Blockchain Empowers the Transparency and Compliance Balance Mechanism of Accounting Information Systems

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Abstract: This article focuses on the impact of blockchain technology on accounting information systems, aiming to explore the balance between transparency and compliance of accounting information systems through the empowerment of blockchain. First, analyze the problems existing in traditional accounting information systems at the levels of transparency and compliance, such as information asymmetry, easy data tampering, high auditing difficulty, high compliance costs, and difficult supervision. Then, it elaborates on the characteristics of blockchain such as decentralization, immutability, traceability, and smart contracts, as well as the transformative potential it brings to accounting information systems, including improving data quality, achieving real-time sharing, reducing audit costs, and strengthening compliance management. Elaborate in detail on how blockchain promotes transparency through data openness and transparency, supply chain finance transparency, public supervision and participation, and ensures compliance by using smart contracts for automatic compliance checks, real-time regulatory reports, identity authentication and authorization management. Furthermore, a balanced mechanism framework is constructed, which includes hierarchical data management, hierarchical authorization of smart contracts, the combination of supervision and self-discipline, and dispute resolution mechanisms. Research shows that blockchain technology can effectively enhance the transparency and compliance of accounting information systems. A reasonable mechanism design can achieve a balance between the two, providing a solid guarantee for the reliability of accounting information and the usefulness of decision-making.

Keywords: Blockchain; Accounting Information System; Transparency; Compliance Balance Mechanism

1. Introduction

As the core system for enterprise financial management and decision support, the transparency and compliance of the accounting information system are of vital importance. A transparent accounting information system can provide stakeholders with true, accurate and timely financial information, which is conducive to improving market efficiency and trust [1]. In a market economy environment, investors, creditors and other stakeholders rely on the accounting information of enterprises to assess their financial status and operating results, thereby making reasonable investment and credit decisions. If accounting information is not transparent, stakeholders will not be able to accurately understand the true situation of the enterprise, which may lead to wrong investment decisions and affect the efficiency of market resource allocation.

A compliant accounting information system ensures that enterprises comply with relevant laws, regulations and accounting standards, avoiding legal risks and reputational damage [2]. With economic globalization and increasingly strict market regulation, enterprises are confronted with more and more legal, regulatory and accounting standards requirements. If an enterprise's accounting information system does not meet the compliance requirements, it may face legal risks such as fines and lawsuits, and at the same time, it will damage the enterprise's reputation and affect its long-term development.

However, traditional accounting information systems have many problems in terms of transparency and compliance, such as information asymmetry, easy data tampering, and high difficulty in auditing [3]. These issues not only affect the quality and reliability of accounting information, but also increase the compliance costs and regulatory difficulty for enterprises. For instance, information asymmetry

may lead to conflicts of interest between the internal management of an enterprise and external stakeholders. The ease of data tampering may trigger financial fraud, and the high difficulty of auditing makes it hard for auditors to comprehensively identify compliance issues existing in the enterprise.

As an emerging distributed ledger technology, blockchain features decentralization, immutability, traceability, and smart contracts, providing new ideas and methods for solving the problems of traditional accounting information systems [4]. By applying blockchain technology to accounting information systems, real-time data sharing, transparent recording and automatic compliance checks can be achieved, thereby enhancing the transparency and compliance of accounting information systems. For instance, the immutable feature of blockchain can ensure the authenticity and integrity of accounting data, and smart contracts can automatically comply with the requirements of accounting standards and laws and regulations, reducing human intervention and errors [5].

However, at the same time, in the pursuit of transparency, issues such as the protection of enterprise trade secrets also need to be considered to achieve a balance between transparency and compliance [6]. If transparency is overly pursued, it may lead to the leakage of a company's business secrets, causing losses to the enterprise. Therefore, it is of great theoretical and practical significance to study the balance mechanism between transparency and compliance of accounting information systems empowered by blockchain. From a theoretical perspective, this research can enrich the application theory of blockchain technology in the accounting field and provide new theoretical support for the development of accounting information systems. From a practical perspective, this research can provide guidance for enterprises to apply blockchain technology, help them resolve the contradiction between the transparency and compliance of accounting information, and enhance their management level and competitiveness.

2. Problems in the Transparency and Compliance of Traditional Accounting Information Systems

2.1 Transparency Issues

Under the traditional accounting information system, there exists a serious problem of information asymmetry among various departments within an enterprise and between the enterprise and external stakeholders [7]. There may be delays and errors in data exchange between the internal finance department of an enterprise and other departments, resulting in financial information not being able to reflect the actual operating conditions of the enterprise in a timely manner. For instance, after completing a sales transaction, the sales department may fail to promptly convey the sales data to the finance department for various reasons, which makes it impossible for the finance department to record the revenue and accounts receivable in a timely manner, thereby affecting the accuracy and timeliness of the financial statements.

The financial information disclosed by enterprises to the outside world may also involve selective disclosure, making it difficult for investors and other stakeholders to have a comprehensive understanding of the true situation of the enterprise [8]. Some enterprises, in order to maintain their own image or achieve specific financial goals, may conceal some unfavorable information, such as major lawsuits and asset impairments, and only disclose favorable information. This selective disclosure behavior can lead to deviations in investors' assessment of the enterprise's value and increase investment risks.

Information asymmetry can also affect the efficiency of market resource allocation. In a market environment with information asymmetry, investors are unable to accurately assess the true value and risks of enterprises, which may result in high-quality enterprises not receiving sufficient financial support, while low-quality enterprises can obtain excessive funds, thereby affecting the healthy development of the market [9].

The data of traditional accounting information systems is stored in centralized databases, which are vulnerable to human tampering and malicious attacks. Once data is tampered with, it is difficult to detect and trace, thereby affecting the authenticity and reliability of financial information. For instance, financial personnel within an enterprise might tamper with financial data for personal gain, such as inflating income or underestimating costs, in order to embellish the financial statements. This kind of financial fraud not only harms the interests of enterprises, but also misleads investors and other

stakeholders.

External hackers may also invade an enterprise's accounting information system through cyber attacks, tampering with or stealing financial data. With the continuous development of information technology, the means of cyber attacks have become increasingly diverse and complex, and the cyber security risks faced by enterprises are increasing day by day. Once an enterprise's accounting information system is subject to cyber attacks, it may lead to serious consequences such as financial data leakage and system paralysis, causing huge losses to the enterprise.

There is a time lag in data update and sharing in traditional accounting information systems, and stakeholders cannot obtain the latest financial information of enterprises in real time. This makes it difficult for them to make timely decisions and reduces market efficiency. For instance, when investors make investment decisions, they need to know the latest financial status and operating results of the enterprise. However, since traditional accounting information systems cannot provide real-time information, investors can only analyze and judge based on outdated financial statements, thereby increasing the uncertainty of investment decisions.

2.2 Compliance Issues

The auditing of traditional accounting information systems mainly relies on sampling checks of paper vouchers and electronic data, with a limited scope of auditing, making it difficult to comprehensively identify compliance issues existing in enterprises [10]. Due to the huge volume of business data of enterprises, auditors cannot check all the data one by one and can only conduct audits through sampling. This sampling audit method has certain limitations and may lead to the omission of some important compliance issues. Moreover, due to the tamperability of data, the reliability of audit evidence has also been affected to a certain extent. In traditional accounting information systems, data is prone to being tampered with, and auditors find it difficult to determine the authenticity and completeness of the data when obtaining audit evidence. If the audit evidence is unreliable, auditors may draw incorrect audit conclusions, thereby affecting the quality of the audit.

In order to meet the requirements of various laws, regulations and accounting standards, enterprises need to invest a large amount of human, material and financial resources in compliance management. Enterprises need to establish a dedicated compliance management department and appoint professional compliance management personnel to be responsible for formulating and implementing compliance policies and monitoring the compliance risks of the enterprise. At the same time, enterprises also need to regularly engage external auditing institutions to audit their financial statements to ensure that they comply with accounting standards and relevant laws and regulations. All these compliance management activities require a significant amount of resources and costs.

The regulatory authorities' supervision of enterprises' accounting information mainly relies on the financial statements and related materials regularly submitted by enterprises, and the regulatory approach is relatively lagging behind. Due to the large number of enterprises, it is difficult for regulatory authorities to conduct comprehensive and timely supervision over all of them, which easily leads to regulatory loopholes. Regulatory authorities usually can only conduct post-event reviews of the financial statements submitted by enterprises and are unable to monitor the accounting operations and financial status of enterprises in real time. If an enterprise engages in financial fraud or illegal operations before submitting the financial reports, it is very difficult for the regulatory authorities to detect and stop it in a timely manner.

In addition, the regulatory standards and requirements vary among different regions, which also brings certain difficulties to the regulatory work. When enterprises operate across regions, they need to comply with the regulatory requirements of different regions, which increases the compliance costs for enterprises and the difficulty for regulatory authorities to supervise.

3. The Characteristics of Blockchain Technology and Its Potential for Transformation in Accounting Information Systems

3.1 Characteristics of Blockchain Technology

Blockchain adopts a distributed ledger structure, without a centralized management institution. All nodes have an equal status and jointly

maintain the consistency of the ledger. This decentralized feature enables data to no longer rely on a single central node, enhancing the system's reliability and resistance to attacks. The data on the blockchain is encrypted and linked through cryptographic technology. Each block contains the hash value of the previous block, forming an unalterable chain. Once the data is recorded on the blockchain, it is very difficult to modify, ensuring the authenticity and integrity of the data. Every transaction on the blockchain has a detailed timestamp and transaction record, which can be traced back to the source of the transaction and the entire circulation process. This makes the source and destination of the data clearly visible, facilitating auditing and supervision. A smart contract is an automatically executed computer program that can automatically enforce the terms of a contract based on preset conditions. On the blockchain, smart contracts can achieve automatic processing and compliance checks of accounting business, improving the efficiency and accuracy of business processing.

3.2 The Transformative Potential of Blockchain for Accounting Information Systems

The immutable and traceable features of blockchain can ensure the authenticity and integrity of accounting data and reduce the possibility of data errors and fraud. Meanwhile, a decentralized structure can prevent data from being controlled by a single node and enhance the reliability of the data. The distributed ledger of blockchain can achieve real-time sharing of accounting data. All departments within an enterprise and external stakeholders can simultaneously obtain the latest financial information, improving the efficiency of information transmission and the timeliness of decision-making. The traceability and smart contract features of blockchain can simplify the auditing process and reduce the workload of auditing. Auditors can directly obtain transaction records and related information through blockchain, eliminating the need for extensive sampling checks and manual verifications, thereby reducing audit costs. Smart contracts can automatically implement the requirements of accounting standards and laws and regulations, and conduct real-time compliance checks on accounting business. Once any violation is detected, the system can automatically alarm and prevent the transaction from continuing, thereby enhancing the compliance management level of the enterprise.

4. The Way Blockchain Promotes the Transparency of Accounting Information Systems and Ensures Compliance

4.1 Ways to Promote Transparency

Accounting data on the blockchain is publicly visible to all authorized nodes, and stakeholders can query the financial information of enterprises in real time, including transaction records, account balances, etc. This open and transparent mechanism can reduce information asymmetry and enhance market trust.

Transparency in supply chain finance: In supply chain finance, blockchain can achieve information sharing and transparency among all links in the supply chain. Enterprises can record financial information of procurement, production, sales and other links on the blockchain. Suppliers, financial institutions and other stakeholders can understand the business operation status and credit risk of the enterprise in real time, improving the efficiency and security of supply chain finance. The openness of blockchain enables the public to participate in the supervision of accounting information systems. The public can query the financial information of enterprises through blockchain browsers, supervise and evaluate the business operations of enterprises, and promote enterprises to operate more standardly.

4.2 Ways to Ensure Compliance

Enterprises can, in accordance with the requirements of accounting standards and laws and regulations, write compliance rules into smart contracts and deploy them on the blockchain. When accounting transactions occur, smart contracts will automatically conduct compliance checks on the business, such as checking whether the transaction amount exceeds the limit and whether the counterparty is legal, etc. If any violation is detected, the smart contract will automatically prevent the transaction from continuing and send out an alert message. Blockchain can record the accounting business and financial information of enterprises in real time and automatically generate regulatory reports. Regulatory authorities can obtain real-time regulatory reports of enterprises through the blockchain interface, promptly

identify compliance issues existing in enterprises, and improve regulatory efficiency and timeliness. Blockchain can use digital certificates and encryption technology to authenticate and authorize users' identities. Only authorized users can access and operate accounting data on the blockchain to ensure the security and compliance of the data. Meanwhile, blockchain can record users' operation logs, facilitating auditing and traceability.

5. Construction of A Balance Mechanism between Transparency and Compliance of Accounting Information Systems Empowered by Blockchain

5.1 Mechanism Design Principles

The design of the balancing mechanism must comply with the requirements of national laws, regulations and accounting standards to ensure the compliance of the accounting information system. Under the premise of safeguarding the business secrets of enterprises, efforts should be made to enhance the transparency of the accounting information system as much as possible and provide stakeholders with true, accurate and timely financial information. Emphasis should be placed on enhancing the efficiency of accounting business processing and auditing, and reducing the operational and regulatory costs of enterprises. It has a certain degree of flexibility, can adapt to the business characteristics and regulatory requirements of different enterprises, and is convenient for enterprises to make personalized Settings and adjustments.

5.2 Balance Mechanism Framework

Accounting data is classified into three levels: public data, internally shared data and confidential data. Public data includes basic information of enterprises, financial statements, etc., which are publicly visible to all stakeholders. Internal shared data includes business process data, cost control data, etc. within the enterprise, and is only accessible to relevant departments and authorized personnel within the enterprise. Confidential data includes a company's business secrets, core technologies, etc. It is subject to strict confidentiality measures and only a few senior managers have access to it. Through data hierarchical management, a moderate transparency of accounting information has been achieved while safeguarding the company's business secrets.

Set different levels of smart contract authorization based on different business types and data sensitivity. For general accounting business, a lower-level authorization can be adopted, allowing relevant personnel to operate in accordance with preset rules. For business involving confidential data and major decisions, a high level of authorization is required, and it can only be executed after multiple layers of approval and verification. Hierarchical authorization of smart contracts can ensure the compliance and security of accounting business. Establish a balanced mechanism that combines the self-discipline mechanism of enterprises with the supervision mechanism of regulatory authorities. Enterprises should strengthen the construction of internal control systems, improve accounting information systems, and voluntarily abide by the requirements of laws, regulations and accounting standards. Regulatory authorities should enhance the supervision over enterprises, establish and improve regulatory systems, and promptly identify and correct any violations by enterprises. Meanwhile, regulatory authorities can achieve real-time supervision of enterprises through blockchain technology, enhancing the efficiency and timeliness of supervision.

Dispute resolution mechanism: In an accounting information system empowered by blockchain, issues such as data disputes and compliance disputes may arise. Therefore, it is necessary to establish a sound dispute resolution mechanism, including both internal and external dispute resolution. Internal dispute resolution can be carried out through the arbitration institution or mediation committee within the enterprise. External dispute resolution can be carried out through legal channels or industry arbitration institutions. The dispute resolution mechanism can safeguard the legitimate rights and interests of all parties and maintain the stable operation of the accounting information system.

6. Conclusion

This article conducts an in-depth study on the mechanism by which blockchain empowers the balance between transparency and compliance in accounting information systems. Through the analysis of the problems in transparency and compliance of traditional accounting information systems, the necessity and urgency of applying blockchain technology have been clarified. The decentralized and immutable features of

blockchain have brought about transformative potential for accounting information systems, such as improving data quality and achieving real-time sharing. In terms of promoting transparency, blockchain effectively reduces information asymmetry through measures such as data disclosure, supply chain finance transparency, and public supervision and participation. In terms of ensuring compliance, measures such as automatic compliance checks by smart contracts, real-time regulatory reports, and identity authentication authorization management have enhanced the compliance management level of enterprises. The balanced mechanism framework constructed, which includes hierarchical data management, hierarchical authorization of smart contracts and other contents, adheres to principles such as legality and transparency, and can effectively balance transparency and compliance while safeguarding the enterprise's business secrets. Research shows that blockchain technology offers a feasible solution to the issues of transparency and compliance in accounting information systems. Its rational application can significantly enhance the reliability and decision-making usefulness of accounting information.

In the future, with the continuous development and improvement of blockchain technology, its application in accounting information systems will become more extensive and in-depth. On the one hand, it is possible to further explore the integrated application of blockchain with other emerging technologies (such as artificial intelligence, big data, etc.) to enhance the intelligence level and data analysis capabilities of accounting information systems. On the other hand, it is necessary to strengthen the standardization and regulatory guidance of blockchain technology in the accounting field to promote the healthy and orderly development of blockchain technology in the accounting industry. At the same time, it is also necessary to pay attention to the possible legal and ethical issues that may arise during the application of blockchain technology, and create a favorable environment for the application of blockchain technology in the accounting field.

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