Research on XBRL Continuous Internal Audit under the Big Data

Yong Wen
Department of finance, GuangDong University of Science & Technology, Dongguan, Guangdong, China
wenyong@gdust.edu.cn

Abstract. The development of digital industrialization has promoted the continuous emergence of new industries, new formats and new models, and has also promoted the transformation of the traditional internal audit model to digital and intelligent. Big data, cloud computing, XBRL, artificial intelligence and other digital technologies are important means to achieve full audit coverage, big data audit has become a hot topic in the current audit field, relevant literature mainly focuses on the impact of big data on traditional audit concepts and audit methods, the impact and risks of big data technology on informatization audits, and how the auditing community responds. However, the research on the integration of big data technology and XBRL technology into continuous internal auditing is relatively rare. Based on the introduction of three XBRL continuous internal audit models, this article analyzes the continuous internal audit process of the XBRL information system, and discusses the application of big data technology in XBRL continuous internal audit.

1. Introduction
As a disruptive technology of internal auditing, big data has attracted widespread attention from academic circles and the industry. The characteristics of "full sample rather than sampling, correlation rather than causality" of big data help to innovate audit thinking, optimize audit technology, and develop new audit tools. The National Audit Office and the Chinese Institute of Certified Public Accountants have proposed the popularization and application of digital technologies such as big data, artificial intelligence, and blockchain in audit work. XBRL makes the financial business management data have a unified data format that can be automatically recognized by the computer, which reduces the cost of information transmission, exchange, and analysis, XBRL enables the internal audit system to directly interpret the financial business data of the audited entity in different formats and realize continuous online auditing. At present, XBRL has been used for many years in the financial reporting field of listed companies and large state-owned enterprises, and the research and application of big data auditing is also constantly deepening. However, the literature on XBRL continuous internal audit research based on big data is rarely reported. In summary, this article clarifies the original intention and types of XBRL continuous internal audit, studies the XBRL continuous internal audit process from two aspects, and finally builds the implementation framework of XBRL continuous internal audit under the big data environment, and makes a detailed discussion.
2. The connotation and goals of XBRL continuous internal audit under the big data

The XBRL continuous internal audit under the big data is an objective and independent audit activity. It uses auditing, XBRL, big data, blockchain, data mining, machine intelligence and other system technologies and methods to review and evaluate the overall risk management of enterprises and institutions, Internal control and the appropriateness and effectiveness of financial business activities, so as to help enterprises and institutions improve governance, enhance value and achieve unit development strategic goals. According to the overall goal of internal audit, the following specific goals are derived:

2.1. Identify the reliability of the XBRL information system

The reliability audit of the XBRL system needs to focus on network security, compliance with general and extended classification standards, coverage integrity, semantic accuracy, etc. On the one hand, the mobile Internet realizes the instantaneous transmission and sharing of information, but hackers, viruses, and network failures are also spreading on the network, bringing new threats to the integrity and reliability of data. The computer professional and technical personnel are required to check the settings of the anti-virus cloud platform and firewall together, and use network management tools for IP address management, switch port management, bandwidth monitoring, and external device monitoring. On the other hand, in 2020, the Ministry of Finance issued the "2020 Accounting Standards for Business Enterprise General Classification Standard Elements List (Draft for Comment)"; adjusted and updated the disclosure content and the modeling structure. On the basis of following the general classification standard and the extended classification standard, the enterprise can expand the classification standard of the enterprise according to the compilation rules [1]. Therefore, the inspection of the XBRL classification standard of the audited unit includes the compliance inspection of the general classification standard and the compliance and accuracy inspection of the enterprise expansion classification standard. At the same time, it is necessary to check whether the markup of the instance document is complete and whether the data mapping relationship is consistent.

2.2. Attestation of the authenticity and existence of transactions or matters

Attestation to the authenticity and existence of transactions or matters, that is, the matters reflected in the generated XBRL instance documents are actually occurred by the audited entity and have been recorded, the business facts reflected by the two are consistent, and it is consistent with the content disclosed by traditional audit methods.

2.3. Review the accuracy of transaction or item pricing

The first is whether the relationship between the presentation items, presentation items, and presentation items of the corporate financial report is correctly mapped to the extended link role (ELR), elements, and link library in the general taxonomy [2]. For example, whether the data items, hypercube items, and dimension items in the XBRL instance documents correctly refer to the elements in the general classification standard and the industry extended classification standard, and whether they follow the element matching principle, whether the value of the real element is reflected in the correct amount. For example, during the purchase transaction, the quantity in the bill does not match the quantity of the goods actually purchased, or the unit price in the bill is wrong, or the total quantity or total amount in the bill is wrong, or it is registered in the inventory commodity account. Wrong quantity, unit price, or amount, all of which violate the accuracy goal. The second is whether the enterprise has followed the "Extensible Business Reporting Language (XBRL) Technical Specifications" basis, dimensions, formulas, version management and general classification standard extension principles and guidelines when changing, expanding, and rebuilding the link library. The third is whether the company's instance documents have been verified for correctness and legitimacy based on the above-mentioned national standards, compilation rules and compilation guidelines. The
fourth is whether the enterprise instance document is consistent with the content of the financial report, and whether the input fact value is correctly marked in the instance document.

2.4. Evaluation of the operating performance of the audited entity
Evaluate the legality, economy, and efficiency of the audited unit’s business activities, evaluate the integrity of the audited unit’s internal control and the effectiveness of risk management, and evaluate the performance of the economic responsibilities of the person in charge of the audited unit.

3. Types of continuous internal audit model based on XBRL
The continuous internal audit model under XBRL can be divided into three types: the manual XBRL continuous internal audit model, the embedded XBRL continuous internal audit model under the big data and the docking XBRL continuous internal audit model under the big data.

3.1. The manual XBRL continuous internal audit model
The traditional manual XBRL continuous internal audit model is that internal auditors continuously monitor the financial information platform of the audited unit, and manually export data from the audited unit’s financial information platform for audit analysis. Under this model, the audit department needs to build a huge data storage system and a powerful data processing system, which is time-consuming, laborious, and expensive, and does not fundamentally change the traditional manual audit mode. Information technology is only an auxiliary tool to replace manual audit.

3.2. The embedded XBRL continuous internal audit model under the big data
The embedded XBRL continuous internal audit model under the big data is to embed continuous audit software into the relevant subsystems of the audited unit’s financial management system, ERP system or cloud financial platform. With the help of web crawlers, data mining and other technologies, it collects massive amounts from the audited unit. Data, perform operations such as analysis, verification, mining, comparison, drilling, etc., to collect sufficient and appropriate audit evidence to form a reasonable audit opinion. This model has the advantages of high level of automation and intelligence, saving audit time, improving audit quality, and reducing the workload of internal auditors. However, because the audit system needs to be embedded in the ERP platform of the audited unit, the risk of data leakage of the audited unit is increased[3]. In addition, companies in different industries have different product varieties and organizational structures. Even different companies in the same industry have different continuous audit models because of different production and operation management processes. Audit software developers need to tailor-made for the audited entity. Audit software, its development cost is relatively high. Therefore, the embedded XBRL continuous internal audit model is mainly applicable to large enterprises with strong funds and strong technical force.

3.3. The docking XBRL continuous internal audit model under the big data
The docking XBRL continuous audit model under the big data is to develop a docking audit system independent of the audited unit. The current financial software and ERP software all follow the “Financial Information Technology Enterprise Resource Planning Software Data Interface” series of national data interface standards, XBRL audit software can automatically collect financial, business, and management data in SQL Server, My SQL, Hbase, No SQL, Access, Oracle, Excel, text and other formats on the ERP platform of the audited unit, and convert it into internal auditors that can operate and The analyzed audit data provides a data source for continuous auditing. For data that cannot be collected automatically, the software should provide a wizard-style custom collection function to complete data collection, and the defined function can be used as a new data collection template for subsequent use. Figure 1 shows the docking XBRL continuous internal audit model under the big data.
Figure 1. The connected XBRL continuous internal audit model under the big data.

The docking XBRL continuous audit software under the big data should have the following functions:

3.3.1. The accounts query function. The docking XBRL audit software should provide balance sheets, income statements, cash flow statements and attached tables and notes, general ledgers, journals, subsidiary ledgers, account balance sheets, voucher libraries, and other accounting lists, as well as purchase orders, sales orders, and delivery orders. Query function with business data such as invoices, warehousing orders and outgoing orders, purchase-sales inventory schedules, fixed asset schedules, etc., it has an integrated query function of general ledger, subsidiary ledgers, journals and vouchers, and supports internal auditors to trace the source of audit problems, trace their data sources layer by layer, to the forefront of business activities.

3.3.2. The audit method library function. The docking XBRL audit software should establish an audit method library, including various audit methods permitted by the audit standards, and audit experience methods summarized by internal auditors, for internal auditors to choose. At the beginning of the audit, the audit system automatically pre-audits, and the problems found after the pre-audit are stored in the suspect database to provide clues for further audits.

3.3.3. The audit document function. The docking XBRL audit software should provide audit document templates such as audit work papers, audit reports, and management proposals. On the one hand, the internal auditors can use Office, scanners, digital cameras, video equipment, audio equipment, voice recognition systems, etc., to record the audit issues discovered and send them to the audit work paper. On the other hand, the automatic calculation and analysis functions of audit tools are used to generate audit work papers. The audit work paper is seamlessly connected with regular office software[4]. The docking XBRL audit software automatically summarizes the requirements of audit statistical indicators and the types of problems found in the audit, generates audit statistical ledgers, and forms statistical reports. The audit work paper is automatically linked to the outline of the audit report, and the first draft of the audit report is automatically generated.

3.3.4. The knowledge base function. The docking XBRL audit software should also provide knowledge base functions. With the rapid development of the digital economy and society and the application of emerging digital technologies such as big data, machine intelligence, and blockchain in the field of auditing, internal auditors need to update professional skills such as audit technology,
policies and regulations, and digital tools in a timely manner[5]. Therefore, the docking XBRL audit software should provide audit-related regulations and policy libraries, digital audit technology libraries, and audit experience libraries, so that internal auditors can refer to relevant knowledge at any time when preparing audit manuscripts.

Compared with the aforementioned two models, the most prominent advantage of the docking XBRL continuous audit model is that it has high security and does not affect the normal use of the ERP system of the audited entity. The internal auditors do not need to consider the business process of the audited unit and the functional structure design of the ERP system. As long as any branch company follows the "Financial Information Technology Enterprise Resource Planning Software Data Interface" standard, its financial business management data can be directly imported into the docking audit Software system.

4. The continuous internal audit of XBRL under the big data
The continuous internal audit of XBRL under the big data refers to the review and evaluation of XBRL information systems, internal control and financial business management processes, and XBRL instance documents by internal auditors. The purpose of the audit is to promote XBRL information technology strategies and strategies through internal audits and keep the company's strategic goals consistent to improve the security and reliability of the XBRL information system and XBRL instance documents, system stability, and system operation efficiency. Internal auditors should conduct system audits and instance document audits based on risk orientation, identify and evaluate major misstatement risks, and implement specific audit procedures to deal with misstatement risks. Risk assessment should accompany the entire process of XBRL information system audits and instance document audits. The process of continuous internal audit based on XBRL can be divided into three stages: preparation phase, implementation phase, finalization and follow-up audit phase.

The main tasks of the audit preparation stage include: Before implementing XBRL continuous internal audits, internal auditors must determine audit objectives, initially assess audit risks, estimate audit resources, determine audit scope and priority of audit activities, clarify auditors’ responsibilities, and prepare XBRL information system audit plans. In the audit implementation stage, XBRL continuous internal audit can refer to the audit process of certified public accountants, and implement further audit procedures, including control testing and substantive testing procedures, based on the risk of major misstatements and omissions at the level of identification of various transactions and matters and disclosure details. In the final stage of the audit, internal auditors should collect, sort out, and review audit work papers, make audit conclusions based on audit findings, provide audit opinions, and prepare audit reports.

5. Summary and outlook
The big data technology provides rich data processing tools for continuous internal audit, which can analyze and understand structured and unstructured data. XBRL has the advantages of scalability, cross-platform, and cross-application. It makes financial, business, and management data have the same caliber and interconnection. It is easy to create a unified XBRL big data platform to solve the automatic access and identification of financial, business, and management data in the audit. problem. XBRL and the big data technology jointly promote continuous internal audit innovation.

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