

Analysis on Risk Evaluation of Big Data Audit Based on AHP

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ABSTRACT. *With the arrival of big data era, audit risk is more complicated and diversified, which brings more uncertainty to audit mode. Based on the analytic hierarchy process, we can try to construct the big data audit risk evaluation system from the operational point of view, invite experts, scholars and firm practitioners to rate all kinds of audit risk indicators, and we can identify the that are most worthy of CPA's attention in the big data audit environment. It is found that the hierarchical analysis method can quantify the weight of the index, enhance the implementation of the evaluation index, help to evaluate the importance of the new audit risk objectively and fairly, and provide for the future audit work Methodological guidance.*

KEYWORDS: *Big data, AHP, Audit risks*

1. Introduction

1.1 Research background

In 2015, the General Office of the Central Committee and the General Office of the State Council, "opinions on the implementation of full audit coverage", put forward "building a big data audit work model, improving audit ability, quality and efficiency, and expanding the scope and depth of audit supervision. Big data not only helps the audit industry information, automation, but also brings new audit risks, and puts forward new challenges to CPA.

Hierarchical analysis method has been widely used in China's economy and society since 1982. For the audit risk, we can establish the order level according to the actual relation of inherent risk, control risk, check risk, and make it orderly, and can carry on the objective analysis through the professional opinion, so the analytic hierarchy process can effectively apply to the audit risk.

1.2 Significance of the study

In the process of CPA practice, in order to enhance the authenticity and fairness of audit reports, it is often necessary to identify and overcome a large number of audit risks, and audit risks are constantly changing with the introduction of big data. The CPA needs to make a lot of professional judgment, because of the inherent risk caused by the complexity of the modern audit environment, the control risk caused by the initiative of the audit object and the inspection risk caused by the wide scope of the audit content, it is more difficult for the CPA to make a completely correct audit conclusion, and the practice judgment risk generated in the practice process is also inevitable, so it is particularly important for the effective identification of audit risk. At the same time, this paper uses AHP to further identify the big data audit risk that is most worthy of attention in the audit, and helps CPA to focus on the important audit risk when carrying out the audit.

1.3 Current Research Situation and Evaluation of the Current Situation

Tan Zou , Fang Dong (2011) according to the category of audit risk as the first layer classification basis, the response measures for different risks as the second layer classification basis, using AHP to identify the internal audit risk, in order to analyze the different internal audit risk, respectively what measures should be taken [1].

Fen Xiao and Lixin Chen (2018) used fuzzy analytic hierarchy process to model and analyze the audit risk under the "Internet" mode, and put forward some suggestions to improve the internal control for the management of the enterprise [2].

Suyue Jiang (2012) used AHP to model and analyze the performance evaluation system of internal audit of enterprises, which is helpful for the internal audit department of enterprises to grasp the important links of internal audit of enterprises relatively accurately and to improve the efficiency and effect of internal audit of enterprises [3].

Some scholars have applied this method to the identification and control of Internet audit risk, but it does not take the accounting firm as the first perspective to analyze the audit risk, and more to provide the management of the enterprise with advice on internal audit risk control. This paper mainly takes the accounting firm as the first angle of view, uses the analytic hierarchy process method, aims to identify the audit risk that the CPA needs to pay attention to most in the big data era, and provides the advice on the audit risk for the CPA.

2. Processes for auditing in the context of big data

A new type of audit risk in the big data era identified CPA the above paper is used as the influencing factor to evaluate the overall audit risk combined with the analytic hierarchy process. Refer to Meili Yang, Yan Zhang, Hui Zhao (2009) nusing AHP [4].

There are three types of audit risk, inherent risk, control risk and check risk. During the era of big data, the connotation of three types of audit risk has also changed. Based on the modeling of three types of audit risk, this paper evaluates the audit risk CPA big data era, and establishes an index system.

2.1 Brief Introduction about the index system

The Target of the model is to identify and analyze the most important risk point of CPA audit risk in the era of big data, that is, the risk point that deserves the attention of CPA most. In the risk factor layer, there includes three risks, namely inherent risk, control risk and check risk. Inherent risk. And the specific risk layers will subdivide the risk for the first level index. The information about this layer will be detailed in the following table.

2.2 Establishing a Set of Factors Influencing CPA Audit Risk in the Era of Big Data

The primary indicators are, the overall audit risk factor set, including inherent risk, control risk and check risk, $A=(B_1,B_2,B_3)$; the secondary indicators are, inherent risk factor set $B_1=(C_1,C_2,C_3)$, control risk factor set $B_2=(C_4,C_5,C_6,C_7)$, inspection risk factor set $B_3=(C_8,C_9,C_{10},C_{11},C_{12})$.

Table 1 Impact factors of CPA audit risk in the big data era

Criterion level	Level I indicators	Level II indicators
The Evaluation Index of CPA Audit Risk in Big Data Era (A)	Inherent Risks (B ₁)	Loopholes inside the audit platform (C ₁)
		Hackers and Trojan viruses (C ₂)
		Competition and benefits increase fraud risk (C ₃)
	Control Risks (B ₂)	Server collapse of financial platform (C ₄)
		Unauthorized access to data (C ₅)
		Data being stolen in transmission (C ₆)
		Data tampering (C ₇)
	Inspection Risks(B ₃)	Data acquisition risk (C ₈)
		Data analysis risk (C ₉)
		Weak information capabilities of auditors (C ₁₀)
		Inadequate professional quality of auditors (C ₁₁)
		Some auditors lack professional ethics (C ₁₂)

2.3 Construct a judgment matrix and test for consistency

This paper invites the auditors of the internal audit department of the enterprise, the auditors of the accounting firm and the university teachers as the expert group to score the audit risk factor set by questionnaire.

The following judgment matrix is obtained by collating the questionnaire data:

Table 2 Judging matrix A-B

A	B ₁	B ₂	B ₃
B ₁	1	1/5	1/9
B ₂	5	1	1/3
B ₃	9	3	1

Table 3 Judging matrix B₁-C

B ₁	C ₁	C ₂	C ₃
C ₁	1	1/2	1/5
C ₂	2	1	1/3
C ₃	5	3	1

Table 4 Judging matrix B₂-C

B ₂	C ₄	C ₅	C ₆	C ₇
C ₄	1	2	1/5	1/9
C ₅	1/2	1	1/3	1/7
C ₆	5	3	1	1/3
C ₇	9	7	3	1

Table 5 Judging matrix B₃-C

B ₃	C ₈	C ₉	C ₁₀	C ₁₁	C ₁₂
C ₈	1	1/3	1/2	1/6	1/7
C ₉	3	1	2	1/2	1/5
C ₁₀	2	0.5	1	1/7	1/2
C ₁₁	6	2	7	1	1

C ₁₂	7	5	2	1	1
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By calculation, the following results are obtained:

Table 6 Results

Criterion layer Weight	(0.0637,0.2674,0.6689)	CI=0.0146,CR=0.0251<0.1
Index Layer Weight	(0.1222,0.2299,0.648)	CI=0.0018,CR=0.0032<0.1
	(0.0831,0.0682,0.246,0.6027)	CI=0.059,CR=0.0656<0.1
	(0.048,0.1359,0.0937,0.362,0.3604)	CI=0.0237,CR=0.0264<0.1
Total Sort Weight	(0.0078,0.0147,0.0413,0.0222,0.0182,0.0658,0.1612,0.0321,0.0909,0.0627,0.2421,0.2411)	CR=0.03647<0.1

CR<0.1 obtained from the calculation of each weight of the criterion layer and the target layer, that is, all judgment matrices pass the consistency test.

Table 7 Weight of CPA audit risk factors in the big data era

Criterion level	Level I indicators	Weight of Level I indicators	Level II indicators	Relative weight	Total weight	Rank of Total weight
The Evaluation Index of CPA Audit Risk in Big Data Era	Inherent Risks	0.0637	C ₁	0.1222	0.0078	12
			C ₂	0.2299	0.0147	11
			C ₃	0.648	0.0413	7
	Control risks	0.2674	C ₄	0.0831	0.0222	9
			C ₅	0.0682	0.0182	10
			C ₆	0.246	0.0658	5
			C ₇	0.6027	0.1612	3
	Inspection risks	0.6689	C ₈	0.048	0.0321	8
			C ₉	0.1359	0.0909	4
			C ₁₀	0.0937	0.0627	6
			C ₁₁	0.362	0.2421	1
			C ₁₂	0.3064	0.2411	2

The calculation results show that the inspection risk and control risk account for a large weight, the CPA should pay attention to the risk of fraud that the data of the audited unit is tampered with and stolen in the audit process, at the same time, the CPA should strengthen its professional accomplishment and information ability, and

maintain a high level of professional ethics in order to reduce the inspection risk and deal with the changing audit environment.

3. Countermeasures for CPA Audit Risk in the Era of Big Data

3.1 Prevention and control of inherent risks

3.1.1 Strengthening the Informatization of Financial Platform

The author believes that accounting firms should put forward suggestions on platform construction to enterprises to jointly reduce the inherent risks of audit. First of all, for the inherent defects of the platform, we should improve the financial platform construction. On the one hand, increase financial, human input or cooperate with relevant software development companies, so that the hardware and software of the computer are upgraded, and strive to reduce the loopholes or defects of the platform. On the other hand, the new platform to increase the strength of testing, in the test found problems, improve the audit on the platform, at the same time to strengthen the maintenance of the platform at the later stage to ensure its stable operation. For external hackers, virus threats, we should improve the internal control system, regularly carry out safety education for financial personnel, set up a scientific management system, implement hierarchical management of data, do a good job of data collection, storage, transmission protection measures, at the same time do a good job of physical isolation measures to ensure the security of information. In the transmission of information, we should also arrange special line transmission to ensure the confidentiality of information. Secondly, for the problems in data transmission, we should do a good job of preventive measures in advance. Accounting firms should also regard the evaluation of the compatibility of audit software with the financial software of the audited unit as an important task in the preparation stage of audit work. If problems are found, computer staff should communicate in time to repair the incompatibility of the software.

3.1.2 Improve relevant laws and regulations and articles of association

Rongsheng Qin (2014) believes that we should formulate the development strategy of big data audit, speed up the construction of big data legislation, establish a platform for big data audit analysis, and actively deal with the development of big data audit [5]. In the era of big data, relying only on data or technology can not avoid the risk brought by human thought. If we want to reduce management fraud, we must resolve the conflict of interest — the most fundamental contradiction of agency theory. The company can provide an equity incentive plan to the management to align the interests of the management with the interests of the shareholders. At the same time, improve the company's internal safety education plan, improve the company's safety culture construction, reduce the motive of fraud ideologically, and change the management from "enterprise threat" to "fraud defense

line ". According to the theory of fraud triangle, in order to protect the legitimacy of management's behavior, in addition to the need for management's own professional ethics education, it is also necessary to increase the punishment. Enterprises should also improve the internal control mechanism, so that people-oriented system as the outline, in order to reduce the possibility of personnel fraud. Aihua Li and Jiaying Yang (2019) believe that audit institutions must also formally make recommendations to enterprises to strengthen their professional education of accountants and pay attention to the motivation and opportunities of fraud in order to reduce the audit risk caused by fraud [6].

3.3 Prevention and control of control risks

In the process of accounting firm's audit, only the internal control can be evaluated, and the size of the risk controlled by the audited unit can not be controlled and controlled. As a part of enterprise operation, internal control can only be controlled by enterprise management, and the only measure to reduce the risk of control is to establish and perfect its internal control system. As an audit unit, accounting firms can identify the operational risks in the financial information control system of enterprises in the big data era. On the basis of summing up the suggestions of scholars and staff of the firm, the author puts forward the following prevention and control measures for enterprises, hoping to provide some help for enterprises.

3.3.1 Enterprises should establish and perfect financial information secrecy system

According to the above mentioned, the confidentiality of information is subject to unauthorized access to data, data in the transmission process is stolen two major risk points. For the risk of unauthorized access to data, enterprises should establish a system of information confidentiality to ensure that low-level employees should be unable to obtain confidential information of the enterprise in order to maintain the security of financial information. For the possible risks in the process of data transmission, enterprises should establish and improve the information barrier or other protective measures to ensure the security of financial information in the process of data transmission. The financial information secrecy system of enterprises reflects the degree of control of information security. If the financial information secrecy system of enterprises is relatively sound, it reflects the high degree of financial information security of enterprises, and its financial information is trustworthy; if enterprises do not have financial information secrecy system or have no validity, it reflects the low degree of financial information security of enterprises, and its financial information credibility is low.

3.3.2 Enterprises should strengthen the security construction of financial software system

According to the above mentioned, the security of financial software system is threatened by two major risks: server collapse and data tampering. For the risk point of server collapse, enterprises should do a good job of "prevention work" and "rescue work ", that is, regularly update or replace the server, backup financial information and so on in advance to prevent, using document repair software, computer experts to restore information and so on for ex post control. For the risk point of data being tampered with, enterprises should physically isolate computers and logically isolate financial software. Physical isolation, that is, the enterprise's intranet does not directly or indirectly access the public network, cut off the path of external contact with the company's network, and then protect the financial software from hacker attacks; logical isolation, that is, the use of logical isolators to ensure that there are no data channels at both ends of the isolation. Whether the enterprise has the related internal control measure to the financial system has the great influence to the enterprise financial information security.

3.4 Prevention and control of inspection risks

3.4.1 Measures to Address Data Risk in the Era of Big Data

First of all, for the risk of data acquisition, all parties should improve the original data acquisition system. The CPA Association can improve the auditing standards for data collection. Auditors should reduce their work errors, strictly control every audit link, and strive to improve the quality of audit. Secondly, for data analysis risk, to innovate data analysis technology and methods. Kangping Li (2016) believes that it is necessary to perfect the data planning of the audit system, establish the standard of the audit method database system, and innovate the advanced audit methods and techniques in the information age [7].Accounting firms should introduce new auditing methods, such as electronic letter certificate and real-time test, to ensure the validity of the analysis. At the same time, professional division of labor and cooperation, regular data analysis training, improve the ability of auditors to analyze; clarify the responsibilities of auditors, improve the audit supervision and review system, let the audit manager and computer experts to review the completed audit work. Auditors should expand their audit ideas, study the audit ideas of new big data audit, and improve the quality of data analysis work.

3.4.2 Improve the professionalism of CPAs

First, improve the audit standards that meet the requirements of big data. Qingxiang Lu and Xinyuan Wei (2015) believe that in the context of big data, auditors should identify audit risks according to the relevance of information through full sample audit; analyze and predict the information through data mining to enhance the effectiveness and timeliness of information; make effective use of the

fast and convenient collection of information to carry out prior, ongoing and post-event continuous audit; and collect all kinds of structured and unstructured data, not limited to the collection of financial, internal and operational information [8]. Second, regular training of big data anti-fraud lectures. In recent years, the financial fraud incidents in Yuzi Island and the financial fraud incidents in Kangdexin have emerged in endlessly. Accounting firms should strengthen anti-fraud training and improve the professional quality of auditors.

3.4.3 Improving the Informatization Ability of Certified Accountants

First of all, we should change the traditional audit thinking of auditors and cultivate the concept of big data audit. First, it is necessary to establish the logical structure of digital audit for auditors, that is, three steps: data collection, data storage and data forensics. Second, it is necessary to break the traditional thinking mode of auditors' checking and summing up, open up and innovate, explore its internal financial logic from a large number of data, and cultivate the ability of auditors to find big data problems. Third, regular training on audit software is held. In addition, establish and improve the internal control system related to big data audit. The firm should standardize the big data audit process, clarify the responsibilities and division of labor of the auditors, ensure that the auditors have rules to follow, and improve the efficiency of the audit. Industry standards also need to be further unified in order to improve the overall industry big data audit level and protect the interests of investors. At the same time, the firm should raise the salary level, implement the talent incentive plan, reduce the turnover rate of employees, and ensure that the cost of training input in the early stage can create more value.

3.4.4 Improving the Informatization Ability of Certified Accountants

For the increasingly fierce competition in the market of accounting firms, the China Institute of Certified Public Accountants should improve the auditing standards, further emphasize the importance of professional ethics of auditors and strengthen industry supervision. At the same time, the relevant legal departments should increase the punishment of financial fraud in enterprises, increase the amount of fines, and revoke their business licenses for firms that have repeatedly cheated. On the legislative side, big data brings more ways of financial fraud, and the legislature should keep pace with the times and constantly improve the legal system. For auditors, the content stipulated by laws and regulations is only the basic bottom line of their practice activities, while the content that is not suitable for inclusion in the regulations is bound by professional ethics, and only by combining the two can they become an excellent auditor.

4. Conclusion

This paper models and analyzes all kinds of audit risks in the era of big data combined with analytic hierarchy process. The data show that CPAs should pay

more attention to checking risks. Although controlling and inherent risks still account for a large proportion. These risks, as objective risks, can not be avoided. However, the proportion of inspection risk is the largest, in the era of big data, especially the professional ability and information level of CPA is particularly important. For CPA, checking risk is controllable risk, which can be reduced by CPA trying to study professional knowledge and improve their information level. Once the auditor has a high level of professionalism, it is more likely to detect the risk of material misstatement, thereby reducing the likelihood of financial fraud sex, improve the quality of audit reports. The sample data of this article come from the questionnaire survey, did not go deep into the enterprise and the accounting firm to carry on the investigation, may have the influence to the research result.

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