Research on Issues of Enterprise Accounting Information Systems in the Context of Big Data

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Abstract. With the continuous evolution of the Big Data era, the accounting information system, as a critical component, plays a vital role in handling massive data and providing real-time decision support. However, within the current operational systems, a series of challenges and issues are also encountered. This paper, set against the backdrop of Big Data, conducts an in-depth analysis of the existing problems in enterprise accounting information systems and proposes corresponding optimization strategies. The aim is to provide effective assistance to numerous enterprises in the use of accounting information systems.

Keywords: Big Data, Accounting Information System, Data Sharing, Blockchain, Cloud computing

1 Introduction

In the era of big data, accounting information systems, specialized software for handling accounting tasks, have deeply penetrated various aspects of daily financial management within enterprises. Currently, big data technology is still in a thriving stage, presenting both rich opportunities and unprecedented challenges for the development of financial accounting in enterprises. Therefore, a thorough investigation into enterprise accounting information systems becomes imperative. Enterprises need to deeply comprehend the application of big data technology in accounting information systems to better grasp and respond to the rapidly changing business environment, thereby enhancing the efficiency and standards of financial management.

2 Current State Analysis of Accounting Information Systems

Currently, the Chinese Ministry of Finance emphasizes the need to vigorously promote the digital transformation of accounting in the "Accounting Informatization Development Plan 2021-2025"[1], aiming to advance the work of accounting informatization to a higher level. Additionally, the "14th Five-Year Plan Outline for Accounting Reform and Development" issued by the Ministry of Finance in 2022[2] highlights the importance of strengthening the role of digital technology. Furthermore, foreign scholars, such as Tse et al[3], Renowned American scholar Ashbaugh H and the British scholar Davila T[4][5] have proposed that the development of accounting information systems in the Internet era has become an inevitable trend. In recent

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years, significant progress has been made in accounting reform in our country. The development of financial and tax information technology in China has gradually achieved new results, as illustrated in Figure 1.

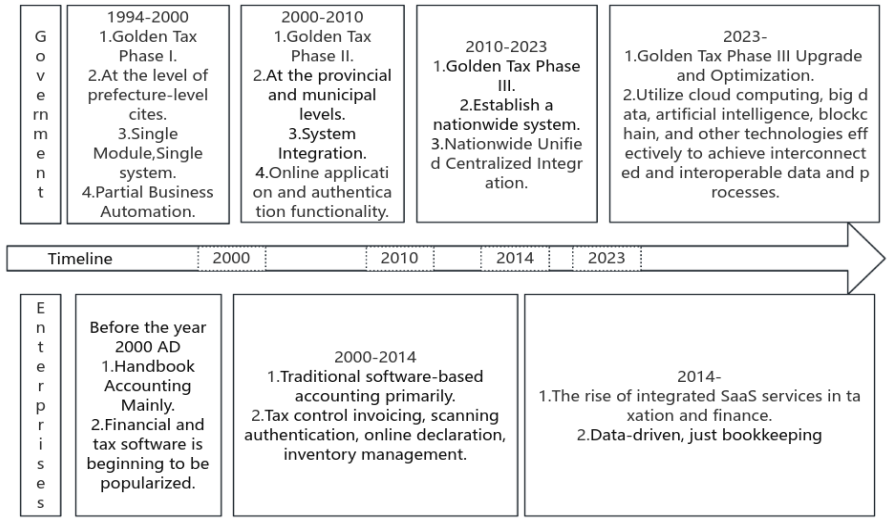

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Fig.1. Development process of fiscal and tax informatization in our country

According to research findings, the scale of China's fiscal and taxation digitalization market, as well as the associated transaction digitalization market, has been experiencing a steady upward trend from 2018 to 2023. As can be seen from Figure 2, the market size has grown from approximately 29 billion yuan in 2018, with the growth rate remaining positive each year. Therefore, it is projected to reach about 70 billion yuan by 2025.

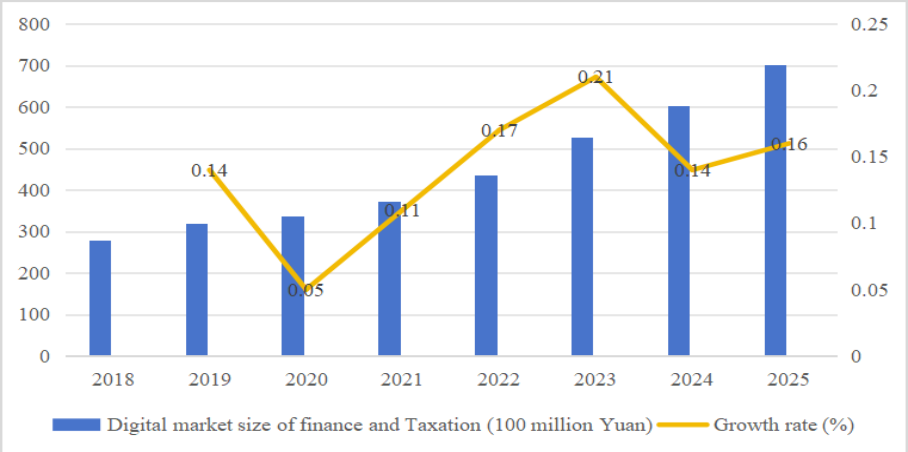

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Fig. 2. Size and growth rate of China's fiscal and tax digitalization market from 2018 to 2025

As shown in Figure 3, the scale of cloud-based solutions is steadily increasing, while the scale of locally deployed solutions shows a fluctuating trend and is expected to decline in the future. Therefore, the future scale of China's digital market for financial and tax-related transactions is expected to further grow, with cloud-based solutions becoming an increasingly popular choice.

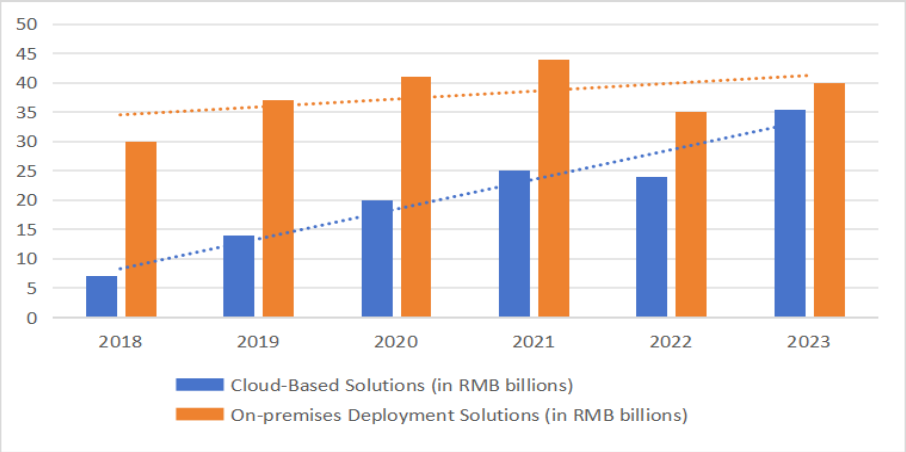

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Fig. 3. Sub-segmented Digital Market Scale of Financial and Tax-Related Transactions in China from 2018 to 2023

At present, the construction of accounting information system is inseparable from the application of blockchain and cloud computing technology. From the perspective of hierarchical construction, the blockchain technology has four levels in the accounting information system: operation layer, application layer, contract layer and technical layer[6]. In the application of cloud computing technology, it is also mainly divided into three aspects: service layer, application layer and technical facility layer (see Table 1 for details).

Table.1. Hierarchical organization of blockchain and cloud computing in accounting information system

Name	level	specific description
Blockchain	Operation layer	Entering raw data, writing smart contract code, etc
	Application layer	Production module, sales module, personnel module, etc
	Contract layer	Smart contracts, script code, algorithmic mechanisms
	Technical layer	Artificial intelligence, big data, distributed ledgers, consensus mechanisms, etc
Cloud computing	Service layer	User login interface, wireless interface, user terminal interface, etc
	Application layer	Application service interfaces, generic service components, development components, etc
	Infrastructure layer	Public infrastructure, private infrastructure

Data source: Aggregated from network data

From the perspective of application links, there are three main links in the region chain. The first link is in the input link of the original data. Blockchain technology is essentially a distributed data ledger, which can realize the decentralized storage and exchange of financial data to ensure the security and authenticity of data. The second link is in the generation of accounting vouchers, which is the mechanism of solidifying the information processing process. Financial data can be verified and shared by multiple participants at the same time, thereby reducing the possibility of data tampering and fraud. In the case of co-governance of opportunity and industry financial audit platform, it can also realize the traceability and supervision of transactions and assets. The third link is the generation link, in which blockchain technology enables data sharing and solves the problem of information asymmetry[7].There are three main delivery models for cloud computing platform services: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).The specific application is shown in the Figure 4[8]:

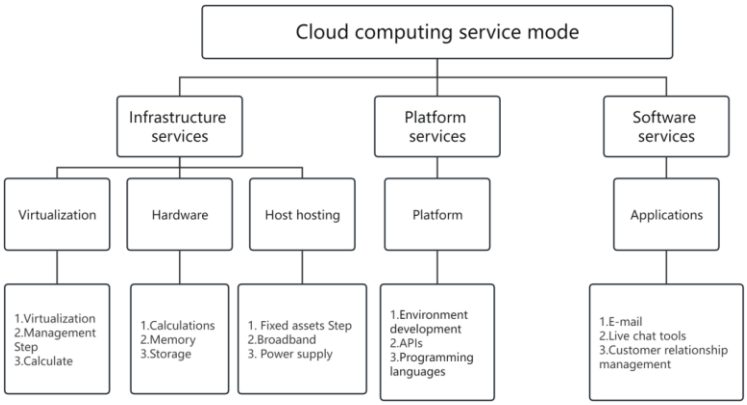

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Fig.4. Cloud computing service model diagram

The application of new technologies of blockchain and cloud computing will point out the direction for subsequent accounting work, effectively promote the innovation in the field of accounting information system, and make it more standardized. At the same time, it can also lay a good foundation for the development of accounting information system under the background of big data.

3 Current State Analysis of Accounting Information Systems

However, as accounting information systems develop, they also face challenges, which can be elaborated on from four perspectives:

3.1 Insufficient Information Technology Proficiency of Financial Personnel

In the current business environment, approximately 75% of the information required for enterprise management comes from accounting information systems. This implies that

enterprises frequently engage with and utilize substantial financial data in their daily accounting work. Many enterprises seem to overlook the urgency of enhancing the skill levels of financial personnel[9]. Given the vast datasets involved, financial personnel must possess solid accounting knowledge and advanced information technology capabilities. This is not only to ensure accurate and efficient use of accounting information systems but also to propel the financial management work of enterprises to a higher level. In this context, the role of financial personnel becomes increasingly crucial. They need to be not only processors of data but also interpreters of information and supporters of decision-making.

3.2 Security Risks in Accounting Information Systems

The security vulnerabilities of accounting information systems pose a severe challenge for current enterprises. With the continuous development of information technology, the scale and complexity of accounting information systems are increasing, accompanied by various potential security risks. Risks related to data recording, maintenance, and reporting are significant information security issues faced by enterprise accounting information systems[10]. Therefore, to mitigate these security risks, enterprises must adopt comprehensive security strategies to effectively reduce the security risks faced by accounting information systems, ensuring the security of financial data and safeguarding the economic interests and reputation of the enterprise.

3.3 Low Quality of Accounting Information Data

In contemporary enterprises, accounting personnel face various challenges when using accounting information systems. On one hand, issues such as data input errors, this situation may mislead management into making incorrect decisions, posing a potential threat to the financial health of the enterprise. On the other hand, there may be issues related to untimely updates of information in databases, resulting in the use of outdated data that does not reflect the current business situation. Additionally, insufficient consistency in information between different systems or departments may lead to information conflicts, causing confusion in understanding overall business operations and increasing the degree of data disorder. Furthermore, delayed or erroneous data updates may also result in inaccurate understanding of the current state of the enterprise, hindering timely responses from the management. In such situations, the management may struggle to obtain timely and accurate information, impeding their acute awareness of the operational status of the enterprise and making it more challenging to formulate effective strategies and decisions. Therefore, ensuring the accuracy, timeliness, and consistency of data in accounting information systems, as well as establishing clear data management strategies, is crucial.

3.4 Poor Information System Sharing in Accounting

When faced with the problem of poor sharing of accounting information systems, its impact extends beyond collaborative work and information flow within the enterprise; it may also affect the overall operational efficiency and decision-making effectiveness of the enterprise. Firstly, if the design of accounting information systems lacks sufficient flexibility and fails to adequately consider the information-sharing needs between different departments or businesses, information islands may form. This makes it difficult for various departments to share data and information, not only reducing efficiency but also increasing the difficulty of

communication and collaboration. Secondly, data isolation may be one of the reasons for poor sharing. If data in accounting information systems is excessively segmented, making it impossible for different departments to share necessary information, it will prevent information circulation within the enterprise, thereby affecting overall data collaboration. Moreover, poor sharing may also be constrained by a lack of effective integration mechanisms between systems. If multiple systems used by the enterprise cannot be effectively integrated, it will hinder seamless information transfer between different systems, impeding collaboration between various business departments within the enterprise.

4 Optimization Strategies for Current Challenges in the Era of Big Data Technology

4.1 Enhancing the Construction of Accounting Informatization Talent Team

To enhance the construction of the accounting informatization talent team in the era of big data technology, enterprises can implement a series of measures to ensure that professionals in the field of accounting informatization possess the necessary skills and knowledge:

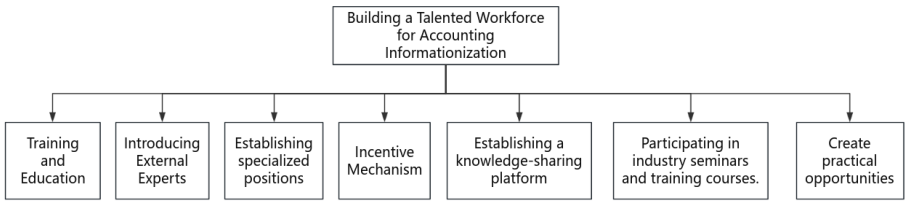

Fig .5. Construction of the Accounting Informatization Talent Team

As depicted in Figure 5, In terms of training and education, regular training and education will be provided to existing accounting personnel to keep them informed about the latest accounting informatization technologies and trends. In terms of expert invitation, professionals or consultants in the field of accounting informatization can be invited for internal training and knowledge sharing. In terms of positions, special accounting informatization positions are set up within the organization to attract talents with professional backgrounds to join. In terms of incentive measures, corresponding incentive mechanisms can be formulated to encourage employees to continue to learn in the field of accounting informatization. In terms of platform construction, a knowledge sharing platform can be created within the enterprise, so that accounting personnel can share their experiences and lessons in accounting informatization projects. In terms of industry conferences, team members are encouraged to participate in workshops, conferences and training courses in the industry to keep abreast of the latest trends and technologies in the industry and expand their horizons. In terms of practice, practical project opportunities are provided for corporate financial personnel so that they can apply their knowledge and skills in accounting informatization in a real working environment and deepen their practical experience.

4.2 Implementing Security Measures for Accounting Information Systems

Ensuring the security of the accounting information system is crucial for safeguarding sensitive financial data from unauthorized access, tampering, or leakage. The incorporation of new technologies within the realm of big data can bring about significant changes. The following are some technologies and their principles when applied to enhance the security of accounting information systems (refer to Table 2):

Table.2. Big Data Technologies Related to Security in Accounting Information Systems

Technologies	Functions	Applications
Blockchain Technology	Blockchain technology provides a decentralized,tamper-resistant distributed ledger, ensuring transparency and security in transactions. Each block contains information from the previous block, forming a chain-like structure that prevents tampering with the data.	In accounting information systems, blockchain can be used to record and verify financial transactions. Each transaction is written into the blockchain, creating a transparent transaction history. This helps prevent fraud and ensures the authenticity of financial data.
Cloud Computing Technology	Cloud computing provides scalable computing and storage resources, enabling accounting information systems to adapt flexibly to data of different scales and requirements. Cloud platforms typically offer robust security measures, including data encryption and identity authentication.	Accounting information systems can be deployed on cloud platforms, leveraging the elasticity and security of cloud computing. Data storage and processing in the cloud can be ensured for confidentiality and integrity through appropriate access controls and encryption technologies.
Data Encryption Technology	Data encryption technology is used to encrypt and decrypt data, ensuring that only authorized users can access and understand the content. This helps prevent data leaks and unauthorized access.	In accounting information systems, sensitive data stored in databases is encrypted using robust encryption algorithms such as AES. Additionally, during data transmission, encryption protocols like SSL/TLS are employed to ensure the security of data in transit.
Data Security Technology	Data security technology includes means such as access control and authentication to ensure that only authorized users can access and operate the data within the system.	In accounting information systems, implementing access control mechanisms is crucial to restrict user permissions. Through technologies such as multi-factor authentication, single sign-on, and other methods, strengthening system authentication helps mitigate the risk of unauthorized access.

4.3 Ensure the Authenticity and Validity of Accounting Data

Ensuring the authenticity and validity of accounting data is crucial for maintaining the financial soundness and transparency of the enterprise. Effective measures can be formulated through the following six aspects (refer to Figure 6):

Fig. 6. Measures for the Authenticity of Accounting Data

From the analysis of Figure 6, it can be observed that businesses, when utilizing accounting information systems, should establish robust internal control systems to better ensure the authenticity of accounting data. This is to guarantee the accuracy and reliability of data entry and processing. Additionally, businesses need to enhance the transparency of financial reporting, presenting the financial condition and performance of the enterprise clearly. This makes financial data more understandable and controllable. Furthermore, adherence to applicable accounting principles and standards is crucial to ensure compliance with regulatory requirements and reduce the likelihood of errors and fraud.

In terms of auditing, regular financial audits, including internal and external audits, should be conducted to verify the authenticity of accounting data and identify potential errors or improper conduct. Moreover, businesses should establish effective accounting information system risk management mechanisms to promptly identify and address potential accounting risks, reducing the risk of financial data errors or inaccuracies.

Finally, regular financial analysis should be conducted by comparing historical data and industry standards to identify potential anomalies. Investigations and corrections should be carried out promptly. The application of big data technology to accounting information systems can effectively address these issues. The latest accounting information systems can leverage big data integration and ETL tools to integrate information from different data sources into a consistent data view. By extracting, transforming, and loading data, inconsistencies are eliminated, ensuring data uniformity.

Visualization platforms such as Tableau or Power BI, among other big data visualization tools, can be used for in-depth analysis and visual representation of financial data. This aids in discovering patterns hidden behind the data, improving interpretability and understandability of the data. Additionally, applying blockchain technology to create a distributed ledger ensures that all parties involved can access and verify the same financial data, reducing the risks of errors and fraud.

Certain technologies within big data can transform traditional financial data into higher-quality visualized data. This allows users to easily identify trends, patterns, and anomalies in a more intuitive way. Through elements such as trend lines, bar charts, or heat maps, users can better understand the developmental trends of financial data, facilitating more accurate predictions and decisions. Big data analytics technology delves deep into patterns,

trends, and correlations within financial data, providing more comprehensive data analysis and enhancing the depth and accuracy of reports.

4.4 Strengthen Collaboration, Eliminate Information Barriers

In today's increasingly digital environment, the application of big data technology in accounting systems has become a key driver for breaking down information barriers and promoting information sharing. By incorporating big data technology, accounting systems can more efficiently process vast amounts of financial data, achieving seamless collaboration across different departments. One major technological application is the process of data integration and ETL (Extract, Transform, Load), which integrates information from multiple data sources, creating a unified data view and eliminating the issue of information silos between departments. This data integration not only includes structured data but also handles unstructured data, providing accounting professionals with more comprehensive information support.

The cloud computing environment also provides an ideal platform for the application of big data in accounting systems. Through the elastic computing and storage resources offered by cloud service providers, accounting systems can flexibly expand their processing capabilities to adapt to changing business demands. Furthermore, the standardized communication protocols and security mechanisms provided by the cloud computing environment ensure the security and controllability of data. This is crucial for information sharing across different departments, as it establishes a trusted environment, allowing departments to securely share sensitive information.

Cloud services offer applications and tools, including collaboration tools, document-sharing platforms, communication tools, etc. These tools facilitate cross-departmental collaboration and information sharing, laying the foundation for breaking down information barriers. This shift addresses the challenges of financial sharing and collaboration under traditional accounting information models.

5 Conclusion

In the era of big data, accounting information systems are undergoing accelerated reform and development. Currently, these systems have to some extent brought convenience to financial work and reduced costs for enterprises. However, they still face certain risks. Through this paper's further analysis and discussion of potential issues, relevant optimization strategies have been proposed, providing effective recommendations for enterprises in the use of accounting information systems. In summary, in an era where convenience and risks coexist, enterprises should strengthen risk management for these systems: from building financial talent to securing the accounting information system to ensuring the authenticity of financial data and enhancing data sharing among departments. Only in this way can enterprises better develop.

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