



# Exploration on Building a New Model for the Integration of Audit and Internal Control Under the Big Data Environment

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**Abstract.** With the gradual deepening of the development process of innovation and transformation of state-owned enterprises, enterprises have put forward higher requirements for internal audit. How to play a greater role in preventing risks and improving benefits has become an important topic for the development of internal audit. Under the guidance of the big data concept and in combination with the management status of manufacturing enterprises, this paper conceives an intelligent audit mode, which is gradually improved layer by layer from data collection, data modeling, early warning monitoring, audit operations to customer display. On the full data audit cloud platform, it carries out risk early warning and raises audit doubts, so as to realize the transformation of internal audit from post engagement to in-process management. Carry out the full life cycle audit around the inventory management concerned by the enterprise, establish the inventory audit model, find audit doubts from a new perspective, put forward management suggestions, and carry out new exploration and practice in preventing risks and improving benefits for the enterprise in order to deeply integrate audit and business, continuously improve efficiency and quality.

**Keywords:** Internal audit · big data · Intelligent audit · Full life cycle · Inventory audit model

## 1 Introduction

Under the background of globalization and informatization of economic and social development, the market competition is becoming more and more fierce, and the operation risks of enterprises are becoming more complex and changeable. The corporate governance structure, management system, business objectives and control mode need to be constantly changed and improved [1]. With the development and expansion of enterprises, especially the rise of cross industry, cross regional, cross national and diversified business groups, the expectations of the company's management on internal audit have increased unprecedentedly, Internal audit only completes the routine economic responsibility audit, which can no longer meet the needs of the management. They need internal audit to put forward targeted, feasible and constructive solutions in promoting

the improvement of corporate governance, strengthening internal control, preventing business risks and improving economic benefits. Therefore, the regular internal audit function positioning can no longer meet the needs of the company's management [2].

With the profound changes in the social and economic structure and the rapid development of information technology, the daily production, operation and management activities of enterprises are more displayed in the form of electronic data, which exist in the business management information system. The acquisition of data is more convenient, showing the characteristics of large amount of data, multiple types and high real-time data. In the face of massive data resources, the traditional audit model is far from meeting the requirements. In the big data environment, information technologies are integrated and innovated with each other. Data mining analysis, cloud computing and other technologies are used to process massive data, which not only provides systematic and forward-looking audit clues for the audit, but also lays a foundation for the internal audit to conduct in-depth business and timely and accurately grasp the enterprise's production and operation data, and provides auditors with a clear and complete evaluation of the material flow, information flow Data flow management defects create conditions for enterprises to improve quality and efficiency. This is an opportunity for internal audit, but also a challenge [3].

In terms of audit technology, the traditional audit analysis mainly focuses on the analysis, summary, induction and comparison of audit objects. It is difficult to find the implicit relationship between data, and it is difficult to broaden the audit extension technically. With the popularity of cloud computing, through the application of data mining and analysis technology, the information between different industries, platforms and systems can be merged into a unified work platform for in-depth analysis, and the accuracy and integrity are greatly improved. Under the new big data environment, higher requirements are also put forward for audit work mode and massive data security protection. According to the survey, the auditors who are familiar with computer knowledge account for about 5% of all auditors. Therefore, how to collect data, analyze and mine data, use data, realize the use of data for "me", create value for the enterprise in the audit work, and put forward new challenges for auditors.

## 2 Related Works

### 2.1 Big Data and Cloud Computing

Big data, also known as massive data, means that the data involved is so large that it cannot be retrieved, managed, processed, and sorted into information that can help enterprises make more active business decisions in a reasonable time through human brain or even mainstream software tools. Big data is characterized by large amount of data, many types of data, strong real-time requirements and great value contained in data. The processing of big data must rely on the distributed processing of cloud computing, distributed database, cloud storage and virtualization technology, which are collectively referred to as cloud computing technology. Cloud computing is the increase, use and delivery mode of Internet-based related services. It usually involves providing dynamic, scalable and often virtualized resources through the Internet [4]. Cloud is a metaphor of network and Internet. In the big data environment, the construction of

cloud computing platform provides a certain program guarantee for the mining and analysis of audit data. Cloud computing technology can effectively solve the filtering, screening, integration and transformation of important data and sensitive data under the huge amount of enterprise information, vigorously promote intelligent audit, and ensure the objectivity and accuracy of audit evaluation results [5].

## **2.2 Life Cycle Management**

Product lifecycle management (PLM) is Professor Raymond of Harvard University The business model proposed by Feijia is a strategic business model. It applies a series of mutually consistent business solutions to support the creation, management, distribution and use of product information in the whole enterprise and the whole product life cycle, and integrates many elements such as processes and information. From the perspective of cost management, in terms of the formation and extinction of each product, it is a cycle from product planning, development and design, production and manufacturing to use and disposal. Product life cycle cost can be divided into narrow sense and broad sense [6].

## **2.3 Ways to Improve Benefits Through Audit Under Big Data and Cloud Platform**

Take the rich information resources provided by the big data environment as the basis for audit work, take cloud computing technology as the means of data collation and analysis, integrate data, and establish an audit cloud platform. On the basis of the audit cloud platform, the audit model is established by using big data technology methods, combining the actual business management of enterprises and integrating the ideas of audit experts. On the basis of the audit model, it realizes risk early warning through monitoring abnormal or sensitive data, provides audit clues, and gradually realizes accurate audit [7]. During the audit, the on-site inspection work of the audit is divided into two parts: on-site inspection and in-depth analysis of background data. The data sampling during the on-site test is transformed into full data audit. The final expansion of the sample size provides the possibility for business trend analysis, increases the probability of problems found in the audit, and improves the ability of value creation.

# **3 Problems in Current Work**

## **3.1 Information Asymmetry Affects Audit Efficiency and Effectiveness**

From the perspective of current audit carriers, more and more audit carriers exist in the main business information system of each enterprise in the form of data. Due to the auditors' inadequate grasp of the development principles and operation functions of the business-related information system, the auditee, to a certain extent, is out of self-protection. It is less likely to fully open the data and functions of the information system to auditors, and there is a problem of information asymmetry, it is not conducive to the systematic problems found in the audit and affects the audit efficiency and effect.

### **3.2 Small Data Sampling Audit Affects Audit Quality**

Under the traditional audit mode, data sampling is adopted to carry out audit work, which is not easy to find audit clues. It is also difficult to truly identify and find potential risks for the complex business activities of enterprises, and the effectiveness of supervision cannot be effectively played. There is a certain degree of “chance taking” phenomenon in the sampling and testing of audit samples, which is not conducive to the evaluation of the overall work.

### **3.3 Failure to Continuously Monitor the Audit Object**

The audit work is carried out in a problem oriented and risk oriented manner. The monitoring of each entity in the production and operation of the enterprise is currently staying at a certain time point to audit the data of a certain period of time, which belongs to post event management. From the perspective of audit creating value, in order to better create benefits, we must continuously monitor the audit objects, and combine pre-warning, in-process control and post audit to provide better decision support and services for enterprise production and operation.

## **4 Conception and Analysis of Intelligent Audit Architecture Based on Big Data**

According to the changes of internal and external environment, in order to actively respond to the opportunities and challenges brought by the big data environment, realize audit transformation, give full play to the audit function, and better create benefits for enterprises, an intelligent audit architecture based on big data is conceived.

### **4.1 Conception of Intelligent Audit Architecture in Big Data Environment**

As shown in Fig. 1, the intelligent audit system platform supported by big data thinking and audit expert experience is divided into five layers according to functions: data collection layer, data modeling layer, early warning monitoring layer, audit operation layer and customer presentation layer. From the basic functions of background data collection and processing, to the implementation of risk early warning and audit operations, to the functional modules at the customer level, layered settings have been made to highlight the synchronization, effectiveness and synergy of audit.

Each functional layer supports from low level to high level, from information collection, core functions to customer presentation.

### **4.2 Conception of Intelligent Audit Architecture in Big Data Environment**

Figure 2 further defines and explains the main modules of each functional layer of the intelligent audit architecture.

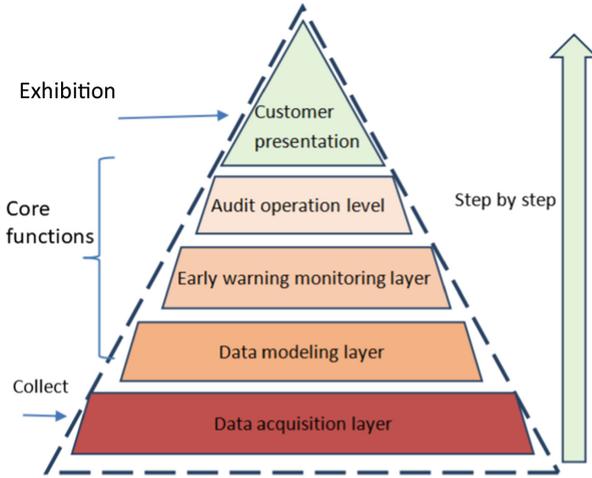


Fig. 1. Intelligent audit architecture

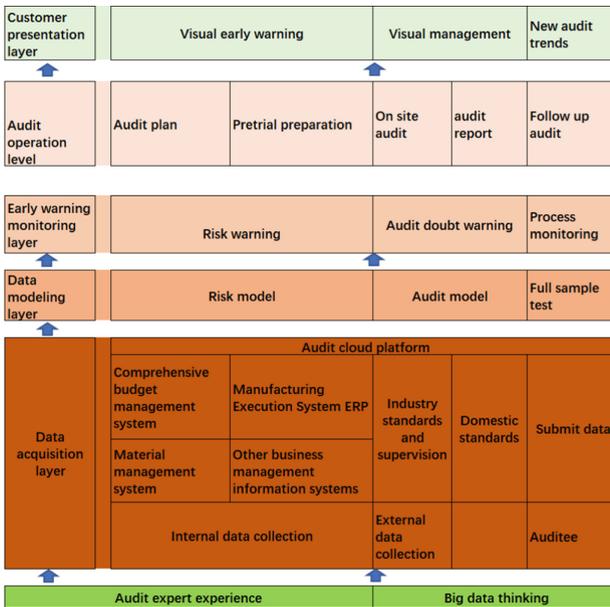


Fig. 2. Intelligent audit architecture main module

### 4.2.1 Data Acquisition Layer

It is used to obtain internal production and operation data, external data and data submitted by the auditee. The internal data includes production execution process data, financial management information data, operation management system, equipment and

material management information system, etc.; External data includes domestic and foreign industry standards and regulatory requirements. The data submitted by the auditee includes economic operation data, financial data and required management data provided according to the audit requirements. The data collection process is divided into two ways: automatic collection from the company's running information system and manual submission. Automatic data collection mainly refers to obtaining data from the information system according to the requirements of the audit department, such as data items, data formats, time points, acquisition real points, etc.; Manual submission is to collect structured and unstructured data outside the information system according to the audit requirements, such as data items, data formats, time points, etc., and upload them to the audit cloud platform according to the audit format. Audit cloud platform refers to a cloud computing platform with the main functions of data collection, storage and data processing in various information systems of production and operation, which realizes the centralized deployment of first-hand data and the barrier free query of audit data.

Data extraction methods mainly include distributed information system, n-blockchain, cloud computing platform, NoSQL, cluster analysis, statistical analysis, visualization, etc. During data extraction, data is collected from a 360° perspective to form a database. Data mining and analysis techniques are used to discover and infer unknown relationships and predict development trends. Pay equal attention to structured data and unstructured data, and analyze unstructured data that have not received much attention in the past, such as document compilation, meeting minutes, video images, etc., so as to improve the audit effect.

For example, in the inventory management audit, auditors access and analyze the data in the manufacturing execution system MES, material management system, production plan management system, warehouse management system and comprehensive budget management information system, so as to realize the data penetration and traceability analysis of WIP, raw materials and finished products from plan management to production execution. When auditing the trial production and feeding control of new products, read the meeting minutes, notices, management systems, business processes, warehousing orders, quality inspection reports, inventory data, order contracts and other information related to the preparation of the company's engine material purchase plan, and conduct data comparison, analysis and tracking.

#### **4.2.2 Data Modeling Layer**

It is divided into three main modules: risk model, audit model and full sample test. Collect the opinions of audit experts, combine the audit experience, frame the audit thinking for the frequent routine businesses and key business flows in key fields, and form the data analysis models and standards with key industries, such as aviation manufacturing enterprises, banking financial enterprises, petrochemical enterprises, hotel tourism enterprises, etc. Combined with industry characteristics, appropriate data mining technologies are adopted, and clustering, association, cluster analysis and other methods are used. Analyze the correlation of data, summarize the extraction framework, and form the risk model and audit model.

### **4.2.3 Early Warning Monitoring Layer**

For the collected data, the risk monitoring items are concretely converted into monitorable indicators according to the modeling rules, quantified into target values and risk tolerance, and monitored. For risks beyond the risk tolerance, further verify whether they are audit clues, realize new functions such as audit doubt early warning, online collaboration, problem feedback, resource management, remote online audit, doubt tracking, etc. in the intelligent audit mode, auditors re-analyze the data according to the clues, and carry out special audit or management audit or follow-up tracking for doubtful points or major problems that need to be traced in depth, Gradually realize the remote supervision mode of audit.

### **4.2.4 Audit Operation Level**

With the development of audit projects as the main line and the standardization, process, informatization and standardization of audit plan, pre-audit preparation, on-site audit, audit report and follow-up audit as the objectives, the standardized work templates and standardized filling instructions such as audit work draft, audit plan, audit scheme, summary of audit findings, audit quality evaluation and audit report are defined to improve the basic audit management, continuously improve the efficiency and quality of each link of the audit operation, especially pay close attention to the follow-up audit link, take the rectification of problems found in the audit as an important link for the audit to participate in the production and operation management of the enterprise and create value, and gradually realize the standardization of the audit workflow, the standardization of the audit operation template, the closed-loop audit rectification and the informatization of the audit management.

### **4.2.5 Customer Presentation Layer**

It includes three modules: visual early warning, visual management and new audit trends. According to the needs of different customer levels, the evaluation results of the auditee are displayed in different forms, mainly including the problems found in the audit, the rectification of the problems found in the audit, the risk early warning information, the progress of the audit operation, the latest audit trends of the National Audit Office and other government agencies. Regularly issue audit briefings, report the rectification of problems found in the audit, and make quantitative or qualitative comprehensive evaluation on the auditee. Show the input-output ratio of audit, audit management results, existing problems, improvement measures, etc., show the performance of internal audit consulting and confirmation functions, and the value created for customers.

## **4.3 The Impact of Building an Intelligent Audit Platform on Auditors**

Based on the intelligent audit platform, the focus of audit resources has changed from on-site audit to data monitoring. In order to realize the open operation, continuous loading, scientific analysis and real-time application of data, the maintenance of audit cloud platform will become a basic daily work of audit. Some auditors will devote themselves to data mining technology, modeling and calculation, research and application, and provide

risk early warning information, audit clues and doubtful point data analysis results. Some auditors will devote themselves to business induction and deduction, regression analysis and summary report, and verify Audit clues and doubtful points. More people should pay attention to the identification and evaluation of risk points in various professional fields, the research and development of audit models and the analysis of monitored structured and unstructured data. According to the doubtful points, carry out on-site audit selectively and pertinently, so as to fully improve the ability of finding problems in the audit and the input-output ratio of audit resources. Auditors' initiative awareness, innovation awareness and innovation skills must be continuously improved in order to continuously create value for the enterprise in the process of intelligent audit.

## 5 Conclusion

Apply big data technology, explore and conceive the “intelligent audit” model, analyze the main functions of each module, provide new ideas for the audit to collect, analyze, apply and manage data under the new normal of big data development, avoid the impact of small data sampling on audit quality, and go deep into the ex ante management and in-process control of enterprise production and operation business by means of audit model and risk early warning, Realize the continuous monitoring of audit objects, give play to the forward-looking and collaborative leading role of audit, and realize audit transformation and value creation on the basis of internal audit performing the confirmation and consultation function.

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