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The Factors and Preventive Measures of Enterprise Audit Risk in the Era of Big Data

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Abstract: *With the prevalence of big data technology and its wide application in business practice, the auditing work of modern enterprises has been gradually freed from the manual mode of operation, and transitioned toward the automation at the core of data-driven. This transition not only brings unprecedented opportunities for auditing, but also exposes a series of new risk factors. The authenticity, integrity and accuracy of auditing are being challenged, and these challenges center on how to ensure the quality and effectiveness of auditing in a big data environment. In addition, big data provides auditors with deeper and broader tools for analyzing data, but it also increases the demands on their professional skills. This intersection of technology and ethics provides a unique perspective for this study to explore how to effectively identify and prevent corporate audit risks in the era of big data.*

Keywords: *the era of big data; audit risk; risk prevention*

1. Introduction

With the rapid rise of big data technology, its impact on many industries has become impossible to ignore. Corporate audit, as an important means of ensuring the authenticity of financial information, is also undergoing challenges and changes in this wave. The huge amount of information, complex data structure and new data analysis methods brought by big data have brought unprecedented opportunities for the auditing field, but at the same time, they are also accompanied by significant risks. In this context, how to deeply understand and explore the risk faced by enterprise audit and take appropriate measures to prevent them has become one of the focuses of modern auditing research. This involves not only the practical operation of auditing, but also the innovation and upgrading of auditing concepts and methodologies.

2. Overview of relevant concepts

2.1. Big data technology

Big data technology is increasingly becoming the core power of enterprise operation and decision-making. The technology involves high-speed acquisition, storage, analysis and utilization of data, including but not limited to data mining, cloud computing, machine learning and distributed storage technology. Since it has the ability to process massive, heterogeneous, real-time and value-intensive data, big data technology provides a broader vision for enterprise audit.

Auditing activities have been traditionally limited by the volume and quality of data, and now their limitations are significantly improved by the support of big data technology. However, the introduction of big data also brings with it a range of audit risks. Specific algorithms may mislead the results of an analysis, while over-reliance on data may mask potential financial irregularities. In addition, with the rapid advances in technology, auditors need to continually update their knowledge to ensure that their auditing approach keeps pace with time. Nonetheless, big data technology offer unprecedented opportunities for auditors. Through machine learning and natural language processing technology, auditors are able to detect potential fraud or accounting errors with greater precision. Data can be stored and analyzed by cloud computing technology and it is not limited by geographic locations, which can facilitate auditing activities on a global scale. [1]

2.2. Audit risk in enterprises

Enterprise audit risk presents complex and variable characteristics in the context of big data. As

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auditing activities mainly rely on the authenticity, integrity and timeliness of data, the introduction of big data not only changes the traditional mode of auditing, but also gives a new dimension to audit risk. Among them, data security and integrity issues caused by the surge in data volume, and the lack of management in complex data processes, may become key factors affecting the authenticity of auditing.

First, the surge in data volume brings challenges in data storage and management. In the application of big data technology, there are many sources of data, and the technical means of data validation have not yet been perfected. Therefore, auditors may face authenticity and integrity challenges from data sources when auditing big data. Second, with the advancement of technology, the automated tools and algorithms relied on for enterprise audit are becoming increasingly sophisticated. However, these algorithms tend to operate in "black boxes," making it difficult for auditors to understand their internal logic. This technological "opaqueness" can lead to misjudgments by the auditor during the audit. And compared with traditional auditing, auditing in the big data era relies more on cloud computing, distributed storage and other advanced technologies. These technologies bring convenience to auditing activities, but also increase technical risks, such as data leakage, illegal access and data tampering. [2]

3. The shaping factors of enterprise audit risk in the era of big data

3.1. Inadequate system

The era of big data has led to the innovation of auditing technology and means, but the ensuing problem of inadequate systems has gradually come to the fore, injecting new motives for audit risk. Inadequate systems, especially the lack of audit guidance, standards and norms related to big data, add uncertainty and complexity to enterprise auditing activities.

The first reason is that the current auditing system is not fully adapted to the progress and changes in big data technology. Most of the existing auditing norms are based on traditional data processing and analyzing techniques, rather than the data acquisition, storage and processing environment of big data technology. In this context, auditors may face the challenge of not being able to cope with complex data structures, data quality and data analysis methods. Another important aspect is the lack of training and certification system related to big data auditing. At this stage, the auditing community still has a limited understanding of big data technology, and there is a lack of systematic training and certification on big data auditing. This results in auditors often lacking sufficient knowledge base and skill support when facing big data audit tasks. Finally, because the systems is inadequate, there may be blind spots in big data governance within an enterprise. For example, key aspects such as data lifecycle management, data security and privacy protection may not receive sufficient attention, leading to increased audit risk.

3.2. Increased inherent risk

With the booming of big data, the complexity of enterprise data management and utilization is increasing, then inherent risk is rising. Inherent risk, as one of the three major risks of auditing, focuses on factors in the business activities of an enterprise that may lead to misstatements in financial reporting without considering the role of internal control.

First, the dimension and coverage of big data continues to expand, and data sources are increasingly diverse, including unstructured data, streaming data, and data from cloud computing environments. This diversity of data leads to a significant increase in the complexity of data integration, cleansing and validation, which increases the likelihood of data errors, loss or tampering. Furthermore, data analysis and models become more complex, resulting in biases or errors in the algorithms that can lead to significant decision-making errors. These algorithms and models have limited transparency and often require specialized knowledge to interpret, injecting a new element of uncertainty into the inherent risk. Finally, as enterprises' reliance on big data deepens, so do the requirements for data completeness, accuracy and timeliness. Any minor data error may be magnified into a significant impact on corporate decision-making, thereby triggering audit risk.

3.3. Limited skills of auditors

In the context of big data, enterprise operating models and data management processes have undergone profound changes. The resulting auditing challenges are far greater than ever before, particularly the limitations of auditors in terms of technical capabilities.

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For auditors, big data does not only mean the explosive growth of data volume, but also represents the diversification of data types, sources and processing methods. Traditional auditing methods are overstretched in the big data environment, making it difficult to meet the depth and breadth requirements of auditing. Lacking an in-depth understanding of new data processing technologies, algorithms and the logic behind them, auditors may overlook important risk points or misjudge the size of risks. Furthermore, with the advancement of technology, the technologies of big data are emerging, such as distributed computing, machine learning and deep learning, which gradually raise the technical requirements for auditors. In this environment, auditors will find it difficult to perform complex auditing tasks if they are stuck with traditional auditing skills. However, it is also worth considering that the effects of the technology is a double-edged sword. Even if auditors have mastered advanced technology, they still need to combine experience with professional judgment. Over-reliance on technology may lead to the neglect of the real risks of an enterprise.

Therefore, for auditing organizations, it is not only necessary to strengthen the technical training of auditors, but also to strengthen the updating of auditing concepts to ensure that auditors can accurately grasp the essence of auditing while mastering technology. In addition, encouraging interdisciplinary cooperation and research is also worth considering, such as the introduction of data scientists to work collaboratively with auditors to jointly identify and assess risks. [3]

4. Preventive measures for enterprise audit risks in the era of big data

4.1. Improvement of business norms and auditing standards

With the wide application of big data technology in enterprises, traditional auditing standards and business norms show their limitations in many aspects. The massive information, diverse data types and high-speed information flow brought by big data have brought new challenges to auditing. Therefore, in order to reduce the audit risk, it becomes especially critical to improve business norms and audit standards.

4.1.1. The centrality of data quality

Big data is characterized by a large amount of data, but it does not necessarily mean the quality of the data. New auditing standards should clearly indicate how to assess the quality of data and ensure its completeness, accuracy and timeliness. This involves not only data cleansing and screening at the technical level, but also the review of data sources.

4.1.2. Cross-departmental cooperation

Sound business norms should emphasize the close cooperation of all departments in the auditing process. In a big data environment, information often comes from multiple departments, and only by guaranteeing the unimpeded flow of information can the effectiveness and accuracy of the audit be ensured.

4.1.3. Continuous updating of auditing technology

Big data technology is changing rapidly, and auditing guidelines and business norms should be updated accordingly. Enterprises should conduct regular training on auditing techniques to ensure that the audit team keeps up with the times, while the auditing standards should also have a certain degree of flexibility to adapt to changes in technology.

4.1.4. Remodeling of auditing culture

In the era of big data, auditing is not just about checking numbers and facts, but more about interpreting the logic and patterns behind the data. It requires audit teams to have a strong desire to learn, and the abilities of critical thinking and innovation.

4.2. Practicing the new model of "data plus audit"

With the rapid development of big data technology, the auditing field is facing a series of unprecedented opportunities and challenges. Especially at the level of risk management, the new model of "data plus audit" has become an increasingly innovative indicator of the industry, and plays an irreplaceable role in identifying, predicting and controlling audit risks.

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4.2.1. Making audit decisions by data

Traditional auditing methods are limited by the limitations of manual sample extraction and analysis, but in the big data environment, auditors can adopt advanced data analysis tools for in-depth data mining. For example, machine learning algorithms can help identify patterns, which provides higher sensitivity and accuracy in term of detecting uncommon financial malpractice or predicting possible risk events.

4.2.2. Auditing in automated processes

Big Data brings large amounts of unstructured data such as text, images or audio. These data types often contain critical audit clues. With automated data disposing and analysis processes, auditors can quickly extract useful information from this data to more effectively locate potential risk points.

4.2.3. Real-time monitoring and risk warning

The "data plus audit" model allows enterprises to conduct ongoing audits, which means that key indicators can be monitored in real time, and the system can automatically triggers warnings once the event of abnormal patterns occurs. This real-time feedback ensures that the audit team can act quickly to minimize risk exposure.

However, to fully realize this new model, it is not enough to rely on technology alone. Audit teams need to have a deep understanding of the nature and characteristics of big data, and they carry out innovation and practice in conjunction with the core principles of auditing. The close integration of technology and methodology will make the "data plus audit" model a powerful weapon for enterprise risk management. [4]

4.3. Increasing control of data security

As the data assets value increases, the importance of its security also rises, which prompts the auditing industry to conduct a deeper examination and control of data security.

4.3.1. Deep learning and anomaly detection

The use of deep learning models to analyze large amounts of transaction data can locate anomalous patterns more accurately, thereby capturing potential security risks in a timely manner. Compared with traditional rule-based detection methods, deep learning provides higher accuracy and response speed, ensuring that data integrity is not compromised.

4.3.2. encryption technology and data protection

In the auditing process, the disposing and storage of sensitive data should adopt advanced encryption technology to safeguard data from the source. Similarly, blockchain technology provides a new safeguard mechanism for integral and tamper-resistant data.

4.3.3. Dynamic access control and audit trail

Dynamic access control ensures that only authorized auditors can access the relevant data, while audit tracking technology is used to record all data access behaviors and provide informative operation records for subsequent reviews.

4.3.4. Quantum security and future auditing

Quantum computing provides a new perspective on future data security threats. The auditing industry needs to layout in advance to understand the potential impact of quantum attacks and provide technical preparation for future auditing.

To sum up, audit work in the era of big data has long been more than just checking financial data, and more attention is paid to the security and integrity of the data itself. Increasing the control of data security is not only the basic requirement of audit, but also the key to ensure the sustainable and sound development of enterprises.

4.4. Constructing the identification system of audit risk

In the context of big data, the complexity and uncertainty of audit risks have increased. In response to this trend, it is particularly important to build a technology-driven and well-structured audit risk identification system.

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4.4.1. Intelligent analysis and pattern recognition

Machine learning technology is used, and potential risk patterns in big data can be automatically identified. Through training, the model is able to learn from historical risk events and provide auditors with accurate risk warnings.

4.4.2. Network topology analysis

Through in-depth analysis of the internal network structure of an enterprise, it reveals its implied weak sectors and potential threats, thus laying a solid foundation for early identification and control of risks.

4.4.3. Semantic auditing technology

For unstructured data, such as text, email or social media, natural language processing technology is used to analyze the implied risk signals, which provide enterprises with a more comprehensive audit perspective.

4.4.4. Quantitative assessment of risk factors

Through statistical methods and econometric models, known risk factors are quantitatively assessed, thus providing an objective and scientific basis for audit decision-making.

4.4.5. Adaptive strategy framework

In order to cope with the evolving audit environment, the identification system should be highly adaptable and flexible, and be able to quickly incorporate new technologies and strategies.

In short, building an efficient, technology-driven audit risk identification system is a core element of auditing in the era of big data. Only when an enterprise is able to accurately and timely identify potential risks can it ensure the quality and efficiency of its audits and meet the growing demand for audits.

4.5. Improving the ethics of auditors

In the wave of big data, audit risks are expanding and evolving, in which the professional ethics of auditors become a key preventive measure. Just as the technological innovations in this context, both the ethical norms and skills of auditors need to be systematically reshaped.

First of all, for traditional audit practitioners, they have a wealth of experience in reviewing financial statements and related vouchers, but in the face of the huge, complex, and volatile data sets of big data, it is clear that traditional auditing methods and techniques are no longer able to satisfy increasingly complex auditing needs. Therefore, auditors must master advanced data processing technologies such as big data analysis and data mining, and then they can identify risk efficiently and accurately for huge data sets.

Then, with the advancement of technology, the boundaries of auditing are also expanding. Auditors not only need to master advanced auditing tools, but also need to have an in-depth understanding of business processes, internal control systems, and related technical architectures. This not only requires auditors to have an interdisciplinary knowledge structure, but also requires them to be able to work deeply with IT experts, data scientists, and other professionals in practice to advance the progress of the audit.

Finally, regular ethical assessments should also be built into the practice to ensure that auditors always adhere to the highest ethical standards when working with complex data. Transparency and fairness become especially important in this environment, and it is necessary to ensure openness and transparency in data processing and analysis, to fully document the decision-making process, and to prevent any form of bias or distortion in data manipulation. In addition, cooperated with data scientists and ethicists cross subjects, auditors are also provided with a broader perspective and strategies, which can respond ethical challenges in the context of technicalization. [5]

5. Conclusion and Implications

In the context of big data, the field of corporate auditing is undergoing a deep transformation. In this transformation, auditors not only need to deal with the increasing volume and complexity of data, but also cope with the new types of audit risks that this entails. However, every technological leap has

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two sides: it presents both opportunities and challenges. The core purpose of auditing is to provide true and fair financial reporting to support decision-making. To realize this goal, big data provides powerful tools like the model of data analysis and prediction, which makes audit work more efficient and accurate. But at the same time, factors such as over-reliance on data, misuse of technology, or incomplete data may lead to auditing errors and may even threaten the credibility of the audit.

Therefore, the takeaways from this paper include that it requires auditors to have greater data sensitivity, stronger technical skills and stricter professional ethics while big data brings great potential to auditing. As it keeps evolving in technology, the field of audit should continue to innovate and improve itself to ensure that the authenticity and reliability of audit work is safeguarded in the new technological environment.

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