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Application of Big Data Technology in Audit

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Abstract

In the new era of rapid development of big data technology, the three key points of high-quality development of auditing are auditing talents, auditing rule of law and auditing technology. In the traditional audit process, auditors focus on professional judgment and professional competence, make audit plans, implement audit procedures and draw audit conclusions. However, there are many problems in traditional audit work, such as difficulty in obtaining sufficient external information and inefficiency in analyzing audit evidence. Therefore, auditors apply big data technology to audit work to solve various problems and put forward corresponding safeguard measures.

Keywords

Audit, Audit process, Big data technology

1. Research Background and Significance

1.1 Research Background

The new era of rapid development of big data technology has prompted changes in audit processes and methods. In order to realize the high-quality development of auditing, it is necessary to cultivate high-quality auditors who are law-abiding, enforce the law impartially, have both ability and political integrity, and have excellent professionalism. Then, improve the audit-related laws and regulations. Finally, the application of big data technology in auditing has promoted the development of auditing technology.

1.2 Research Significance

At the research level, applying big data technology to auditing is a change in the way of auditing. The traditional audit process is to collect, sort out and analyze data artificially. On the practical level, it mainly reflected in the innovation of audit mode, promoting the full coverage of audit, improving audit efficiency and audit quality in three aspects. So, by expounding the application of big data technology in audit work, this study can provide the combination of audit practice and theory, enrich the related theories of big data technology and audit, and is also a way for auditors to innovate audit mode. In

addition, the application of big data technology in auditing will fully promote the high-quality development of auditing.

2. Application of Big Data Technology in Audit Preparation Period

2.1 Understand the Situation of the Audited Entity

Knowing about the audited entity is the process of collecting audit evidence, obtaining internal information such as financial information, business processes from the audited entity, and inquiring and collecting relevant information from external websites. However, there are three limitations in the process. First, the cost and utility of obtaining information are unbalanced. Second, the quality of the information obtained is inferior. Third, information acquisition is inefficient.

In order to break the limitations of collecting information, auditors introduced web crawler technology, tag cloud analysis technology and Hadoop distributed system framework. Firstly, the auditor can fully collect the public data of the audited entity on the Internet by using the web crawler technology, and explore the relevant audit clues more comprehensively. (Wang, 2020) Chang and Li's (2023) experiment proved that in the audit process of Jin Zhengda from 2015 to 2019, if using web crawler technology to dig and analyze on the Internet can help certified public accountants quickly obtain and analyze data and adjust audit procedures in time. (Chang, 2023) Secondly, auditors can visually present data other than structured data through tag cloud analysis technology. Mu and Nie (2023) used tag cloud analysis for unstructured data in their research, so that it is concluded that some of the funds are used for employee welfare, meals and other aspects. (Mu, 2023) Thirdly, auditors combine multidimensional data analysis technology and visualization technology to analyze structured data with multiple dimensional attributes, and present the analysis results directly in the form of scatter plot and parallel coordinates. (Xu, 2020) Yao and Ai (2021) used multidimensional data analysis technology in the process of budget execution audit, and verified that the unit had the problem of defrauding special financial subsidy funds. (Yao, 2021) Finally, auditors can use Hadoop, which can solve the problems of different types of data storage and anticipation. In the process of medical insurance audit in Hubei province, a big data audit system was built using Hadoop framework, and the files were divided into file blocks by HDFS and Map Reduce, and stored in the corresponding databases respectively. (Chen, Zhang, etc., 2018)

2.2 Preliminary Evaluation of the Internal Control System of the Audited Entity

The purpose of the preliminary evaluation of the internal control system of the audited entity is to preliminarily evaluate the design rationality and implementation effectiveness of the internal control system. Generally, auditors use walk through testing to observe and analyze the actual business process and key positions. However, there are two limitations in the process of initial evaluation of internal control. On the one hand, auditors generally use two methods to compare the actual business process and internal control system of the audited entity. The first method is that auditors draw the flow chart manually by using drawing tools. The second method is to operate the actual business. In actual audit

work, auditors are easily influenced by subjective factors when using these two methods, which are easily distracted by things with low correlation. On the other hand, auditors choose the important business processes and key positions of the audited unit to compare with the internal control system. This ignores the internal control system design of other business processes, the staffing of other posts, and the audit risk points existing in other processes.

In order to realize the improvement of evaluation efficiency, auditors use process mining technology. By using the occurrence time and related information of events recorded by the audited entity, the real business activity process is directly restored, and then the occurrence process of events is automatically presented as a process model by using process mining algorithm. Cheng and Yang (2023) identified and analyzed the capital recognition process of an enterprise with process mining technology, which realized automatic processing of capital recognition process and improved work efficiency. (Cheng & Yang, 2023)

2.3 Make an Audit Plan

The auditors make an overall audit strategy and a specific audit plan based on the evaluation results and the previous audit results. However, in this traditional process, if the audit doubt beyond the plan is found in the implementation stage, the auditor needs to modify the audit plan according to the specific situation. It will also lead to an increase in the difficulty of the audit work and reduce the audit efficiency and quality.

In order to make the audit plan more accurate, auditors use Ghat GPT to assist in making the audit plan. The first step is that the auditor will import the standard audit plan template and the obtained useful information into Ghat GPT. The second step is that Ghat GPT will analyze and summarize the information according to its own technologies. In the third step, auditors check the audit plan automatically generated by Ghat GPT. Cheng, Liao, and Wu (2023) studied the audit process of certified public accountants, and concluded that Ghat GPT has strong natural language processing ability and assist auditors in making audit plans. (Cheng, Liao, & Wu, 2023).

3. Application of Big Data Technology in Audit Implementation Period

3.1 Test and Evaluate the Internal Control System of the Audited Entity

In the audit implementation stage, the internal control system of the audited entity is tested whether the internal control is running truly and effectively and whether there are defects. Because on the basis of maintaining professional suspicion, if the internal control of the audited entity is true and effective, and the obtained audit evidence is reliable and relevant, then the number of samples taken can be reduced accordingly when implementing substantive testing. In addition, auditors should implement re-execution procedures. However, there are two defects in the process of designing and implementing the control test program. Firstly, if the control test program designed by auditors is unreasonable or not implemented properly, it will directly lead to the failure of control test, which is likely to lead to inappropriate risk assessment results. Secondly, due to the high cost of re-execution, it is likely that

auditors will be superficial in the implementation process in pursuit of cost-effectiveness.

In order to solve the shortcomings of designing and implementing control tests, auditors adopted IPA technology. IPA technology can automatically perform a large number of repetitive tasks through preset programs, thus reducing the pressure of audit work and improving audit efficiency. (Jiang, 2023) Deloitte Certified Public Accountant had developed an intelligent robot. According to the preset procedures and parameters, it uses IPA technology to design and execute control tests, and automatically capture and track the process documents at any time, intelligently analyze the documents, and record the occurrence and processing of business activities in time. (Tian, Chen, & Zhou, 2022)

3.2 Test Financial Statements and Economic Activities

when testing financial statements and the economic activities they reflect, auditors to identify and deal with the risk of major misstatement at the identified level, mainly including detailed testing and substantive analysis procedures. However, there are two limitations. On the one hand, when implementing the detail test, auditors use a variety of audit methods and implement different audit procedures for different projects, which may not control the increase of audit costs. On the other hand, in the process of implementing substantive analysis procedures, auditors need to analyze the financial data such as financial ratio analysis and data comparison analysis. If audit conclusions are drawn based on false information, the risks borne by auditors will increase sharply.

Therefore, auditors use block-chain technology, multidimensional data association analysis technology and visualization technology to improve the efficiency of implementing substantive procedures. Block-chain technology prevents the audited entity from tampering or forging business activities and transaction records and increases the credibility of the audited entity’s information. (Zhang, Li, Wan, etc., 2020) Then, using the multidimensional data association analysis technology, the abnormal data and other related multidimensional data of the audited entity are associated and causal analyzed, and compared with the multidimensional data of other enterprises in the industry. (Zhu, 2021) Finally, structured and unstructured data are programmed with Python and the analyzed contents and results are drawn into many types of images such as line charts and tag cloud. (Wang, Lu, Ren, etc., 2021) Tao, Zhou, and others (2023) founded that in the research of the project-driven internal audit system of overseas EPC of state-owned enterprises, the block-chain technology solves the problems of file storage and transmission errors. (Tao, Zhou, Hu, etc., 2023)

3.3 Collect and Analyze Audit Evidence

Auditors need to screen out effective audit evidence from the quantitative point of view and from the qualitative point of view to provide sufficient support for their published audit opinions. After considering the cost and benefit, auditors usually collect audit evidence by sampling, so that sampling audit brings certain risks to the audit work. Firstly, sampling audit cannot achieve full coverage audit. Secondly, there are fewer channels to obtain audit evidence, such as financial statements and accounting books. Thirdly, evidence is not reliable.

The reason why auditors have introduced big data collection and mining technologies, such as web

crawler technology, Optical Character Recognition (OCR) technology and association rules technology. Auditors get enough external data through web crawler, and use Hadoop distributed system framework to automatically collect and classify the internal data of the audited unit. For unstructured contract texts and other documents, OCR technology is used to audit. Using technology of association rule to mining the deep relationship between the data, and directly generating association rules from these data (Li, 2023). Using multidimensional data analysis technology, auditors can grasp the characteristics reflected by the data by analyzing and studying the excavated data from multiple angles. Wu, He, and others (2021) in the application research of big data mining technology in financial statement fraud audit, realize the in-depth mining and analysis of all the samples of the audited units and urge auditors to obtain strong audit evidence. (Wu, He, Fang, etc., 2021)

3.4 Prepare Audit Working Papers

The preparation of audit working papers is a behavior that runs through the whole audit process from the audit activities to the issuance of audit reports. Auditors fill in the audit working papers according to the collected data, sort out and analyze the data in the papers, and compare the analysis results with the data provided by the audited entity. So the preparation of audit working papers will cost auditors a lot of time to fill in and analyze the data in audit working papers, instead of using time to find out the reasons and solve the differences in data.

Therefore, auditors can use IPA technology to prepare audit working papers. In 2017, Deloitte & Touche Accountants launched the financial robot, which has digital intelligence technologies. When compiling audit working papers, auditors only need to input the data of the audited entity into it, which will not only automatically fill in the corresponding audit working papers, but also use various big data technologies to analyze the data in the audit working papers. According to Deloitte's data, the time for preparing the manuscript was reduced from the previous 1.5 hours to less than 30 minutes. (Cheng, Yu, & Gong, 2023)

4. Application of Big Data Technology in Audit Completion Period

4.1 Overall Project Review

The overall review of audit projects can be divided into two parts: review of audit evidence and audit working papers. In reviewing audit evidence, auditors mainly check the correlation between audit evidence and audit objectives and the support for audit conclusions. The traditional review of audit working papers is to implement three-level review. In order to avoid the auditor's careless review of audit evidence and audit working papers. Auditors can use IPA technology to conduct automatic review directly by audit robots according to the provisions of audit standards and the requirements of audit work. Jiang and Zhao (2022) expounded that IPA audit robots imitate the thinking mode of auditors and make audit judgments and decisions. Audit institutions can build IPA audit robots according to their own capabilities, so that they can compile appropriate algorithm models, implement audit procedures and audit reviews through continuous deep learning. (Jiang & Zhao, 2022)

4.2 Prepare Audit Report

In the traditional audit process, the audit report is compiled manually by the certified public accountant according to the audit conclusion obtained from the implementation of the audit procedure. However, before the audit report is issued, the auditor will inform the management of the audited unit of the audit opinion. If the audited unit does not recognize the audit conclusion, it is likely that the auditor will choose to conceal the actual audit conclusion and publish inappropriate audit opinions when preparing the audit report after considering factors. In order to avoid expressing inappropriate audit opinions, auditors combined Chat GPT and block-chain technology to prepare audit reports. Firstly, auditors input audit evidence and audit working papers into Chat GPT, which uses machine learning and natural language processing technology to master the rules of audit reports, automatically generate high-quality audit reports. Secondly, the block-chain technology is applied to the process of compiling audit reports. Wu and Tang (2023) had researched on smart audit based on Chat GPT, it is stated that Chat GPT can select a suitable audit report template, automatically generate an audit report according to the requirements of the audit report. (Wu & Tang, 2023)

5. Safeguard Measures for The Application of Big Data Technology in Audit

5.1 Building an Audit Intelligent Platform

At present, audit work is divided into on-site audit and off-site audit, and the combination of on-site audit and off-site audit is often used in the audit industry. However, due to the outbreak of COVID-19 epidemic, it is difficult for audit institutions to achieve on-site audit, which increases the opportunities for off-site audit. However, in the process of off-site audit, the opportunity for auditors to verify the authenticity of internal data provided by the audited entity is greatly reduced, so the audit opinions issued by auditors may not objectively reflect the real situation of the audited entity, and the risk of audit failure will increase. It can be seen that auditors should build an audit wisdom platform to realize the possibility of remote audit, avoid the audit work during the epidemic period and reduce the risk of audit failure.

5.2 Establish Data Thought

The application of big data technology in auditing solves all kinds of problems existing in the traditional auditing process, for example breaking the barrier of data acquisition through big data technology such as web crawler technology, which enables auditors to obtain information from the network at any time. it is the basis for realizing the steady development of full coverage of auditing. Therefore, people engaged in auditing should keep up with the development of the times, learn from the pioneers who introduced big data technology, establish data thinking in time, fundamentally understand the convenience brought by big data technology to auditing, and realize the importance of big data technology to auditing.

5.3 Cultivate Compound Audit Talents

Compound audit talents refer to talents who have both audit expertise and proficiency in big data

technology. Audit institutions should not only pay attention to auditors' learning and storage of accounting-related professional knowledge, but also pay attention to auditors' learning of big data technology, actively organize relevant training on the combination of big data technology and auditing, regularly assess auditors' professional knowledge such as auditing, check the learning situation of big data technology, and inspect auditors' use of big data technology in audit work.

5.4 Improve Laws and Regulations Related to Auditing

On the one hand, the audit legislation should solve the legality of the application of big data technology in the audit, so as to establish the norms of using big data technology in the audit work and ensure the smooth development of big data technology in the audit work, so as to better promote the healthy development of the application of big data technology in the audit work. On the other hand, from the perspective of the popularization of laws and regulations, improving audit-related laws and regulations can guide the audit industry to vigorously promote the application of big data technology in auditing, improve the enthusiasm of auditors for learning and applying big data technology, open up audit thinking, and promote the innovation and change of audit mode and audit tools.

6. Conclusion

The traditional audit work is that auditors have professional competence, and use professional judgment to collect and analyze the relevant information of the audited unit in the audit work, and finally draw the audit conclusion. However, there are various problems in the traditional audit process. In order to solve these problems, auditors select the applicable big data technology and apply it in specific audit procedures.

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