

Construction of an Intelligent Supervision System for Internal Audit of State owned Enterprises in Beijing

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Abstract: Internal audit, together with national audit and social audit, constitutes China's audit supervision system and is an essential component of the Party and state supervision system. This article explores the construction of an intelligent supervision system for the internal auditing of state-owned enterprises in Beijing from four aspects: data intelligence collection, data intelligence processing and storage, data intelligence extraction and analysis, and data intelligence application. It helps to provide a reference for enterprises to build a centralized, unified, authoritative, and efficient internal auditing intelligent supervision system. Also, it helps to improve the supervision system of the Party and the state, and promote the modernization of the national governance system and governance capacity.

Keywords: Internal audit; State owned enterprises in Beijing; Intelligence supervision system

1. Introduction

After the 19th National Congress, internal audit was elevated to a new level of development, and together with national audit and social audit, it formed China's audit supervision system, becoming an essential component of the Party and state supervision system. In January 2018, the revised "Regulations of the National Audit Office on Internal Audit Work" (Order No. 11 of the National Audit Office) expanded the functions of internal audit, emphasizing the value of "advice and consultation" based on "supervision and evaluation", and emphasizing the rectification and implementation of problems. Internal audit is no longer seen as a simple control method but gradually becomes a source of value for achieving the high-quality development of enterprises. However, existing research on the economic consequences of internal auditing has mainly focused on the impact of internal auditing on corporate value (Zhao Na, 2008; Liu Deyun, 2014; Chen et al., 2016), as well as the corporate governance effects of internal auditing (Prawitt et al., 2009; Wang et al., 2010; Vijayakumar & Nagaraja, 2012; Wang et al., 2014; Gros et al., 2017; Bajra and Cadez, 2018; Li Shihui, 2019), and other aspects. There needs to be more literature constructing an internal audit intelligent supervision system. This article explores the construction of an intelligent supervision system for the internal auditing of state-owned enterprises in Beijing from four aspects: data intelligence collection, data intelligence processing and storage, data intelligence extraction and analysis, and data intelligence application. It helps to provide a reference for enterprises to build a centralized, unified, authoritative, and efficient internal auditing intelligent supervision system. Also, it helps to improve the supervision system of the Party and the state, and promote the modernization of the national governance system and governance capacity.

2. Construction of an Intelligent Supervision System for Internal Audit of State owned Enterprises in Beijing

Based on the background of digital transformation, state-owned enterprises in Beijing can construct an internal audit intelligent supervision system according to the framework process of intelligent data collection, intelligent data processing, intelligent data storage, intelligent data extraction and analysis, and intelligent data application, as shown in Figure 1, to promote the role of internal audit in risk management, improve internal control, audit coordination, and supervision governance, and thereby promote the high-quality development of state-owned enterprises in Beijing.

2.1 Intelligent data collection

The data sources of enterprises mainly include external and internal data sources. External data sources mainly include government statistical databases, internet platforms, other third-party databases, and so on, which can obtain industry information, market information, and other information about enterprises. Internal data sources mainly include financial systems, financial shared service centers, and so on, which can obtain business data, financial data, management data, control data, and so on. of enterprises. Among them, the operation information of system users, such as login, browsing, and modification, is control data. In the context of digital transformation, the internal audit intelligent supervision system can automatically obtain data information through data sharing, utilizing internet crawler technology, blockchain technology, artificial intelligence technology, and so on, significantly increasing the depth of data collection, expanding the scope of data collection, and improving the speed of data collection. For example, visual recognition in pattern recognition technology can be used to track and locate the inventory of enterprises, view the status and location of inventory in real-time, and confirm the circulation, loss, and damage of inventory; It can automatically identify whether there are seals and signatures of relevant personnel on the company's voucher books and documents through pattern recognition technology; We can use internet crawler technology, combined with various big data recognition technologies, to quickly obtain customer dynamic data from company official websites, government websites, and social media websites, and establish customer panoramic images; You can use natural language processing technology to access various text information such as market demand, contracts, competitors, and market prices, and conduct professional and rapid analysis of the text information, accurately extract critical information, and automatically generate reports.

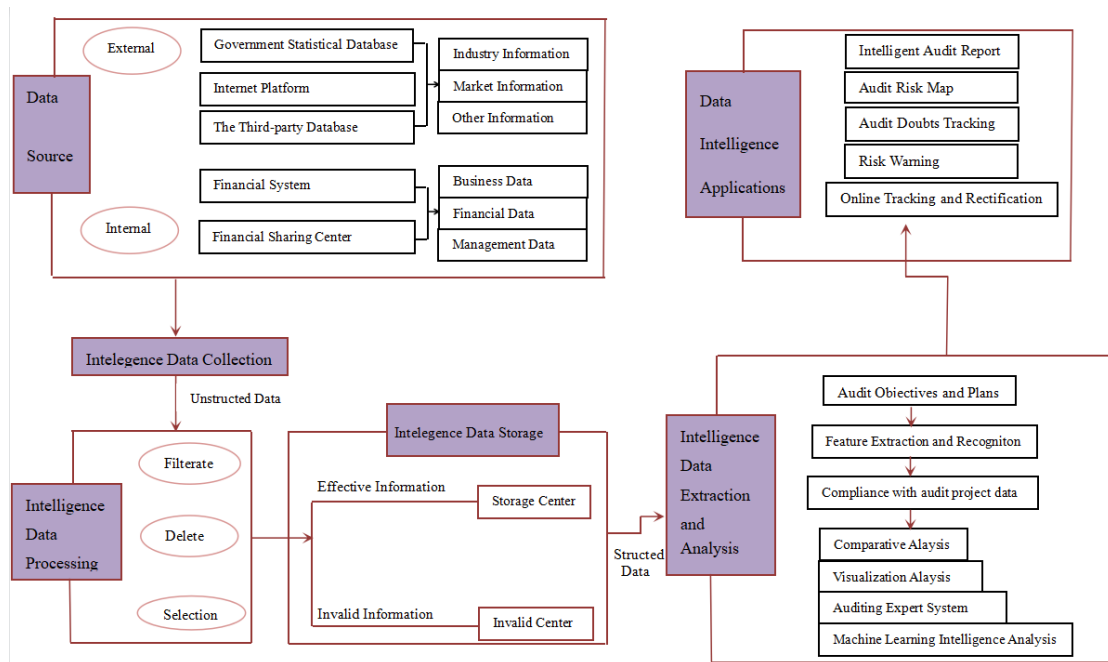


Figure 1: Internal Audit Intelligent Supervision Framework Process

2.2 Intelligent data processing and storage

To obtain meaningful or accurate results through data analysis and comparison, it is necessary to rely on a large amount of high-quality data, which requires processing the accuracy of data collected from various channels. Firstly, all collected text, web pages, images, and other data information are transmitted to the processing center, and the data information is filtered and eliminated through artificial neural network technology to select adequate data information; Secondly, convert all of it into structured data that can be uniformly recognized and processed. Then, these data are transmitted to the storage center, where they can be classified and stored according to their regions, network segments, and so on, to facilitate on-demand data extraction and analysis; Finally, transfer the filtered invalid data information to the invalid center and perform regular automatic cleaning to improve the storage efficiency of the database.

2.3 Intelligent data extraction and analysis

Different internal audit projects require different data to be audited and analyzed. The internal audit intelligent supervision system can identify the objectives, plans, mission statements, pre-audit investigation reports, and audit plans through in-depth learning technology and then extract relevant data consistent with the audit project from the data storage center. Specifically, through deep learning training, data related to the audit project, such as audit objectives, plans, task books, and plans, are used as input data. Based on the concentrated characteristics of the data, new features are learned to identify the text and numbers of the audit project data, and corresponding data is obtained from them, corresponding to the audit project's evaluation indicators. If it meets the audit activity, the data will be automatically configured into the audit project through a data classifier, thereby outputting data by category. After multiple data training sessions, all data that meets the requirements of the audit project can be obtained, such as audited data and benchmark value data. In addition, to address issues such as inaccurate judgments in the intelligent supervision system and insufficient internal audit intelligent supervision system, human-machine interaction mode can be activated during feature recognition, and audit project features can be deleted or added manually.

After extracting relevant data that meets the audit project in the data storage center, the internal audit intelligent supervision platform can perform comparative analysis, visual analysis, and intelligent analysis using audit expert systems, machine learning analysis, and other methods. Specifically, compare and analyze the data of the audited entity with benchmark data and then provide the analysis results in the form of text and images to the internal auditors. Internal auditors understand the company's operational and management level based on the feedback received, conduct in-depth investigations into areas of doubt or existing problems, or use expert systems to analyze the causes of the results. Then, internal auditors review the results and use machine learning technology to help enterprise managers develop the optimal response plan. For example, machine learning can be used to construct the optimal work organization model based on the company's business management data to improve the governance structure; We can compare the company's product sales plan with market demand information to evaluate the appropriateness of the company's relevant decisions. In addition, the internal audit intelligent supervision platform has strong data continuous analysis capabilities, which can record and correct errors and continuously improve data analysis and processing methods. For example, suppose there are any issues with the audit results after the audit is completed. In that case, the audit process can be verified automatically or manually by the system, and errors during the audit process can be recorded and corrected. In this way, when conducting similar audit work next time, the optimized audit plan can be directly called to achieve dynamic improvement and refinement of the audit plan. The internal audit intelligent supervision platform can also recognize and process text, data, and images and continuously perform real-time dynamic analysis.

2.4 Data Intelligence Applications

The final stage of the internal audit intelligent supervision system is the application of data intelligence. The output results of data intelligence applications include intelligent generation of audit reports, preparation of audit risk maps, audit doubts, risk warnings, and online tracking and rectification.

Intelligent generation of audit reports. Intelligent analysis, automatic review, internal audit decisions and opinions issuance, and intelligent production audit reports based on collected audit project data. Under the digital transformation, with the help of artificial neural network technology, pattern recognition technology, machine learning technology, natural language processing technology, expert system technology, deep learning technology, internal auditors can be liberated from the tedious and time-consuming audit process. More resources and time can be invested in the preparation and completion stages of the audit, significantly improving the effectiveness and efficiency of internal audit work.

Develop an audit risk map. The digital transformation promotes the expansion of internal audit from sampling to full coverage audit. The intelligent supervision system of internal audit can be implemented through the integration of on-site audit operations and backend data analysis in a digital audit method, implementing online audit and real-time online supervision, achieving extensive data analysis and visualization, and compiling audit risk maps to better play its role in risk management and provide consulting services, Promote high-quality development of enterprises.

Implement audit suspicion tracking. Under the digital transformation, the intelligent supervision

system of internal audit provides strong technical support and data information support for internal audit to shift from post-audit to full process audit. During the entire process of auditing, internal auditing can dynamically track the bidding and procurement process, investment and financing decision-making process, engineering construction process, progress and quality control process, completion acceptance process, settlement process, and so on, of the enterprise, and analyze and compare the audited unit values and industry averages, audited unit values and historical values, audited unit values and corresponding values of industry-leading or competitive enterprises during the same period. Furthermore, compare the results obtained from the analysis and comparison with the reference value. If the comparison results are within the normal range, it indicates that the operating and management activities of the audited unit are likely to be expected; If there is a significant difference between the comparison results and the reference value can be determined as an audit suspicion. In addition, in order to more accurately and efficiently identify audit suspicious points, assist the risk management department in dynamically monitoring audit suspicious points in various processes and links, and achieve audit suspicious point tracking, an intelligent audit data analysis model can also be established by combining deep learning technology, such as tracking system user login, modification, and browsing operation information, and finding abnormal operations.

Conduct risk warning. Based on tracking audit doubts, based on the intelligent collection, processing, storage, extraction, and analysis of business data, audit rules, and warning thresholds are set according to the risk points of business processes such as enterprise planning and construction, human resource management, marketing management, and financial management. Through dynamic data analysis, data exceeding the warning threshold is dynamically monitored, the reasons for the warning are analyzed, and the warning process is stored, edited, invoked and submit, so that internal auditors can promptly identify anomalies and take intervention measures. In addition, by establishing an audit risk indicator system, real-time and dynamic monitoring of the implementation of audit projects, and timely analysis of project data information, an automatic warning is provided for links or business processes with existing risks or anomalies to assist internal auditors in identifying high-risk areas, determining key audit targets and audit directions, identifying reasons, completing online supervision of internal audit work, and issuing corresponding audit reports.

Online tracking and rectification. The function of internal audit continues to expand, emphasizing the value of "suggestions and consultations" based on "supervision and evaluation" and the implementation of problem rectification. The internal audit intelligent supervision platform can proactively identify hidden problems through deep-level intelligent analysis, audit suspicion tracking, and risk warning. It can establish a ledger, monitor in real-time, track and verify problems that need rectification, and provide corresponding opinions and suggestions. It can track the progress and results of rectification online and monitor the quality of rectification. The internal audit intelligent supervision system conducts online tracking of the rectification implementation of relevant departments, providing assistance for the efficient implementation of the "suggestion and consultation" function of internal audit, fully leveraging the role of internal audit in the supervision and governance of state-owned enterprises in Beijing, and promoting the high-quality development of state-owned enterprises in Beijing.

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