Research on Information-based Internal Audit in the Era of Big Data

-- Taking Kangli Elevator as an Example

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Abstract

The current society has fully stepped into the era of big data, and information technology represented by the large concentration of electronic data has become the main driving force for economic and social development. The era of big data not only brings development opportunities for internal audit, but also presents challenges to internal audit. As an important part of the internal control of enterprises, the development trend of internal audit in the era of big data directly affects the efficiency of enterprise management and the effectiveness of achieving organizational goals. Therefore, it is of practical significance to study the issue of Information-based internal auditing. Based on this, this paper takes Kangli Elevator Co., Ltd. as the research object, and from the concept of internal audit, it analyzes in depth the problems in internal control of Kangli Elevator in three aspects of informationized audit infrastructure, application promotion and technical guarantee, and puts forward feasible opinions on the construction of internal audit informationization of Kangli Elevator.

Keywords

Big Data; Internal Audit; Informatization.

1. Introduction

In 2011, McKinsey Global Institute's research report clearly stated for the first time that "the era of big data has arrived". The "Internet+" is profoundly changing and influencing people's production and life style. The rapid development of new Internet technologies such as data warehouses, mobile Internet and cloud computing has brought about an unprecedented increase in the scale and variety of data, transforming data from a simple processing object to a fundamental resource. The improvement of enterprise informatization construction level in the era of big data brings challenges for the development of internal audit, and at the same time creates opportunities and conditions for enterprises to promote internal audit reform and take the upgrade development path of informatization audit.

At the same time, internal audit, as an important part of enterprise internal control, has a direct impact on the efficiency of enterprise management and the effectiveness of achieving organizational goals in the era of big data. By managing and supervising the management system, business system and financial system of an enterprise through computers and the Internet, the analysis and evaluation level of the internal audit department can be greatly improved, and the risk points in the process of enterprise operation can be identified more quickly and precisely, so as to reduce the business risk and financial risk, improve the corporate governance system and internal control system, and create value for the development of the enterprise. Therefore, this new internal audit method has significant practical significance and value for all industries.

Therefore, after explaining the development history and current situation of internal audit, this paper selects a representative company in the construction of internal audit informatization in the current big data environment - Kangli Elevator Co. (hereinafter referred to as "Kangli Elevator") as the object of the study, and then we deeply investigated the enterprise in the big data environment, comprehensively summarized the current construction and work of internal audit informatization of Kangli Elevator, and discovered the main problems of internal audit informatization of Kangli Elevator, and put forward feasible opinions and measures in the construction of internal audit informatization of Kangli Elevator in the big data environment.

2. The Development History and Status of Internal Audit of Enterprises

2.1. History of Internal Audit Development

So far, the development stage of internal audit in China can be divided into three stages: starting, improving and transformation.

The first is the initial start, internal audit in China's constitution established an independent is the audit and supervision system based on the rapid establishment of internal audit institutions, and constantly improve the internal audit norms, internal audit work in an orderly manner.

The second is the improvement stage, as a result of the reform of the economic system, the industry management of internal audit has also undergone significant changes, the main task of internal audit in this stage is to focus on the conversion of the operating mechanism of state-owned enterprises and the establishment of a modern enterprise system.

It is now the transition stage, and government regulators have promulgated a series of norms that enable internal audit to play an increasingly important role in strengthening risk management, promoting shareholding transformation and establishing a modern enterprise system.

2.2. Current Environment of Internal Audit

2.2.1. Big Data Environment

So far, the state has issued a series of policies to promote the development of big data. From the perspective of enterprises, the big data environment will affect many important aspects such as corporate culture, internal organizational structure and daily business management processes. Through the rational use of big data, business processes can be better optimized and the internal organization and management of the company can be strengthened, thus making the cooperation of various departments closer and enabling the company to make rapid judgments and responses in front of the changing market to avoid being eliminated. Therefore, the change of big data environment makes internal audit more accurate, scientific and diversified.

With Big Data, the work of internal auditors in companies is no longer limited to finding fraud and correcting errors. Now, internal auditors can also monitor and predict risks while using big data to obtain all data related to them, so as to avoid losses from risks to a greater extent and achieve added value to the enterprise. This is the new orientation of internal audit objectives in the context of big data environment.

2.2.2. Increasingly Valued by Leadership

Many enterprises and institutions set up internal audit organizations only for the initial purpose of meeting external requirements such as laws and regulations or higher-level units. With the increasing globalization, the supervisory role of internal audit has become more and more obvious, and more internal audit organizations are set up mainly to serve the spontaneous needs of organizational management.

Since internal audit mainly plays a supervisory role, whether leaders attach importance to it is the most important reason to decide whether internal audit can play an effective role. When stakeholders taste the sweetness of internal audit's role in management, they will also let internal audit staff participate more in management, which makes the focus of internal audit gradually shift from post-audit to pre-audit and in-audit, and from the initial This allows the focus of internal audit to gradually shift from post-audit to pre-audit and in-audit, from the initial supervision to the integration of supervision and service.

Under the conditions of economic globalization, the number and scope of stakeholders have been expanded infinitely compared to the previous ones. Because they have access to more data and information with the help of information technology, their expectations and demands will be more direct and realistic under the impact of these huge data and information.

In conclusion, stakeholders' expectations of return on benefits are increasing, the tasks of internal audit in organizations are becoming more precise and complex, and the importance of internal auditors is gradually being reflected.

3. Case Study of Internal Audit Informationization of Kangli Elevator

3.1. Introduction of Kangli Elevator

Kangli Elevator is one of the major domestic elevator suppliers in China. As a modern manufacturing enterprise that centralizes the whole process of design, R&D, manufacturing and sales, Kangli Elevator has service outlets all over the country; the total area of the company exceeds 280,000 square meters and has a 92-meter special test tower, which is a pioneer in China's elevator industry. Since its birth, Kangli Elevator has taken the building of national brand and the development of national innovative manufacturing power as its responsibility, and after years of accumulation, its business operation and product quality have ranked among the top in the country, and even some of its products are in the leading position internationally. In March 2012, Kangli Elevator became the designated supplier of elevators for the central state organs from 2012 to 2014, and won the "No. 1 sales of similar products in the national market by domestic brands" for 7 consecutive years.

3.2. Current Status of Internal Audit Informationization of Kangli Elevator

3.2.1. Construction of Internal Audit Information System

The audit information system currently in use and under construction by Kangli Elevator includes a working platform, which is the audit portal, and three main business systems: audit comprehensive management, operation and continuous audit. The audit information system currently applied by Kangli Elevator is mainly the audit portal, audit comprehensive management and operation system, and the continuous audit system of Kangli Elevator is under construction. The overall architecture of the audit information system is shown in Figure 1.

The current Conrad Elevator audit operation system and continuous audit system are divided according to the business system, and the division and audit inspection are cut. This model cannot adequately respond to the immediate needs of audit cross-system and cross-business applications. In the big data environment, the audit work needs to deal with rich data information, such as all kinds of original image evidence, all kinds of report text, all kinds of surveillance video, etc. The current audit operation system and continuous audit system cannot analyze all types of data information for the time being. After all, the scale of data volume of financial, marketing and ERP related business systems facing audit is expanding, and it is obviously a big challenge to the traditional thinking mode and processing ability of audit work to find out problems and analyze from the huge amount of business data. Thus, it is clear that the application of big data technology to analyze and solve internal audit work is also the future development trend of audit work.
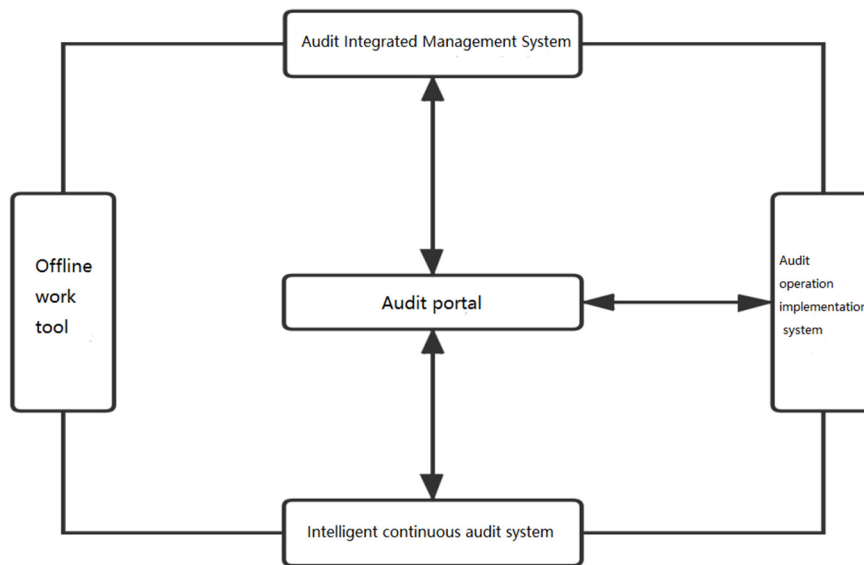
Figure 1. Audit information, the overall architecture of the system

3.2.2. Internal Audit Information Technology "Big Data" Analysis Application Construction

Combined with the adjustment of national requirements and internal management needs, the internal audit function of Kangli Elevator has also shown a trend of significant adjustment. Out of the need to solve the problems of the existing audit information system, in 2017, Kangli Elevator completed the optimization and innovation of the audit technology method, and the "big data" of internal audit informationization gradually took shape, as shown in Table 1.

Table 1. Internal audit information technology "big data" analysis application framework

Audit Risk Library	Audit focus on process Identify business process risk points Risk points hierarchical positioning
Online Audit Model	Audit Rules Audit model defined by regulations Audit model determined by logical relationships, correspondence
Big Data Collection	Data Classification Source Data Sheet Basic Data Sheet
Big Data Warehouse	Storage data
Big Data Analytics System Application	Audit Model Data Analysis

4. Problems of Internal Audit Informationization of Kangli Elevator

In order to further improve the efficiency of internal audit and internal audit capability, Kangli Elevator has continued to promote the construction and application of Information-based audit while promoting the full implementation of informationization. However, compared with the impact brought by the development of big data technology and the trend and demand of Information-based audit development, there are still some problems and shortcomings in the construction of Information-based audit system of Kangli Elevator, which are reflected in three aspects: Information-based audit infrastructure construction, Information-based audit application and Information-based audit technology guarantee.

4.1. Information Technology Internal Audit Infrastructure

4.1.1. The Working Mechanism of Information-based Internal Audit Construction is not Sound

However, compared with the impact and challenges brought by the era of big data on internal audit, the working mechanism of Kangli Elevator to promote the construction of Information-based audit is still not sound and seems to lag behind the changes of the internal audit environment. In addition to the technical level of support appears to be inadequate, its corresponding work mechanism for the construction of the Information-based audit team is not sound, which is particularly prominent. First, the lack of information technology construction personnel, audit information technology construction mostly rely on consultants, daily operations and maintenance also rely on outsourced IT services, information system designers are lacking. Second, the audit information system application staff are not familiar with the application of the system, the daily work of the application is not much. IT auditors only understand computer auditing, not financial auditing, audit policies and regulations are also less understanding, financial auditors are mostly unable to help IT audit.

Most of the auditors in enterprises are transferred from the financial system, and there are fewer personnel with information technology, which makes it difficult to provide effective support for the construction of audit information technology. It is difficult to retain information technology personnel with strong technical skills because of limitations such as salary. Therefore, it is necessary to improve the utilization rate by means of training to ensure that the relevant regulations are effectively implemented.

4.1.2. The Existing Audit Management Model does not Match with the Information Audit Requirements

The management mindset of internal audit is still stuck in the traditional mode. From the existing audit practice, although Kangli Elevator has established a relatively advanced audit information system, the operation of its audit behavior is still driven by the project system, which is reflected in the very limited consideration of continuous audit monitoring and evaluation in its annual audit plan; in other words, on the whole, Kangli Elevator currently mainly applies Information-based audit analysis techniques and procedures in individual audit projects, while In other words, on the whole, Kangli Elevator mainly uses Information-based audit analysis techniques and procedures in individual audit projects, but there is still a fracture in the audit logic in the overall work planning, and a comprehensive, tight, integrated and efficient audit information management model has not yet been formed, which makes it difficult to match the massive data processing brought by its business expansion in the era of big data.

4.2. Information Technology Audit Application Promotion

4.2.1. Insufficient Continuous Audit Application Capability

Theoretically and technically, continuous auditing can be initially automated and intelligent, and its functions include continuous control monitoring CCM and continuous data auditing CDA, but in actual application, the implementation of continuous auditing in Kangli Elevator is far from reaching the corresponding degree, and its functions are still limited to continuous auditing of data, while the automation and intelligence of internal control and continuous monitoring are very low. Most of the continuous audit software applied by Kangli Elevator is from the marketed general-purpose software, whose functions are mainly for processing audit data and simple statistical analysis; in addition, the degree of application of audit software is still heavily dependent on the auditors' mastery of database operation commands, so it is difficult to reflect the characteristics of automation and intelligence of continuous audit.

In addition, the data comes from the management department instead of the internal audit department, so on the one hand, the authenticity and accuracy of the data are not confirmed,

and on the other hand, the advantages of internal audit such as strong global view, sensitivity to risk and control issues, and strong data analysis ability are not fully utilized.

4.3. Information Technology Audit Technology Assurance

4.3.1. Insufficient Information Capture Capability, Forming an Audit Model of "Information Silo"

Over the years, with the state's attention and support for enterprise informatization, large group enterprises, especially central enterprises, have invested more in the construction of informatization, the level of enterprise informatization is getting higher and higher, and more departments and businesses have achieved informatization. However, many information systems on line is not in accordance with the unified planning, the overall consideration, more in accordance with the department or professional lines to implement. This situation has resulted in systems and platforms that are not interoperable with each other, or data sharing can only be achieved by implementing data import through electronic documents. For internal audit, it creates obstacles to the application of internal audit informatization, with a low level of data sharing and multi-point login access, resulting in increased costs and reduced efficiency of internal audit. Communication barriers between multiple systems form "information silos".

The current audit system mainly relies on the ERP (SAP) system to develop embedded audit procedures, a large number of applications and ERP systems are not integrated or only partially integrated, resulting in audit data is not comprehensive enough, need to provide separate accounts to other systems to query, can not penetrate online to query all data, resulting in the limitations of the audit system application effect, reducing the efficiency and effectiveness of the audit system applications.

4.3.2. The Accuracy of Data Analysis is not High Enough to Effectively Support the Change of Information Audit

With the continuous development and improvement of Internet information technology, big data has also been better developed, and the most significant feature is the strong professional and technical nature. Therefore, enterprises can only recruit or train high-level professional and technical personnel to realize the effective use of big data technology, and to gradually build a data-based platform for aggregating and analyzing data, as well as to be able to skillfully apply the new technical software to promote the smooth implementation of internal audit work. The realization of internal audit informatization must upgrade the software and hardware in the existing operating system. It is necessary to build a more stable and smooth running with a larger storage capacity as well as better compatibility in order to improve the accuracy of the analysis of audit data and reduce the incidence of errors.

5. Suggestions for Improving the Informationization of Internal Audit of Kangli Elevator

5.1. Enhance the Soft Power of Information-based Internal Audit Construction

5.1.1. Active Change to the Concept of Information-based Auditing

Audit philosophy originates from audit practice. At the same time, it has a guiding and promoting effect on audit practice. As an important part of internal control, Kangli Elevator upholds the "concept of audit" and has achieved positive results in promoting business development and preventing risks. For Kangli Elevator, the construction of audit operation and quality system, including the big data foundation platform, has made great progress, and the audit organization and management system has been improved and perfected, laying a good foundation for the transformation to Information-based audit. Actively carry out training related to Information-based auditing, the introduction of advanced Information-based

auditing concepts, with a strong sense of mission and responsibility, follow the direction of the times, and promote the transformation of audit information to Information-based auditing.

5.1.2. Strengthen the Construction of Information Technology Audit Specification System

While promoting the standardization of audit behavior, Information-based auditing should also put forward certain requirements for its own standardization. Information-based audit guidelines are the standard for carrying out the construction of Information-based audit system and the guarantee for improving audit quality, which should be continuously improved. First, we should focus on system design and development, operation and maintenance, audit process, audit technology, the collection and use of audit evidence, internal auditors should have the qualifications to make specific specifications, the development of relevant standards, so that internal auditors in the implementation of Information-based audit process to achieve rules and regulations, to achieve standardized operation of audit activities. Second, the nature and status of the audit software is clear from the system, providing that the internal audit department can be audited information systems for data collection and extraction operations, the use of audit software for data and information conversion analysis. Third, in the process of construction and practice of the interplay, and constantly improve the theoretical basis of information technology construction.

5.1.3. Create a High-quality Information Audit Team

First, they should have a strong understanding and grasp of policies and regulations, and a full understanding of business; second, they should be proficient in data analysis technology and be able to handle millions and hundreds of millions of pieces of data, and discover the patterns and phenomena in the data; third, they should have the professional sensitivity of auditing. For this reason, Kangli Elevator should strive to build a High-quality information audit team from multiple levels.

First, cultivate a composite information technology audit talent team. Vigorously introduce information technology talents, optimize the knowledge structure of the internal audit team, to create a team of High-quality, composite internal audit talents who not only have rich business knowledge and skills, familiar with audit standards, but also master computer knowledge and its application techniques, master data processing and management techniques. Second, improve the organization of Information-based audit. The establishment of multi-professional integration of data analysis team, play the advantages of different professions, from multiple perspectives, multi-dimensional, multi-level expansion of data analysis space, to improve the efficiency of data analysis; the formation of specific areas of Information-based audit research team, Information-based audit objectives in specific areas, ways, focus, and urgent or significant practical value of the subject of research, to maximize the potential for innovation. Provide valuable theories, techniques and methods for Information-based auditing. Third, deepen the level and strength of audit training. Combining with the business development and risk management requirements of Kangli Elevator, we will develop medium and long-term training plans to make audit training more systematic, standardized, cutting-edge and practical; combining different dimensions of audit business areas, audit management levels and audit project needs, we will establish a tiered training mechanism to make audit training more targeted to meet the needs of the development of Information-based internal audit.

5.2. Improve the Internal Audit Information Technology in the Big Data Environment

5.2.1. Consolidate the Theoretical Basis of Information Technology Construction and Develop Information Technology Construction Standards

In order to adapt to the continuous transformation of the enterprise audit business and the upgrade of various business systems, it is necessary to not only update the relevant audit system of the enterprise, adapt to not only the emergence of new business, and provide a basis for the implementation of audit informatization work. Internal audit informationization related concepts, technologies, processes and content methods will be summarized and summarized to form a comprehensive operating instructions. Some typical cases of audit informatization applications will be summarized and promoted to form a strong operational guide. In this way to promote the standardization of audit information technology from implementation to application of the construction. Only with the standardization of applications to promote successful audit information technology experience to promote the replication of other units to help other units to learn from the relevant experience, in the implementation of audit information technology process less detours, as soon as possible to achieve the promotion of audit information technology. At the same time, standardization is also conducive to the implementation of the comparison of the effect of the implementation between enterprises, to summarize the experience and to share.

5.2.2. Establishing a Perfect Information-led Internal Audit Operation Mechanism

The quality management documents and system for traditional internal audit work cannot cover some of the needs and values of internal audit work informationization. From within the enterprise need to re-evaluate and sort out their own internal audit environment, the nature of work and content, and innovate the original internal audit quality management system to ensure the effective improvement and assurance of the quality of Information-based internal audit work.

The era of big data has produced significant changes in the environment of internal audit, and in order to ensure that such changes have a positive meaning, relevant laws and regulations need to be formulated to guide and constrain the development of new forms of internal audit work. At the same time, it is also necessary to establish and strengthen the regulatory knowledge base and legal awareness of internal auditors, so that internal audit work can be carried out in accordance with the law.

At present, the rapid development of international big data technology has also led the development of big data in China. For enterprises, big data management is not only a kind of internal audit work or internal audit technology, but also, moreover, provides data support for enterprise development. Therefore, enterprises should take advantage of the information integration role of big data for their development. This in turn promotes the management of internal big data and auditing through the integrated data. Enterprises need to analyze risks with the help of big data and reasonably control the risks according to the actual situation and past experiences to achieve the smooth development of enterprises.

5.3. Further Improve the Information Technology Audit Platform System

5.3.1. Establish an Intelligent and Resource-sharing Audit Cloud Service Platform

The key to the transformation and development of internal audit lies in informatization, and digitalization is the foundation of informatization. Therefore, in the process of audit transformation and development, it is necessary to strengthen the digitalization construction, and to improve the level of enterprise informatization by enhancing the level of digitalization, so that the audit informatization construction can be put into practice.

(1) Strengthen the construction of enterprise basic data center. There are three levels of data center development in China, ① government-led construction, mainly for SMEs to provide public services or to provide high-performance computing services super data center, the majority of SMEs can use these data centers to improve their own level of information; ② large Internet enterprises-led construction, providing hosted services data center, such as Baidu, Ali and other domestic Internet giant enterprises The data centers established by large Internet enterprises. At present, more and more large Internet enterprises are actively building big data centers, and "cloud computing" may become a new hot spot for the development of Internet enterprises; ③ enterprise self-built and self-used data centers, which are more expensive to build and have very high technical requirements, and are suitable for large group companies with a high degree of informationization.

(2) Improve the enterprise's big data computing ability, i.e., the ability of data mining and data analysis. The so-called data mining is essentially a decision support process, i.e.: by analyzing data and drawing analytical conclusions. Its theoretical basis and technical support mainly include:database, statistics, machine learning, artificial intelligence, visualization technology, pattern recognition, etc. Data mining technology can automatically, high-speed, accurate analysis of enterprise data, and analysis and reasoning, from which the potential laws are found and excavated, thus helping enterprise managers to quickly make the right decision.

5.3.2. Integrate and Strengthen the Construction of Big Data Application Platform

Data analysis and mining technology, represented by "cloud computing", is the key to open the treasure house of "big data". The basic aspects of big data analysis are: visual analysis, data mining algorithms, predictive analysis capabilities, language engines, data quality and data management. The audit department should apply the data analysis technology to the audit work, introduce the basic software and application system from outside, or jointly develop the "big data audit system" with the IT department, and set up the "early warning system", "monitoring system" and other applications. "Monitoring system" and other application modules to strengthen the construction of models to truly achieve "auditors think, computers think" to fundamentally improve the effectiveness of internal audit.

The so-called "Audit Big Data Platform" is an embedded audit module that continuously monitors and captures important audit information, allowing monitoring of each transaction as it occurs, as well as planning weekly or monthly monitoring procedures (depending on the type of audit activity). The "Big Data Platform" produces early warning results by regularly extracting data and checking the results of analytical calculations based on data collection against specific indicators. The inclusion of an embedded audit module in the computer system requires prearrangement at the beginning of the design. Therefore, the audit department should be involved in the overall planning and design of the system by clearly identifying audit requirements during the audit phase of the system.

6. Summary

Faced with the impact of rapid development of information technology and globalization and the growing expectations of stakeholders, internal auditing in enterprises faces the challenges and opportunities of transformation. Economic globalization and information technology provide both a stage and advanced technology for internal auditing, but also bring more uncertainties and potential risks.

Therefore, internal audit needs to continue to improve its own organizational construction with the support of the government and society to further promote the comprehensive and rapid development of internal audit in China. At the same time, internal auditors should strengthen their professional ethics and professional skills, pay more attention to the use of information technology in auditing, train themselves to become new composite internal audit talents who

can adapt to the development of society, and continuously play the role and value of internal audit in the organization.

References

[1] Gramling A A , Maletta M , Schneider A , et al. The role of the internal audit function in corporate governance: A synthesis of the extant internal auditing literature and directions for future research [J]. Journal of Accounting Literature, 2004, 23(1):194-244.

[2] Adams, Michael B . Agency Theory and the Internal Audit[J]. Managerial Auditing Journal, 2013, 9 (8): 8-12.

[3] Al-Twaijry A , Brierley J A , Gwilliam D R . The Development of Internal Audit in Saudi Arabia: An Institutional Theory Perspective[J]. critical perspectives on accounting, 2003, 14(5):507-531.

[4] Leung, Cooper P , Robertson B J, et al. Role of Internal Audit in Corporate Governance & Management, The [J]. RMIT Publishing, 2003.

[5] Stewart J, Subramaniam N. Internal audit independence and objectivity: emerging research opportunities [J]. Managerial Auditing Journal, 2010, 25(4):328-360.