*Original Paper*

# Research on Big Data Audit Application in Commercial Banks

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*Abstract*

*Along with the rapid progress of technology, such as the Internet, cloud computing, mobile communications, and a wide variety of applications, big data has deeply penetrated into all of our fields and become an important tool that not only changes the way we think, but also advances our business model. Along with increasingly complex operations and advances in Internet technology, internal auditing has become increasingly important. Using these new technologies, we are able to analyze and apply a large amount of data in depth to accurately recognize and evaluate various types of potential business risks, and we are able to give our clients the best auditing solutions based on the conclusions of these studies and analyses, thus helping them to enter a new market.*

*Keywords*

*big data, internal audit, commercial banks*

## 1. Background and Significance of the Study

*1.1 Background of the Study*

Over the past few years, with the development of motion statistics, the Internet of Things, virtual reality, and a number of other cutting-edge sciences, information technology has penetrated deeply into our daily lives and has revolutionized our mindset in unprecedented forms, providing us with more possibilities to create, use, share, and disseminate more information in a better way. The rapid advances in information science have profoundly affected our daily lives and driven a revolutionary turnaround in many fields [The rapid dissemination of information has become an important feature of today's world, not just as a carrier of information, but as a driving force for economic growth.

*1.2 Significance of the Study*

In the era of big data, "everything is numbered" and "quantify everything", everything will be data-enabled. Therefore, no matter what kind of characteristics, if reasonably coded, they can be presented in the form of corresponding numerical values. The advantage of utilizing big data is that it can be converted into more accurate results. It can be said that big data is regarded as a business

opportunity, and in order to gain profit, "processing ability" and "processing" efforts are particularly important (MENG & Ci, 2013).

For commercial banks, the implications of conducting big data research include the following three aspects:

1) Utilize data analytics to enhance the value and effectiveness of internal audit

With the emergence of "big data analysis", domestic appraisal firms are able to discover and analyze a large amount of data to gain insights into the trend of social wealth flow, customers' financial needs, and innovative methods of asset management, and accurately judge financial institutions with return on capital, and at the same time, they can also electronically combine them with original liability management methods to realize changes in liability management methods, and ultimately achieve the best liability management methods and give enterprises the best return on capital to enhance the value of auditing. At the same time, through electronic means, it can also be combined with the original liability management method to realize the change of liability management method, and ultimately realize the best liability management method, and give the enterprise the best return on capital, and enhance the value of the audit.

2) Effective prevention of customer risk through external data analysis

Through the application of digital mining technology, internal audit can not only continuously analyze, explore and study the business information of the enterprise, but also give effective, planned, foreseeable and valuable audit reports from a global and macro perspective, so as to realize the all-round reform of the function of the internal audit, which is not only to realize the supervision, but also to realize the consulting, and to realize the goal of "single business risk" and the goal of "cross-business related risk", but also to realize the goal of "after-action supervision". It is also necessary to realize the goals of "single-business risk" and "cross-business related risk" as well as "ex post facto supervision". Through the collection of data from various sources and the study of "zombie enterprises" and their relationship with customers, we will continue to conduct in-depth research and develop technical tools that can provide accurate and timely early warning of credit risk.

3) Utilizing data analytics to significantly improve the management level and efficiency of commercial banks

Through the use of big data technology, we can deeply analyze the operation and management process of commercial banks, so as to find out the key factors that can improve the efficiency, and give effective management suggestions to help the management to better control and manage all the operation activities, and at the same time, efficiently use all kinds of resources, so as to achieve the optimization of the efficiency.

## 2. Relevant Concepts and Theoretical Foundations

### 2.1 Big Data Concepts

Big Data was first introduced in 2008. The McKinsey Institute refers to this emerging technology as "large-scale datasets," which have enhanced capabilities for inclusion, processing, control, and analysis. With the advancement of technology, the book "The Age of Big Data" suggests that Big Data has become a vast, ever-changing and complex wealth of information. It can be seen that big data includes at least the following two aspects: firstly, it is huge in quantity, and secondly, it cannot be processed using traditional tools. Big data is not about how it is defined, but most importantly how it is used. The importance of big data technology is not only in its size, but also in its ability to help us quickly access valuable information and knowledge. Its strategic significance does not lie in the collection of large amounts of data, but requires us to process this valuable information through specialized methods. It can be said that, comparing big data to an industry, "processing power" is the basis for obtaining benefits, and "processing" is the key to realizing them.

### 2.2 The concept of Big Data Auditing

Big data auditing aims to make use of data technologies and tools, as well as various forms and types of data, to carry out comprehensive data collection, organization and processing of different economic and social operating conditions, as well as auditing of different areas and behaviours, with a view to better identifying and resolving existing problems, and providing objective and accurate assessments and comprehensive analyses of them.

## 3. The Current Situation and Problems of Big Data Audit Application in Commercial Banks

Financial institutions are the central force in the financial market, responsible for converting savings into investment and serving as the backbone of the country's economic development. As representatives of financial institutions, the stable development of commercial banks is crucial to the economic and social development of the country. However, with the development of big data technology, the risks faced by commercial banks have become more and more complex, which brings great challenges to the audit work of banks.

### 3.1 Technical Operational Level

Big data analytics, as part of the development of science and technology, not only presents a valuable reference for the sector to make decisions, but also a reliable resource that helps to realize the effective operation of the enterprise and leads to a leapfrog transformation from tradition to modernity. Although some industries have begun to adopt and utilize analytical information technology, the limitations of the current information technology infrastructure and environment have prevented the sustainable development of these industries by making their applications less than optimal. Many enterprises have begun to utilize analytical information technology to support their internal audit operations, but the lack of corresponding laws and regulations, as well as the lack of sound application guidelines, have led to many problems in the internal audit practices of these banks, such as the application of errors, leakage

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of personal data, and so on. With the evolution of time, the application field of big data mining is becoming more and more extensive, which can not only assist small and medium-sized enterprises (SMEs) to improve their work efficiency, but also provide decision support for the government (Wang, 2021). However, for commercial banks, their internal auditing tasks are very tedious and require careful design by experts to accomplish. Therefore, applying big data to the internal auditing of commercial banks will surely bring great challenges.

*3.2 Data Security Dimensions*

As big data technology continues to grow in popularity, it has brought great improvements to the informatization of commercial banks. However, data information leakage and other potential data security risks exist as well. The CBRC has taken drastic measures against a January 29, 2021 bank for data leakage and poor information system security, and imposed a fine of RMB 4.2 million for the violation. This situation arose mainly due to the lack of effective measures for data management and the failure to incorporate data security into the bank's auditing mechanism, thus making the storage and use of the bank's information seriously risky. After in-depth analysis, it was found that the lack of adequate auditing of data security had led to an increasing risk of data security, thus affecting the normal operation of commercial banks. Therefore, after-the-fact auditing is also an important factor, and effective measures must be taken to address it.

*3.3 Quality of Personnel*

With the popularity of big data, it has been successfully integrated into the daily management and decision-making process of commercial banks, thus changing the traditional auditing methods. By utilizing this new type of technology, auditors can not only quickly and accurately collect, integrate and analyze customer-related information, but also improve the efficiency and accuracy of auditing. However, since many auditors of commercial banks are engaged in finance, financial or other related fields, they lack knowledge in this area, so it is difficult for them to master the latest science and technology, thus hindering the development of their auditing ability. With the intensification of market competition, many commercial organizations have begun to place greater emphasis on developing a diverse workforce; however, they still rely on traditional campus-based recruitment methods, which leaves them with employees who do not have sufficient practical skills to complete their auditing tasks in a timely and effective manner.

*3.4 Division of Functions*

In recent years, with the development of the market, many commercial banks have been improving and refining their information technology systems, including but not limited to the collection and processing of various financial, customer, operational and other related information. In addition, in order to ensure the security of such information, they have stipulated corresponding access rights. The lack of clarity in the division of auditing responsibilities has led to limitations in data access time and coverage, thus seriously affecting the collection and processing of audits in commercial banks, and thus preventing the effective detection of suspicious issues. With the development of big data technology,

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how to effectively divide the functions and powers of each department in an orderly manner is crucial for improving the audit level of commercial banks. However, due to the lack of autonomy of the audit departments of some commercial banks and the lack of clear functional positioning, the auditors are unable to fulfill their proper audit roles, but only undertake some non-core tasks, such as foreclosure processing and collection of deposits, etc. This confusion of functions greatly affects the independence of auditing, which leads to the risk of division of functions.

## 4. Analysis of the Causes of Big Data Audit Application Problems in Commercial Banks

### 4.1 Insufficient Awareness of the Concept of Big Data Auditing

With the progress of science and technology, big data auditing is developing rapidly, but due to the limitations of traditional auditing thinking, the weak informatization foundation of grass-roots units and the shortage of talents, auditors must change their working methods and experiences over the years, especially to abandon the deep-rooted traditional auditing concepts, so as not to trigger people's fear of and resistance to big data auditing, which will hinder the popularization and application of big data auditing. In the context of big data, auditors should follow the trend, take the initiative to change their thinking, actively learn and practice innovative big data technology methods to carry out auditing work and improve the effectiveness of auditing work.

### 4.2 Inadequate Information Systems

With the rapid development and application of big data, the Government and enterprises have recognized that big data technology will bring great potential to the development of the auditing business, and have begun to carry out a comprehensive technical update, the National Audit Data Centre has also established the "Golden Audit Project", the Audit Office has established a cloud computing data center, and enterprises have also put on-line the relevant information systems, and have begun to see results. The first results have already been seen. However, there are still regional and structural imbalances, due to the lack of uniformity in the technical standards and data caliber of the information system, thus forming a multi-industry, multi-agency, multi-departmental, self-contained system, varying degrees of informatization, and a lack of correlation between the system and the overall, resulting in the phenomenon of the information silo is obvious, the narrow resources of the data-sharing platform, the data exchange is restricted and other passive situation, seriously restricting the advantages of big data to give full play to its role in the development of the information system. This severely restricts the advantages of big data from being fully utilized.

### 4.3 Lack of Big Data Audit Complex Talents

Existing auditors are mostly dominated by personnel with traditional auditing skills, and most of them have single professional knowledge and skills, generally lacking computer networks, database technology, big data analysis-related skills, making it difficult for them to be competent in big data mining and analysis, and composite talents who can deeply integrate auditing expertise with big data analysis capabilities are even more scarce, and are far from being able to meet the actual needs of big

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data auditing. Big data auditing is a complex and challenging work, which requires auditors to have comprehensive auditing and financial knowledge, but also need to master a variety of interdisciplinary technologies, including information systems, big data, statistical analysis, etc. More importantly, they must have in-depth big data thinking, combine it with the auditing concept, and construct a complete set of big data auditing system as a way to guide the new audit practice. The lack of composite talents and teams for big data auditing greatly restricts the breadth and depth of the promotion of big data auditing applications.

## 5. Recommendations for Promoting the Application of Big Data Auditing in Commercial Banks

### 5.1 Changing the Concept of Internal Auditing Work and Raising Its Profile

The Fourth Session of the 19th Central Committee emphasized the need to build a sound financial institution with a broadly adaptable role, strong market competitiveness, and universality, and insisted on improving the requirements of the supervision system in the "Playing a Functional Role in Audit and Supervision," so as to ensure the effectiveness of the operation of the power to make an important contribution to the promotion of China's economic development, the improvement of people's livelihoods, and the enhancement of the well-being of the society. We will make an important contribution to promoting China's economic development, improving people's livelihoods and enhancing social well-being. "In this challenging period, we need to further study and implement the spirit of the twentieth big data auditing is not only the innovation of audit technology and methodology, but also the scientific and technological impetus to promote high-quality development of auditing; it is not an individual feature of some auditors and audit projects, but the direction of the development of traditional audit informatization; it is not an auxiliary option to carry out auditing, but the process of audit implementation; and it is not an option to carry out auditing. optional, but a mandatory program of the audit implementation process." Auditors should abandon the traditional mindset, actively embrace the era of big data, deeply understand the importance of big data auditing, and integrate it into auditing practice as a way to improve the quality and efficiency of auditing work, so as to better meet the needs of social development.

### 5.2 Full Utilization of Modern Information Technology to Enhance Audit Efficiency

In recent years, the Party Central Committee and the Audit Commission have been actively promoting the Fourteenth Five-Year Plan, as well as other relevant policies, in order to promote the in-depth development of technology-enhanced auditing and innovative big-data auditing, making big-data auditing a core tool for auditors in their future practice. In addition, the 14th Five-Year Plan will also promote the sustainability of green finance and other types of environmentally friendly renewable energy sources, which will bring unprecedented opportunities and challenges to internal auditing. In order to better implement internal auditing, we need to rapidly promote the transformation of information technology and implement digital transformation. In order to better promote green development, we should strengthen the audit information system of the People's Bank of China, closely

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integrate it with the national financial audit information system, and utilize digital and other technological means to effectively test and assess the implementation of green development policies, thereby greatly improving the overall level of green development.

*5.3 Improving the Quality of Relevant Personnel and Creating a High-Quality Team*

Banks big data auditors are the main body of the implementation of big data audit, people-oriented, the training of professionals is undoubtedly the most important. In the era of big data, auditors not only need to have accounting and auditing professional knowledge and skills, but also should have big data mining and analyzing technology, the growing number of composite big data auditing talents is the key to the smooth promotion of big data auditing and new breakthroughs. In order to better develop big data auditing, we need to take more comprehensive measures, including: carrying out specialized big data technology training, expanding the horizons of auditing experts, stimulating their thinking about big data, prompting them to continuously learn on their own, and constantly exploring more forward-looking solutions; recruiting outstanding big data auditing experts, injecting more vitality into the development of commercial banks, and jointly creating a group of professional, innovative, and capable big data auditors. professional and innovative big data audit professionals who can meet actual needs. Through these flexible and diversified forms, the professional quality of big data auditing will be continuously improved and the competence of auditors will be upgraded.

*5.4 Optimizing Departmental Collaboration to Enhance Audit Effectiveness and Relevance*

In accordance with the organizational structure of commercial banks, the functions of the audit department will be redistributed, eliminating its operational functions in areas such as deposit-taking, in order to allow the audit department to focus more on auditing. In addition, the responsibilities and authorities of each department will be clarified in order to better accomplish the auditing tasks. In order to effectively prevent the misuse of data and information of commercial banks, it is proposed to open the relevant access rights to the auditing departments so that the auditors can access and utilize such information more conveniently, and to require the auditing departments to strictly supervise and manage such data to ensure its security and integrity. In order to more effectively promote the smooth progress of auditing, an effective mechanism for collaborative departmental communication should be established to provide a harmonious communication environment between auditees and auditors, and activities such as beneficial heart-reading talks should be organized to enhance mutual trust and reduce resistance, thereby promoting the smooth progress of auditing.

## 6. Conclusion

The rapidly changing business situation and the innovative development of banking business in the process of transformation of commercial banks have made the operation more difficult and the form of transactions more and more complicated, and in the period of high incidence of various types of risks and cases, the commercial banks are facing risks that have not existed under the traditional business model. As the third line of defense for operation and development, internal audit needs to perform its

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duties better, make full use of big data, provide more valuable value-added services to the company through supervision and evaluation and service consulting activities, and support the transformation and development of commercial banks. Applying big data to commercial bank auditing, bank audit data information is efficiently collected and processed, and dynamic supervision is carried out to ensure that bank auditing work is completed with high quality and efficiency. Therefore, commercial banks should seize the opportunities brought by big data, improve the data informatization construction of bank auditing work, and play the role of prediction and supervision of auditing work.

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