

# Research on Internal Control and Risk Management of State Owned Enterprises under Big Data

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**Abstract:** The widespread application of information technology and the Internet has promoted the popularization of big data technology. As an important component of national economic development, the level of internal control and risk management of state-owned enterprises directly affects their operation. This article explores the application of big data technology in internal control and risk management of state-owned enterprises, and proposes improvement measures for internal control and risk management of state-owned enterprises in the era of big data. I hope that this study can have certain reference value for state-owned enterprises to strengthen internal control and risk management in the era of big data.

**Keywords:** big data; State owned enterprises; Internal control; risk management

Big data is an important support for the development of China's digital economy. With the rapid development of information technology and the internet industry in China, the application and development of big data are showing an explosive growth trend. At present, China has formed a big data application ecosystem mainly composed of internet enterprises, including various fields such as e-commerce, finance, logistics, healthcare, education, and tourism. In China's economic development, big data has become an important means to promote economic transformation and upgrading, improve economic efficiency and quality. Especially in various aspects such as internal management, industrial upgrading, product research and development, marketing, and supply chain management, the application of big data has become an important way for enterprises to improve competitiveness and achieve sustainable development. In addition, big data has a wide range of applications in government management and public services, such as smart city construction, public safety management, medical and health services, environmental supervision, etc.

With the application of big data technology, state-owned enterprises can obtain more, more comprehensive, and more accurate data information, thereby better grasping the internal operation situation of enterprises, identifying and controlling potential risks. Through big data technology, state-owned enterprises can combine internal control with risk management, establish a comprehensive, full process, and real-time risk identification and monitoring system, and better predict and avoid risks. With the widespread application of big data, it has brought new opportunities and challenges to the internal control management of state-owned enterprises. The security of data and the ability to analyze data have become the current challenges in the application of big data. Therefore, this article delves into how to improve the internal control level of enterprises and prevent risk management in the context of big data.

## 1 Review of Previous Related Research

Since the 1990s, research on internal control and risk management in state-owned enterprises has gradually received attention from scholars, and relevant studies have been conducted at different levels. Wang Zhenhua et al. (2020) explored the innovation of risk management in state-owned enterprises from the perspective

of big data application, and proposed a risk management framework and method based on big data, providing useful reference for the practice of risk management in state-owned enterprises. Liu Yin Hai et al. (2021) explored new ideas and models for internal control and risk management in enterprises in the era of big data from the perspective of internal control and risk management. They proposed improvement measures such as strengthening internal control awareness, optimizing internal control processes, promoting information construction, and improving internal control systems, providing ideas and methods for enterprises to upgrade their internal control and risk management. Luo Juan et al. (2021) explored the new characteristics and challenges of risk management in state-owned enterprises in the era of big data from the perspective of risk management, combined with the actual situation of state-owned enterprises. They proposed application strategies for risk identification, risk monitoring and early warning, risk analysis and evaluation using big data technology, providing useful reference for the practice of risk management in state-owned enterprises. Zhao Hai et al. (2015) studied state-owned enterprises and explored the correlation and influencing factors between risk management and internal control through empirical analysis. Li Jianfeng et al. (2019) published an article titled "Research on Internal Control Improvement in State Owned Enterprises Based on Control Self Evaluation". This study takes control self-evaluation as the starting point, analyzes the internal control self-evaluation of state-owned enterprises, identifies the root causes of problems, and proposes good improvement suggestions, providing reference for internal control evaluation and management in state-owned enterprises.

In summary, the research process of internal control and risk management in state-owned enterprises has gone through a gradual deepening and theoretical improvement. Early research mainly focused on the problems and weak links in internal control of state-owned enterprises, and proposed some basic frameworks and functional theories, providing a theoretical basis for subsequent research. In recent years, research has focused more on empirical analysis and case studies, delving into the correlation and influencing factors between internal control and risk management, and proposing some specific improvement strategies and guiding suggestions, providing theoretical support for state-owned enterprises to achieve effective integration of internal control and

risk management. With the continuous development of technologies such as big data and artificial intelligence, internal control and risk management of state-owned enterprises are facing new challenges and opportunities. Related research is gradually shifting from traditional control theory to digitalization and intelligence, exploring how digital technology can provide better support and protection for internal control and risk management.

## 2 Theoretical analysis

### 2.1 Conceptual analysis

#### 2.1.1 Analysis of Internal Control in State Owned Enterprises

Internal control of state-owned enterprises refers to the management system established by state-owned enterprises to achieve business goals, manage risks, ensure property safety, and improve economic efficiency. It includes a series of systems, procedures, measures, and actions aimed at ensuring that enterprise managers comply with laws and regulations, internal rules and regulations, and professional ethics in the execution of business processes, standardize enterprise operations, prevent and control various risks, and improve enterprise economic efficiency.

The content of internal control in state-owned enterprises includes financial internal control, operational internal control, compliance internal control, and information internal control, mainly involving decision-making, execution, and supervision of the enterprise. Financial internal control is a necessary control for enterprises to address financial issues; Internal control is mainly aimed at controlling the daily operations and management activities of the enterprise; Compliance internal control mainly focuses on controlling the legitimate and compliant operation of enterprises; Internal control of information is mainly aimed at controlling the informationization construction of enterprises.

#### 2.1.2 Risk management analysis of state-owned enterprises

State owned enterprise risk management refers to the establishment of a scientific risk management mechanism and method in the operation process of state-owned enterprises, identifying, analyzing, evaluating, and controlling various risks to ensure the safety of assets and economic benefits of the enterprise, improve the competitiveness and sustainable development ability of the enterprise.

For state-owned enterprises, the risks they face are multifaceted, mainly including social environmental risks, market environmental risks, political risks, legal risks, etc. To establish a sound risk management system, it is necessary to consider the risk factors of state-owned enterprises and analyze and evaluate risks through a series of risk processes, such as identification, analysis, evaluation, control, and monitoring. Among them, risk identification mainly involves analyzing the internal and external environment of the enterprise to effectively identify various potential risk points that may occur; Risk analysis is the process of identifying specific risk characteristics and influencing factors by analyzing the identified risks; Risk assessment refers to the assessment of risks through quantitative or qualitative methods, clarifying the severity of the risks and their possible impact and consequences; Risk control refers to the effective reduction of the probability and impact of risks by formulating control strategies and specific measures for risks; Risk monitoring refers to the monitoring and evaluation of

already controlled risks to ensure that the control measures taken have practical effectiveness, especially in terms of effectiveness and timeliness.

### 2.2 Analysis of challenges and opportunities brought by big data to internal control and risk management of state-owned enterprises

#### 2.2.1 Main challenges

Data security and privacy protection issues. The collection and processing of big data involve a large amount of personal and sensitive information, and once leaked, it may cause huge losses to enterprises and individuals. Therefore, enterprises must strengthen data security and privacy protection measures.

Data collection and integration issues. The collection and integration of big data involves the collection, storage, management, and processing of massive amounts of data. Therefore, enterprises need to possess technical capabilities and hardware facilities for big data processing.

Data quality issues. During the process of collecting and integrating big data, there may be data quality issues, such as missing, duplicate, and incorrect data, which will affect the accuracy and reliability of the data, as well as the internal control and risk management of the enterprise.

Organizational and management issues. The collection and processing of big data require collaborative work across departments and systems, and a unified organizational and management mechanism, including norms and standards for data sharing, permission management, data quality control, and other aspects.

The problem of talent shortage. Big data processing requires professional technical talents, but currently there is a shortage of big data talents in China. State owned enterprises need to increase the quantity and quality of big data talents through training, introduction, and mining.

#### 2.2.2 Main opportunities

Improve the efficiency of internal control and risk management. Big data technology can quickly and accurately analyze and predict the internal operations and market situation of enterprises, help enterprises discover potential risks in a timely manner, and propose specific measures to respond, effectively improving the level of internal control and risk management of enterprises.

Expand the scope of internal control and risk management. Big data technology can help enterprises expand the scope of internal control and risk management, covering more internal processes and external factors, thereby more comprehensively and accurately identifying and evaluating potential risks.

Improve the decision-making process. Big data technology can provide enterprises with more comprehensive and accurate data support, help them better grasp market dynamics and industry trends, optimize decision-making processes, and reduce decision-making risks.

Strengthen data-driven internal management. Big data technology can help enterprises establish data-driven internal management models, optimize and adjust business processes and organizational structures based on data analysis results, and improve internal operational efficiency and management level.

Promote digital transformation of enterprises. The application of big data technology has promoted the digital transformation

of enterprises, accelerated the digital process of internal control and risk management, and provided more refined and intelligent management methods for enterprises.

### 3 Analysis of the application of big data in state-owned enterprises

#### 3.1 Application Analysis in Internal Control

In recent years, many state-owned enterprises have applied big data to internal control management, providing them with more comprehensive and accurate data information, which helps to strengthen the effectiveness of internal control and risk management, thereby improving the management level and competitiveness of enterprises.

##### 3.1.1 Data collection

Data collection is an important part of big data applications, and it has a decisive impact on subsequent data analysis and decision-making. In the internal control of state-owned enterprises, the application of big data technology can help enterprises collect internal data more comprehensively and accurately, including operational data, financial data, risk data, and other aspects. By collecting and integrating these data, state-owned enterprises can better grasp the internal operation of the enterprise, identify and control potential risks.

##### 3.1.2 Data analysis

The analysis of data is an important part of the application process of big data, mainly to deeply mine and analyze the collected data, and find the logical level patterns behind the data. Big data technology can help state-owned enterprises accurately analyze internal control issues and provide theoretical support for formulating internal control and risk management strategies.

##### 3.1.3 Risk identification and monitoring

Risk identification and monitoring are the core content of internal control and risk management, and also an important direction for big data applications. Through big data technology, state-owned enterprises can combine internal control with risk management, establish a comprehensive, full process, and real-time risk identification and monitoring system, and better predict and avoid risks. By real-time monitoring and analysis of internal data, enterprises can quickly identify and handle risk events, reducing risk losses.

##### 3.1.4 Efficiency improvement

The application of big data technology can improve the efficiency of internal control and risk management for state-owned enterprises. Through automated and refined internal process management, enterprises can reduce manual intervention, improve the efficiency and accuracy of internal control and risk management, and help optimize the allocation and utilization of resources, improving productivity and efficiency.

##### 3.1.5 Innovative applications

The application of big data technology is not limited to data collection, analysis, and risk identification, but can also play a more powerful role in certain specific fields. For example, state-owned enterprises can use big data technology to achieve customer data analysis and prediction, in order to better meet customer needs;

Using big data technology to analyze supply chain data and achieve supply chain risk management and optimization; Utilize big data technology to analyze market data, achieve market risk management and positioning, etc.

#### 3.2 Application analysis of big data in risk management of state-owned enterprises

With the application of big data in state-owned enterprises, their internal control and risk management have undergone a transformation towards digitalization and intelligence. The application of big data technology provides more comprehensive and accurate data information for state-owned enterprises, which helps to identify and evaluate potential risks, thereby improving the risk management ability and decision-making level of enterprises.

##### 3.2.1 Risk identification and assessment

Identifying and evaluating risks is not only one of the core contents of risk management, but also an important direction for big data applications. Through big data technology, state-owned enterprises can integrate and analyze various types of data, such as internal data, market data, and industry data, to quickly identify potential risks. At the same time, utilizing big data technology for quantitative risk assessment helps enterprises to comprehensively grasp the trend of risk development and formulate more scientific and effective risk management strategies. To quickly identify risks, enterprises need to establish specialized mechanisms, utilize technical means such as data analysis and model prediction, establish a comprehensive, scientific, and effective risk assessment system, strengthen monitoring and early warning mechanisms, and also strengthen corporate culture construction to cultivate employee risk awareness.

##### 3.2.2 Risk monitoring and early warning

Monitoring and early warning of risks is an important aspect of risk management and one of the important directions for big data applications. Through big data technology, state-owned enterprises can establish a comprehensive, full process, and real-time risk monitoring and early warning system, timely obtain and reflect potential risk information, accurately identify risk events, and take timely measures to respond. At the same time, utilizing big data technology for data analysis and model prediction, predicting and warning the likelihood and scope of risk events, helps enterprises better avoid risks and improve the effectiveness of risk management.

##### 3.2.3 Risk response

Risk response is an important aspect of risk management and one of the important directions for big data applications. Through big data technology, state-owned enterprises can establish flexible and rapid risk response mechanisms, and adopt different risk response strategies and measures based on the occurrence and impact of risk events. At the same time, utilizing big data technology for data analysis and model prediction, optimizing and adjusting risk response plans, and improving the accuracy and efficiency of risk response.

##### 3.2.4 Risk assessment

Risk assessment is one of the important links in risk management and also an important direction for the application of big data. Through big data technology, state-owned enterprises can

establish a comprehensive, scientific, and effective risk assessment system. By integrating and analyzing various data such as internal data, market data, and industry data, the possibility and impact of risks can be comprehensively evaluated, helping enterprises formulate more scientific and effective risk management strategies.

## 4 Research recommendations

This article proposes the following suggestions for the above research:

### 4.1 Improve internal control system

State owned enterprises should be able to develop internal control systems that comply with national regulations and enterprise characteristics based on their actual situation, improve their internal control system, and strengthen the standardized and institutionalized development of internal control. In addition, it is necessary to optimize the internal control process. State owned enterprises need to optimize and upgrade the internal control process as necessary. By formulating reasonable internal control processes and regulations, establishing effective internal control mechanisms, and improving the efficiency and accuracy of internal control. In order to highlight the effectiveness of internal control, it is necessary to strengthen the supervision and evaluation standards of internal control. State owned enterprises need to strengthen the supervision and evaluation of internal control, establish a sound internal control evaluation mechanism and supervision system, timely identify problems in internal control and risk management, and take corresponding measures for effective improvement.

### 4.2 Enhance risk awareness

Firstly, it is necessary to strengthen the internal control awareness of employees in state-owned enterprises. Only by enhancing their risk awareness and improving their understanding and awareness of internal control and risk management can enterprises form a fully participatory internal control and risk management environment. Secondly, it is necessary to improve the risk management system of state-owned enterprises, including multiple aspects such as risk identification, evaluation, control, and monitoring, to ensure timely detection and effective control of risks.

### 4.3 Promote information technology construction

State owned enterprises need to accelerate the process of information construction, build comprehensive, accurate, and real-time data collection, processing, and analysis systems, establish digital internal control and risk management systems, and improve the intelligence level of internal control and risk management.

### 4.4 Applying new technologies

In the future development, state-owned enterprises should strengthen the digital transformation of internal control and risk management, actively introduce new technologies such as big data and artificial intelligence, build a comprehensive and full process internal control and risk management system, and strengthen the capacity building of internal control and risk management, improve the technical literacy and analytical ability of employees, in order to cope with the challenges of internal control and risk management in the digital and intelligent era.

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