivalent to an accounting and audit related personnel, who can record financial data independently, and data modification requires the consent of all nodes. Under this framework, the accounting responsibility will be borne by each corresponding node, and the responsibility and trust mechanism of the enterprise financial department will no longer be "centralized". Therefore, the quality of financial information within the enterprise system will be improved to a certain extent. At the same time, as an emerging technology, blockchain technology also requires relevant financial personnel of enterprises to have certain professional quality of operating the blockchain system in the accounting and audit system. This can help financial personnel and relevant parties improve their ability, establish crisis awareness, innovation awareness and rigorous attitude, and achieve accurate and true bookkeeping.

### 2.1.3 Improve the efficiency of accounting information transmission

For listed companies, blockchain has the characteristics of consensus mechanism, which can improve the transmission efficiency of accounting information and further reduce transaction costs effectively. In the blockchain, new data will first enter a node, which will immediately notify all nodes for verification. Each node can quickly reach an agreement, so as to ensure the transmission efficiency of the system. The information generated by one node can be quickly synchronized to all nodes of the whole system and automatically backed up and stored, which greatly improves the timeliness of internal audit, directly reduces the level of internal audit of traditional listed enterprises and reduces the transaction cost.

## 2.2 Effectiveness of external audit

### 2.2.1 Improve the authenticity and effectiveness of external audit

The encryption method and transmission mechanism of blockchain data ensure the effectiveness of external audit of listed companies. Based on the chain structure of blockchain, the data generated by any node will be transmitted to all nodes in real time and completely through the protocol for verification. The external audit as one of the nodes can also receive the corresponding data through the key. The real transaction information corresponding to the data can be called and checked by external audit institutions, and the information such as accounting vouchers and audit account books can also be checked, so as to directly eliminate the possibility of data fraud. Meanwhile, blockchain is a distributed ledger. Each node in the system forms a complete ledger instead of a separate ledger, and all information is stored in the data chain. The data viewed by external audit is not easy to change, which avoids the possibility of easy data change and reduces the level of data transmission. In this case, the objectivity and authenticity of the data will be improved to avoid data distortion, which will also make the external audit more comprehensive and effective.

### 2.2.2 Realize real-time audit and improve audit efficiency

The introduction of blockchain technology can greatly reduce the possibility of listed companies adopting non-compliance practices in external audit. All data are stored on each node of the chain block and can be obtained at any time, which saves the time of reading paper materials, random inspection certificates and letters. The external audit does not have to worry about a large number of substantive tests, and greatly improves the extraction efficiency and audit efficiency of transaction data.

### 2.2.3 Reduce subjective differences in external audit

The current audit work is mainly judged by auditors, which is easily affected by the subjective deviation of auditors, making the evaluation criteria of audit slightly different. The integration of blockchain technology and external audit can avoid the differences caused by subjective factors in audit and make up for the shortcomings of traditional audit. Under the blockchain architecture, the source of data reflects the authenticity and reliability of data, which can be clearly displayed in the audit. This reduces the threshold of external audit to a certain extent and makes the audit less vulnerable to personal factors. Blockchain helps external auditors avoid individual differences and make more realistic and objective judgments.

### **2.3 Product design -- Taking the field of Internet of things as an example**

In recent years, the development of the Internet of things has gradually taken shape. The integrated development of blockchain in the field of Internet of things product design has also become a new trend. Blockchain technology is more and more applied to product design. At present, the problems existing in the field of Internet of things product design are mainly the high trust cost between products, the insufficient risk tolerance of centralized structure, the difficulty in maintaining the security and privacy of data storage, and the difficulty in expanding the business platform. We use the advantages of blockchain to solve these practical problems. As a potential trust mechanism, blockchain technology is an important technical means to mix the real society, build digital twins and maintain data security. At present, build an Internet of things application platform based on blockchain technology, use blockchain thinking to analyze and solve product design problems, and use its internal advantages of "decentralization" to integrate various design processes related to a single product Applications, services and user experience are effectively connected and integrated to promote mutual cooperation and reduce costs, which largely meets the needs of trusted transactions, efficiency improvement, data security and so on.

### **2.4 Supply chain**

In the field of supply chain, blockchain technology was mainly used in the financial industry at first, and then gradually expanded to agriculture, retail, medical treatment, manufacturing, energy and other industries."Blockchain + supply chain finance" is the main mode of blockchain technology development in China [3]. The application of blockchain technology can solve the problems existing in traditional supply chain finance, such as incomplete supplier credit information records, difficult access to loans for suppliers and dealers above secondary level, difficult access to credit for small, medium-sized and micro enterprises, difficult confirmation of credit line, credit after financing, lagging liquidation and so on [4]. Blockchain has obvious advantages in improving the transparency of the supply chain financial industry, expanding service objects, improving efficiency, reducing risks and strengthening capital flow management [5]. The traditional financial supply chain can be operated more efficiently and effectively with the help of financial technology. It can be said that the "blockchain + supply chain finance" model gave birth to the combination of innovative models in all walks of life, mainly including the following [6].

2.4.1 One is "blockchain + supply chain finance" initiated by blockchain technology service providers.

The blockchain technical service provider is responsible for the daily maintenance of the supply chain financial platform and provides professional technical services to relevant departments. Warehousing, logistics, industry and trade, taxation and other departments enter the platform, and participants can view the required information in real time through the platform. The bank connects its virtual account to the bank's payment channel through a special channel contact platform. The platform uses blockchain smart contracts to strengthen execution conditions, block paths, reduce human interference and eliminate fund management risks in business processes. By taking the core business credit and their own data of small and medium-sized enterprises as credit derivatives for guarantee, these platforms can provide financial services for suppliers at different levels and fix the whole industrial chain.

2.4.2 The second is "blockchain + supply chain finance" initiated by core enterprises.

This model is usually a chattel pawn shop, which is composed of Internet of things layer, smart contract layer and technical interface layer. Internet of things technology can digitize and transform subjective credit into objective credit, so as to minimize the moral hazard of depositors. Meanwhile, with the help of blockchain technology, it can store warranty, early warning and other information identified on the Internet. Blockchain technology can effectively prevent data manipulation and closely connect relevant information. Many parties need to confirm the transfer of movable property and start the smart contract [3]. Intelligent protocol identifies online space, reduces human factors and greatly improves the objectivity of the event process. IOT early warning can directly transfer risk information to the business system of financial institutions through blockchain technology. This mechanism has changed the traditional mode of financial supervision. When information is transmitted through the blockchain intelligent system, a financial system with high credit mechanism will be generated, making online and offline transactions more secure.

2.4.3 The third is "blockchain + supply chain finance" initiated by banks.

This model is mainly based on the existing resources of the bank to develop supply chain financial services, which are mainly used for sales accounts receivable financing. Build a supply chain financial platform based on the operation mode of blockchain technology business, and each participant enters basic information such as identity information and transaction information into the platform; In the whole supply chain, credit support is still the core. Suppliers of core enterprises can pledge the receivables of core enterprises for financing; With the participation of blockchain technology, the authenticity of accounts receivable can be directly verified and confirmed, and the system will automatically convert the verified accounts receivable into electronic credit vouchers; After obtaining the electronic letter of credit, the supplier can directly apply to the bank for financing. Banks can directly lend or pay to lower tier suppliers; When the business is due, the platform automatically performs accounting processing, completes the payment for goods and returns the bank loan.

## **2.5 Blockchain + non-financial supply chain**

The application of blockchain in the supply chain of other fields reflects the diversity of blockchain technology applications, which is embodied in the specific application in many fields such as agricultural products, food, medicine, electric power, military supply chain and so on. The application of blockchain in the supply chain of agricultural products [7] and food [8] is conducive to ensuring the safety and quality of products in the supply chain, so as to bring good brand image and trust to enterprises; The application fields mainly include fresh food delivery, safety, transparency and traceability of food, dairy products and agricultural products, food supervision and evaluation, etc. The application of blockchain in pharmaceutical supply chain can strengthen the procedure of detecting counterfeit drugs in Global trade [9] and improve the efficiency of drugs in cross-border transportation [10]; Applications mainly include the supply, safety and supervision of medical equipment and medical supplies, transparency of procurement channels, construction of healthy Internet of things, etc. [11]. The application research of blockchain in manufacturing supply chain includes product traceability and recall, process visualization, logistics real-time tracking, etc. [12]. The application of blockchain in power supply chain can solve the problem of benefit distribution in

power supply chain [13], and promote the construction of smart grid, distributed photovoltaic and other power energy systems. The application of blockchain in military supply chain can improve the intelligent level of military supply chain management, ensure the interconnection between internal demand side and external supply side, and promote the value interconnection of entities in military supply chain system [14]. As for the application of blockchain technology in supply chains of different industries, the existing literature mainly focuses on case studies.

### **3. LOOKING FORWARD TO THE FUTURE**

The application of blockchain technology has received more and more attention, but the application of blockchain technology is still in the initial stage. Both the blockchain technology itself and its practical application in listed companies need to be further studied.

#### **3.1 Research on underlying technology of blockchain**

The research on the underlying technology of blockchain is mainly to explore the future improvement direction according to the limitations of blockchain technology. At present, the technical problems of blockchain technology such as low business throughput, network delay, storage resource redundancy and privacy security have become the technical bottleneck of its application in the field of supply chain. Future research should focus on selecting the appropriate algorithm and block size to solve this problem without side effects. For the storage capacity of blockchain, some solutions have been proposed, such as storing the original data outside the chain, while only the metadata, small key data and hash value of the original data are stored on the chain; Build a multi-layer blockchain architecture for different purposes; Develop new algorithms involving deep learning concepts. Future research should combine deep learning or artificial intelligence with existing algorithms to improve computing efficiency and eliminate redundant data in blockchain. In terms of privacy protection, the existing research mainly solves the problem of privacy disclosure from the perspective of open blockchain architecture, such as stealth address, Pedersen commitment, ring signature, dynamic encryption, zero knowledge proof, etc. Future research should improve privacy security more from the perspective of dual blockchain architecture. In addition, to carry out the research on the security of blockchain applications, we need to focus on its integration with other technologies, such as artificial intelligence, big data analysis technology, Internet of things technology, etc. Different industries have different needs for technology, so it is also necessary to study the matching between the application of blockchain technology and the needs of relevant industries.

#### **3.2 Research on application supervision of blockchain**

At present, for the possible risks brought by blockchain technology, most of them take post intervention and readjustment measures, which can not deal with the financial risks with strong concealment, strong infectivity and rapid diffusion. There is an urgent need to form a complete and systematic supervision system to reduce the losses caused by risks. For example, we should establish corresponding regulatory systems and technology use standards, and establish risk prevention and governance mechanisms to achieve prior supervision; We should establish a flexible supervision system, introduce supervision technology, improve the effectiveness and efficiency of supervision, and promote and support the innovation of laws and regulations. By establishing the "authorized legislation" mode, establishing the threshold for enterprises to enter the sandbox, establishing the

sandbox exit mechanism, forming a sandbox supervision framework in China, and establishing a blockchain financial risk supervision mechanism with "Chinese sandbox supervision" as the core. Generally speaking, the research on the regulation of blockchain is still in the exploratory stage, and more attention should be paid to the construction of adaptive regulation system in the future.

### 3.3 An empirical study on the application of blockchain in supply chain in China

Combined with the research results in the context of China, there are few empirical studies on the application of blockchain in supply chain. In the future, we will discuss the further application of blockchain technology in different industries and supply chain scenarios under the Chinese background. Including: Empirical Research on the influencing factors of the application of blockchain technology by Chinese supply chain enterprises; Study the application framework of blockchain in supply chain implementation, explore the best practice of blockchain application in different types of supply chains, compare the application of blockchain in specific industries or cross industries, analyze the problems and Countermeasures of blockchain application in different scenarios, and apply blockchain to the research of supply chain organization; The application of smart contract in supply chain, in-depth discussion of the impact of smart contract application on transaction cost and overcoming supply chain interruption, as well as the impact of various smart contracts on contract management, long-term supplier relationship and service level agreement under different supply chain environments.

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