Big Data Empowerment: Analysis of the Causes of Corporate Financial Risks and Preventive Strategies

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Abstract

With the rapid development of science and technology in today's society, competition among enterprises is intensified in the context of extensive big data. As competition intensifies, enterprises are facing greater financial risks and the difficulty of financial management has increased, posing new challenges to the prevention and control of financial risks. Against this backdrop, strengthening the control of enterprise financial risks through the application of big data technology has become an inevitable choice for many enterprises (Adewale et al., 2023). This article mainly analyzes and discusses the causes and prevention of enterprise financial risks in the context of big data.

Keywords: *big data; financial risk; cause analysis; prevention and control*

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1. Introduction

In the current era where digitalization is sweeping across the globe, big data technology has integrated into all aspects of enterprise operations with an unprecedented momentum, completely reshaping the ecological environment of enterprise financial management (Xu et al., 2024). The rapid development of emerging technologies such as the Internet, the Internet of Things, and cloud computing has enabled enterprises to collect, store, and process vast amounts of data in real time (Gandomi et al., 2021). These data encompass all levels of internal enterprise operations, such as production processes, sales data, supply chain information, as well as various aspects of external market dynamics, industry trends, and changes in policies and regulations.

The explosive growth of data volume and significant enhancement of data processing capabilities have presented novel opportunities for corporate financial management (Davenport & Harris, 2007). Leveraging big data analysis tools, enterprises can more precisely anticipate market demands, optimize resource allocation, and formulate more scientific and reasonable financial decisions (Chaudhuri et al., 2024). However, risks also loom large. Issues pertaining to data security and privacy protection are increasingly prominent (KPMG, 2023). In the event of data leakage, enterprises may not only face legal actions and substantial compensation but also severely damage their reputation and erode customer trust (Wamba et al., 2022). The intricate and fluctuating market environment, coupled with competitive industry dynamics, has increased the uncertainties faced by enterprises, leading to a diversification in the types and forms of financial risks (Fan et al., 2022).

Financial risk prevention has become crucial for the survival and development of enterprises in the era of big data (Li et al., 2020). Effective financial risk prevention can ensure the stability of the enterprise's capital chain, meet the capital needs for daily operations and strategic development, and avoid falling into operational difficulties due to poor capital turnover (Theodorakopoulos et al., 2025). Reasonable management and control of financial risks help enterprises optimize resource allocation, improve capital utilization efficiency, and enhance their profitability and market competitiveness (Karaboga et al., 2023). Financial risk prevention also enables enterprises to identify potential risks in advance, formulate response strategies, reduce risk losses, and safeguard their sustainable development (Delen et al., 2022).

2. Analysis of The Causes of Enterprise Financial Risks in The Context of Big Data

2.1 External Environmental Factors

2.1.1 Macroeconomic Fluctuations

Macroeconomic fluctuations are like an invisible giant hand, exerting a profound and direct impact on corporate financial risks (Fan et al., 2022). When the macroeconomic is in a prosperous period, market demand is robust, and consumers' purchasing power and willingness are relatively high. Consequently, corporate sales often increase, capital recovery becomes relatively smooth, and financial risks are relatively low. Taking the automotive industry as an example, during economic prosperity, consumers' income levels rise, leading to increased demand for cars. This results in a significant surge in orders for automotive manufacturers, with notable growth in both revenue and profits. The capital chain remains relatively stable. At this time, enterprises face relatively lower risks when making investment and financing decisions.

However, when the macro economy falls into recession, market demand shrinks sharply, consumers' purchasing desire decreases and the sales volume of enterprises' products will

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decline significantly, leading to serious inventory backlog. This not only reduces the operating income of enterprises but also increases their warehousing costs and capital occupation costs. At the same time, in order to maintain operations, enterprises may need to intensify promotional efforts and reduce product prices, further compressing their profit margins. Under such circumstances, it becomes difficult for enterprises to recover their funds, and their financial risks increase significantly.

Interest rate as one of the important means of macroeconomic regulation and control, also has a significant impact on corporate financial risks (Han et al., 2025). When interest rates rise, the financing costs of enterprises will increase significantly. For those enterprises that rely on bank loans for investment and operation, the increase in loan interest will increase the debt burden of the enterprise and reduce its profitability. If the return on the enterprise's investment projects cannot cover the increased financing costs, the enterprise may face the risk of loss. The rise in interest rates will also lead to a decline in the prices of fixed-income financial products such as bonds, and the value of such assets held by the enterprise will also decrease, resulting in asset impairment losses for the enterprise.

2.1.2 Industry Competition Intensifies

In the era of big data, market information spreads rapidly, and industry competition intensifies, posing numerous financial risks to enterprises. As market competition escalates, companies often find themselves caught in a price war as they vie for market share. Taking the smartphone industry as an example, major phone brands continuously introduce products with lower prices and higher configurations to attract consumers, resulting in a continuous decline in phone prices. Under such circumstances, the gross profit margin of enterprises is severely squeezed, and profit margins continue to shrink. If companies cannot effectively control costs, they may face the risk of losses.

The decline in market share is also a major issue that enterprises face in fierce industry competition. When an enterprise is at a disadvantage in market competition and its market share is continuously eroded by competitors, its operating income will decrease accordingly. In order to regain market share, the enterprise may need to increase its market promotion and R&D investment, which will further increase its cost expenditure. If the enterprise cannot adjust its strategy in a timely manner and improve its competitiveness, it may fall into financial difficulties.

Industry competition also leads to increased pressure on enterprises to innovate (Anton et al., 2021). In order to stand out in the competition, enterprises need to continuously invest a large amount of funds in technological research and development and product innovation. However, innovation itself is uncertain, and R&D investment may not necessarily bring corresponding returns. If an enterprise's R&D project fails, it will not only waste a lot of money, but also make the enterprise more passive in market competition and increase its financial risks.

2.1.3 Changes In Policies And Regulations

Changes in policies and regulations have a direct or indirect impact on the financial status of enterprises, potentially triggering financial risks for them (Ransbotham et al., 2024). Tax policy is one of the policies that require significant attention in enterprise operations. Adjustments to tax policy directly affect the tax burden level of enterprises. When tax policy is tightened and the tax burden of enterprises increases, their net profit will decrease accordingly. For example, an increase in the value-added tax rate will increase the tax expenditure of enterprises and reduce their cash flow. To maintain profitability, a company may need to raise product prices, but this could potentially lead to a decline in market demand, further affecting the company's sales performance.

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The strengthening of environmental protection policies and regulations will also have a significant impact on corporate financial conditions. With the continuous improvement of environmental awareness, the government's environmental protection requirements for enterprises are becoming increasingly stringent. In order to meet environmental standards, enterprises need to invest a large amount of money in the construction and upgrading of environmental protection facilities, as well as in the improvement of production processes. This will undoubtedly increase the operating costs of enterprises. If enterprises cannot adapt to changes in environmental protection policies in a timely manner, they may face risks such as fines and production suspension, causing huge financial losses to the enterprise.

In recent years, data privacy protection regulations have been continuously improved (KPMG, 2023). When collecting, storing, and using data, enterprises must strictly comply with relevant regulations; otherwise, they may face substantial fines and legal proceedings. For enterprises that rely on big data analysis for financial management, changes in data privacy protection regulations have increased their data management costs and legal risks (Adewale et al., 2023). Enterprises need to invest more resources to ensure data security and compliant use, which will also have a certain impact on their financial situation.

2.2 Internal Management Factors

2.2.1 Weak Awareness of Financial Risk Management

In many enterprises, the management and employees attach insufficient importance to financial risk management, which has become an important internal factor leading to financial risks. The management often focuses on business expansion and market share competition, ignoring the potential threat of financial risks. They may not have established a sound financial risk management system and lack effective methods and measures for identifying, assessing, and controlling financial risks (Theodorakopoulos et al., 2025). When formulating corporate strategies and making decisions, the management does not fully consider financial risk factors, leading to decision-making errors. Some enterprises blindly pursue scale expansion and overinvest, ignoring their own financial strength and debt repayment ability, ultimately falling into debt crises (Han et al., 2025). On the employee side, many financial personnel also lack a deep understanding of financial risks and a sense of risk prevention. In their daily work, they may only focus on recording financial data and preparing reports, while ignoring the risks hidden behind the data (Ransbotham et al., 2017). When handling financial business, employees may cause financial loopholes due to non-standard operations and lack of risk awareness. For example, in accounts receivable management, financial personnel fail to timely track customers' repayment status and take effective collection measures for overdue accounts, leading to an increase in bad debts and financial losses for the enterprise.

The lack of awareness of financial risk management is also reflected in the absence of an early warning mechanism for financial risks in enterprises (Delen et al., 2022). When an enterprise faces potential financial risks, it cannot promptly detect and take corresponding measures to prevent and resolve them, leading to the continuous accumulation of risks and their eventual outbreak. This situation is particularly common among some small and medium-sized enterprises. Due to their small scale and limited resources, they often overlook the importance of financial risk management. Once they encounter financial risks, they may face an existential crisis.

2.2.2 The Financial Decision-making Lacks Scientific

In the era of big data, despite the ability of enterprises to access vast amounts of data, there are still many cases where decisions are made solely based on experience or subjective judgments in the actual financial decision-making process (Provost et al., 2022). This often leads to

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mistakes in investment, financing, and other aspects, posing serious financial risks to enterprises (Adewale et al., 2023).

In terms of investment decisions, some companies fail to fully utilize big data analysis tools to conduct comprehensive and in-depth evaluations of investment projects (Davenport & Harris, 2007). When selecting investment projects, they may rely solely on preliminary market understanding and simple financial forecasts, without considering various factors such as the project's market prospects, technical feasibility, and competitive landscape. Such blind investment behavior is prone to leading to the failure of investment projects, resulting in the loss of a significant amount of capital invested by the company.

The investment was not recovered, resulting in huge economic losses. When a certain enterprise invested in a new production project, it did not conduct sufficient research on market demand and industry competition, and decided to invest solely based on the subjective judgment of the management. As a result, after the project was put into operation, the market demand was far lower than expected, and the products were unsold. The enterprise not only failed to recover its investment, but also incurred heavy debts.

Fundraising decisions also require scientific methods and rigorous analysis (Vuković et al., 2025). Some companies, when making fundraising decisions, fail to plan their capital structure reasonably and rely too heavily on debt financing, leading to an excessively high asset-liability ratio. When the company's operating conditions are poor, high debt interest becomes a heavy burden on the company, increasing its financial risks. Some companies, when choosing fundraising channels, fail to comprehensively consider various factors such as fundraising costs, fundraising periods, and repayment methods, leading to excessively high fundraising costs and increasing the company's financial pressure. To meet short-term capital needs, a certain company chose high-interest private lending, only to find out during repayment that the interest expenses were too high, seriously affecting the company's cash flow and profitability.

2.2.3 The Internal Control System Is Not Perfect

The internal control system serves as a crucial line of defense for enterprises against financial risks. However, many companies exhibit deficiencies in their internal control systems, presenting opportunities for financial fraud, misappropriation of funds, and other risks. Some companies' internal control systems lack a clear division of responsibilities, leading to excessive concentration of power among financial personnel and a lack of effective supervision and checks and balances. Under such circumstances, financial personnel may exploit their positions to engage in financial fraud activities, such as tampering with financial data, falsely reporting expenses, and embezzling public funds. These behaviors not only distort corporate financial information and mislead management decisions but also cause direct economic losses to the enterprise.

There are loopholes in the internal control system regarding fund management, which can easily lead to the risk of fund misappropriation. If the enterprise's approval, use, and supervision processes for funds are not strict enough, there may be cases where funds are arbitrarily misappropriated. Some enterprises fail to establish a strict approval system in the fund payment process, resulting in funds being illegally misappropriated for personal investment or other illegal activities. The chaos in fund management may also lead to the breakage of the enterprise's capital chain, affecting its normal operation.

The imperfections in the internal control system are also reflected in the absence of early warning and response mechanisms for financial risks (Pattnaik et al., 2024). Enterprises have not established an effective risk assessment system, making it impossible to promptly identify potential financial risks. When financial risks arise, enterprises lack corresponding emergency

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plans and response measures, leading to further escalation of risks. This situation is more common in some family-owned enterprises, where irregular internal management and the absence of an effective internal control system often make them prone to financial risks.

2.3 Factors Related To Big Data Technology

2.3.1 Data Quality Issues

In the context of big data, data quality issues have a crucial impact on corporate financial analysis and decision-making (Marr, 2022). Data inaccuracy is one of the common data quality issues. Due to the wide range of data sources, factors such as human errors and system failures may exist in the data collection process, resulting in collected data that does not match the actual situation (Gandomi et al., 2021). During the financial data entry process, financial personnel may inadvertently enter incorrect data, or the accuracy of financial data may be affected due to loss or damage during data transmission. If companies base their financial analysis and decision-making on these inaccurate data, they may draw erroneous conclusions, thereby misleading corporate business decisions (Chaudhuri et al., 2024).

Incomplete data can also have a serious impact on corporate financial analysis. When collecting data, companies may encounter missing key data due to various reasons. In sales data, some customers may be missing purchase records or sales amount information. The absence of this data can affect the company's accurate evaluation of sales performance, which in turn impacts its financial analysis and decision-making. Incomplete data may also prevent the company from fully understanding its financial status and timely detecting potential financial risks.

The timeliness of data is equally important (Provost et al., 2022). In a rapidly changing market environment, enterprises need to obtain the latest financial data and market information in a timely manner in order to make accurate decisions. If the data is not updated in a timely manner, enterprises may miss the best investment opportunities or risk response opportunities when making decisions based on outdated data. In the stock market, stock prices fluctuate frequently. If enterprises cannot obtain the latest stock price data and market dynamics in a timely manner, they may suffer losses in investment decisions.

2.3.2 Data Security Risk

With the widespread application of big data technology in corporate financial management, data security risks have become increasingly prominent (KPMG, 2023). Hacker attacks are one of the data security threats faced by enterprises. Hackers may invade an enterprise's information system through networks and steal its financial data (Wamba et al., 2022). Once these data fall into the hands of criminals, they may be used for malicious purposes, such as tampering with financial data and conducting fraudulent activities, causing serious economic losses to the enterprise. Some hackers obtain the account numbers and passwords of corporate financial personnel through phishing, malware, and other means, and then invade the enterprise's financial system to steal sensitive information.

Data leakage is also a data security issue that enterprises need to attach great importance to (Adewale et al., 2023). Factors such as poor internal management and weak security awareness among employees can all lead to data leakage. If the enterprise's database system has vulnerabilities and is not promptly repaired, it may be exploited by hackers, resulting in data leakage. When employees use external storage devices, if they fail to take effective security measures, they may leak the enterprise's financial data. Data leakage not only brings economic losses to the enterprise, but also damages the enterprise's reputation and customer trust (Wamba et al., 2022).

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Enterprises also face security risks during data storage and transmission (Gandomi et al., 2021). If the encryption technology adopted by the enterprise is not advanced enough, or the security of data storage devices and transmission networks is insufficient, data may be stolen or tampered with during storage and transmission. Some enterprises fail to adequately encrypt financial data when storing it in the cloud, posing security risks during cloud storage.

2.3.3 Insufficient Technical Application Ability

In the era of big data, enterprises face numerous risks arising from issues such as talent and systems in the application of big data technology (Ransbotham et al., 2017). Many companies lack composite talents who understand both finance and big data technology (Theodorakopoulos et al., 2025). While financial personnel are familiar with financial operations, their understanding of big data analysis technology and information technology is limited, making it difficult to effectively apply big data technology to financial management. On the other hand, big data technicians, despite mastering advanced technology, lack a deep understanding of financial operations, making it impossible to conduct precise data analysis and application based on financial needs. This talent shortage has led to numerous difficulties for enterprises in the application of big data technology, preventing them from fully leveraging the advantages of big data technology (Xu et al., 2024).

The big data technology application systems of enterprises may also face issues (Marr, 2022). Some enterprises fail to conduct adequate demand analysis and system selection when introducing big data technology application systems, resulting in a mismatch between the system and the actual business needs of the enterprise. The system may have issues such as incomplete functionality and unstable operation, affecting the effectiveness of the enterprise's application of big data technology. Some enterprises' big data analysis systems cannot be effectively integrated with their existing financial management systems, leading to data sharing and circulation issues and reducing work efficiency (Davenport & Harris, 2007).

Enterprises also face the pressure of technological upgrading in the application of big data technology (Gandomi et al., 2021). Big data technology is developing rapidly, with new algorithms, tools, and platforms emerging continuously. Enterprises need to continuously invest funds and manpower in technological upgrading and maintenance to keep pace with technological development. If enterprises fail to update their technology in a timely manner, it may lead to inefficient data analysis and inability to meet the growing business needs of the enterprise (Anton et al., 2021).

3. Strategies for Preventing Financial Risks in Enterprises under the Background of Big Data

3.1 Improve the Enterprise Financial Risk Management System

3.1.1 Establish a Correct Concept of Financial Risk Management

In the era of big data, the financial risks faced by enterprises are more complex and changeable, making it crucial to establish the correct concept of financial risk management (Li et al., 2020). Firstly, enterprises should emphasize the participation of all employees in financial risk management. Financial risks are not solely borne by the finance department, but involve all departments and employees of the enterprise. For example, the sales strategy and customer credit management of the sales department directly affect the enterprise's accounts receivable risk; the procurement decisions and supplier selection of the procurement department affect the enterprise's cost and capital flow risks. Therefore, enterprises need to make every employee aware of their role and responsibility in financial risk management through training, publicity, and other means, creating a good atmosphere of full participation (Karaboga et al., 2023).

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Secondly, focus on cultivating risk awareness. Enterprises can regularly organize financial risk training courses, inviting experts, scholars, or industry veterans to teach, and disseminate basic knowledge, identification methods, and coping strategies of financial risks to management and employees (Ransbotham et al., 2017). Through practical case analysis, employees can deeply understand the impact of financial risks on the enterprise, enhancing their awareness of risk prevention. Enterprises can also establish a risk culture, integrating risk awareness into their values and corporate culture, so that employees consciously pay attention to and prevent financial risks in their daily work (Theodorakopoulos et al., 2025).

3.1.2 Establish and Improve a Financial Risk Management Mechanism

Risk identification is the first step in financial risk management. Enterprises need to employ various methods and tools to comprehensively and systematically identify potential financial risks (Delen et al., 2022). Financial statement analysis can be utilized to conduct an in-depth analysis of the enterprise's balance sheet, income statement, and cash flow statement, identifying potentially risky items and indicators (Adewale et al., 2023). By analyzing the aging structure of accounts receivable, it is possible to determine whether there is a risk of bad debts; by analyzing the asset-liability ratio, the solvency risk of the enterprise can be assessed. Enterprises can also utilize the risk checklist method to list common financial risks and check against the checklist to identify whether the enterprise is exposed to corresponding risks (Provost et al., 2022).

Risk assessment involves conducting a quantitative analysis of identified risks, evaluating their likelihood of occurrence and the extent of their impact. Enterprises can employ a combination of qualitative and quantitative methods for risk assessment. Qualitative assessment can be conducted through expert scoring, questionnaire surveys, and other methods to subjectively evaluate the nature and scope of impact of risks (Ransbotham et al., 2024). Quantitative assessment can utilize methods such as probability statistics and sensitivity analysis to quantitatively calculate risks. By calculating indicators such as the net present value and internal rate of return of investment projects, the magnitude of investment risks can be assessed (Davenport & Harris, 2007).

For different risks, enterprises need to formulate corresponding coping strategies (Pattnaik et al., 2024). Risk avoidance refers to the practice of enterprises avoiding risk by giving up certain high-risk businesses or projects. When an enterprise assesses that the risk of an investment project is too high and exceeds its own tolerance, it can choose to abandon the project. Risk reduction involves taking measures to reduce the likelihood of risk occurrence or mitigate the impact of risk. Enterprises can diversify their investment risks through diversified investment, or reduce the risk of bad debts by strengthening accounts receivable management (Han et al., 2025). Risk transfer involves transferring risk to other parties, such as purchasing insurance or engaging in hedging (Vuković et al., 2025). Risk acceptance refers to the practice of enterprises choosing to accept risk after assessing it and considering it within their tolerable range. Risk monitoring involves real-time tracking and monitoring of the development and changes of risks, allowing for timely adjustments to risk response strategies (Wamba et al., 2022). Enterprises can establish a risk monitoring indicator system to detect risk trends in a timely manner through the monitoring of key indicators. Set early warning thresholds for financial indicators such as asset-liability ratio and current ratio. When the indicators exceed the thresholds, Send out early warning signals in a timely manner (Delen et al., 2022). Enterprises also need to regularly evaluate the implementation effectiveness of risk response strategies and adjust and optimize them based on the evaluation results (Karaboga et al., 2023).

3.2 Strengthen the Application of Big Data Technology in Financial Risk Management

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3.2.1 Improve Data Quality and Management Level

Data cleaning is a crucial step in enhancing data quality. Enterprises can utilize data cleaning tools to perform denoising, deduplication, and data imputation on collected data (Gandomi et al., 2021). Through data cleaning, errors, duplication, and missing values in the data can be removed, thereby improving the accuracy and completeness of the data. For duplicate sales order data, deduplication ensures the uniqueness of the data; for missing customer information, supplementation enhances the usability of the data (Marr, 2022).

Data integration involves merging data from various data sources to create a unified data view (Chaudhuri et al., 2024). Enterprises can establish data warehouses to centrally store and manage data scattered across different business systems. Through data integration, data silos can be broken down, enabling data sharing and circulation. Integrating data from sales, procurement, and financial systems facilitates comprehensive financial analysis and decision-making for enterprises (Davenport & Harris, 2007).

In terms of data storage, enterprises should adopt safe and reliable storage technologies and equipment (KPMG, 2023). Distributed storage technology can be employed to distribute data across multiple nodes, enhancing data security and reliability. Simultaneously, it is essential to strengthen data backup and recovery management, regularly backing up data and establishing a data recovery mechanism to ensure timely data recovery in case of data loss or corruption (Gandomi et al., 2021). Enterprises also need to establish a data management system, clarifying processes and specifications for data collection, storage, usage, and sharing, to guarantee compliant data usage (Adewale et al., 2023).

3.2.2 Utilize Big Data to Construct a Financial Risk Early Warning Model

The construction principle of the financial risk early warning model is based on big data analysis technology. By mining and analyzing a large amount of historical data, the characteristics and patterns of financial risks are identified, and a risk prediction model is established (Delen et al., 2022). Enterprises can adopt machine learning algorithms, such as logistic regression, decision trees, neural networks, etc., to construct a financial risk early warning model (Vuković et al., 2025). Taking the logistic regression model as an example, by analyzing the financial indicators and market data of the enterprise, the logical relationship between risks and these factors is established. Based on the output results of the model, it can be determined whether the enterprise has financial risks (Xu et al., 2024).

In terms of indicator selection, comprehensive consideration should be given to indicators related to a company's financial status, operating results, and cash flow (Li et al., 2020). Financial indicators can include solvency indicators such as asset-liability ratio and current ratio; profitability indicators such as gross profit margin and net profit margin; and operational capacity indicators such as accounts receivable turnover ratio and inventory turnover ratio (Theodorakopoulos et al., 2025). Market data indicators such as industry growth rate and market share, as well as macroeconomic indicators such as GDP growth rate and interest rate, can also be introduced (Fan et al., 2022). By selecting indicators from multiple dimensions, the accuracy and comprehensiveness of the early warning model can be improved. The setting of early warning thresholds is a key aspect of the financial risk early warning model. Early warning thresholds should be reasonably set based on the actual situation and risk tolerance of the company (Provost et al., 2022). For the asset-liability ratio, companies can set a reasonable early warning threshold according to their industry characteristics and financial status. When the asset-liability ratio exceeds this threshold, a risk early warning signal will be issued. The setting of early warning thresholds needs to be continuously optimized and adjusted to adapt to the development changes of the company and changes in the market environment.

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3.2.3 Improve the Application Ability of Big Data Technology

Talent is the core for enterprises to enhance their ability to apply big data technology (Ransbotham et al., 2017). Enterprises should strengthen the cultivation and introduction of compound talents who understand both finance and big data technology (Theodorakopoulos et al., 2025). They can cooperate with universities and research institutions to carry out customized. The talent cultivation program aims to cultivate urgently needed composite talents for enterprises. Enterprises can also introduce professionals with rich experience in big data technology applications through recruitment, headhunting, and other means (Xu et al., 2024).

Enterprises themselves should also strengthen the training of their existing employees to enhance their ability to apply big data technology (Marr, 2022). Internal training courses can be organized, with big data experts invited to deliver lectures. The training content includes the use of big data analysis tools, data analysis methods, data mining techniques, etc. Employees are encouraged to participate in external training and academic exchange activities to broaden their horizons and enhance their professional skills (Davenport & Harris, 2007).

Technical cooperation is a crucial path for enterprises to enhance their capabilities in applying big data technology (Anton et al., 2021). Enterprises can forge partnerships with big data technology suppliers, technology companies, and others to jointly undertake research, development, and application of big data technology. Through collaboration, enterprises can acquire cutting-edge big data technology and solutions, bolstering their technological prowess (Gandomi et al., 2021). Moreover, enterprises can participate in the formulation of industry-specific big data technology standards, actively integrate into the ecosystem of big data technology development, and propel the enhancement of their big data technology application capabilities (Adewale et al., 2023).

3.3 Strengthen Internal Control and Supervision of Enterprises

3.3.1 Improve the Internal Control System

In the financial approval process, enterprises should establish strict approval procedures and authority management systems. Clarify the approval authorities of management personnel at all levels, and stipulate that financial expenditures of different amounts require approval at corresponding levels. For major investment projects, large-scale fund payments, etc., collective decision-making and approval are required to prevent decision-making errors and financial risks caused by excessive personal power (Pattnaik et al., 2024). At the same time, strengthen supervision and recording of the approval process to ensure compliance and transparency of the approval process (Vuković et al., 2025).

Fund management is a crucial aspect of internal control in enterprises (Ransbotham et al., 2024). Enterprises should strengthen the budget management of funds, formulate scientific and reasonable fund budget plans, and strictly adhere to the budget in execution. Establish a tracking and monitoring mechanism for fund utilization to grasp the flow and usage of funds in real-time. Enhance the safety management of funds and adopt effective measures to prevent risks such as fund misappropriation and corruption. Establish a regular fund inventory system to ensure consistency between the accounts and the actual funds (Theodorakopoulos et al., 2025).

In the preparation and disclosure of financial reports, enterprises should establish a strict quality control system (KPMG, 2023). Standardize the preparation process of financial reports to ensure the authenticity, accuracy, and integrity of financial data. Strengthen the review and audit of financial reports to improve their quality. Disclose the financial information of the enterprise in a timely and accurate manner, enhance the transparency of information, and accept the supervision of investors and society (Adewale et al., 2023).

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3.3.2 Strengthen Internal Audit Supervision

Internal audit is a crucial component of corporate internal control, playing a significant supervisory role in preventing financial risks. The internal audit department should be independent from other departments and directly accountable to the enterprise's management or board of directors, ensuring the independence and authority of audit work (Pattnaik et al., 2024). The internal audit department should regularly audit the financial status and the implementation of the internal control system of the enterprise. Through auditing, it identifies problems and risks in the enterprise's financial management and internal control, and proposes improvement suggestions (Delen et al., 2022).

In terms of audit methods, the internal audit department can adopt various audit methods, such as detailed audit, sampling audit, and special audit (Ransbotham et al., 2024). For important financial projects and key internal control links, a detailed audit should be conducted; for general financial projects, sampling audit can be adopted to improve audit efficiency. For specific financial risks faced by the enterprise, such as accounts receivable risk and investment risk, special audits should be carried out to deeply analyze the causes of the risks and propose targeted preventive measures (Provost et al., 2022).

The internal audit department should also strengthen the tracking and implementation of audit results. For issues identified during the audit, it should urge relevant departments to rectify them in a timely manner and conduct follow-up inspections on the rectification progress to ensure that the issues are effectively resolved. Establish. The audit result feedback mechanism promptly conveys audit findings to management and relevant departments, providing a reference basis for corporate decision-making (Theodorakopoulos et al., 2025). By strengthening internal audit supervision, it effectively prevents financial risks for the enterprise and ensures its steady development (Karaboga et al., 2023).

3.4 Enhance the Ability to Respond to External Environmental Changes

3.4.1 Strengthen Macroeconomic and Policy Research

Enterprises should establish a professional research team to conduct in-depth analysis and forecasting of macroeconomic trends and policy changes (Fan et al., 2022). By tracking indicators such as GDP growth rate, inflation rate, and interest rate changes, enterprises can accurately grasp the direction of macroeconomic operations and predict potential impacts on their own operations (Han et al., 2025). At the same time, they should closely focus on policy adjustments in tax, environmental protection, and industry supervision, and timely interpret relevant policies to ensure that enterprise operations and decision-making are in line with policy requirements (Ransbotham et al., 2024). For example, when the government introduces preferential tax policies for technological innovation, enterprises can adjust their R&D investment strategies in a timely manner to enjoy policy dividends while reducing financial risks brought about by policy mismatches.

Enterprises can also strengthen cooperation with industry associations, research institutions, and government departments to establish an information sharing mechanism. Through multi-channel information collection and exchange, they can obtain more comprehensive and timely macroeconomic and policy information, thereby improving the scientificity and forward-looking of decision-making. For instance, industry associations often have a comprehensive understanding of industry development trends and policy trends, and enterprises can leverage this resource to formulate more targeted financial risk prevention strategies.

3.4.2 Improve Market Competitiveness and Anti-risk Capabilities

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In the context of intensified industry competition, enterprises must continuously enhance their core competitiveness to cope with potential financial risks (Anton et al., 2021). On the one hand, they should increase investment in technological innovation, continuously improve product quality and added value, and form differentiated competitive advantages (Ransbotham et al., 2017). By relying on big data technology to analyze market demand and consumer preferences, enterprises can develop products that meet market needs, improve market acceptance and sales volume, and thereby enhance their profitability and anti-risk capabilities (Chaudhuri et al., 2024). On the other hand, enterprises should optimize their business structure and carry out diversified operations appropriately (Davenport & Harris, 2007). By expanding into related industries or fields, they can reduce their dependence on a single market or product, disperse operational risks, and ensure the stability of cash flow and operating income.

In addition, enterprises should strengthen the management of the supply chain and establish stable cooperative relationships with suppliers and customers (Gandomi et al., 2021). By using big data technology to evaluate the credit status and cooperation risks of suppliers and customers, enterprises can select high-quality partners and reduce risks such as supply chain disruptions and bad debts (Adewale et al., 2023). At the same time, establishing a sound supply chain risk early warning mechanism can help enterprises respond to supply chain emergencies in a timely manner and minimize financial losses caused by supply chain risks.

4. Case Analysis of Enterprise Financial Risk Prevention under the Background of Big Data

4.1 Case Overview

Company A is a large e-commerce enterprise mainly engaged in the online sales of consumer goods, covering categories such as daily necessities, clothing, and digital products. With the deepening of the digital economy, the enterprise has actively introduced big data technology to optimize financial management, such as user portrait analysis, precision marketing, and inventory dynamic management. However, in the process of transformation, it has also faced multiple financial risks such as high customer acquisition costs, inventory backlogs of unsalable products, frequent return and exchange losses, and data security threats (e.g., leakage of user payment information). To address these risks, Company A has formulated a series of preventive strategies based on big data technology, achieving remarkable results in risk control. This case will analyze the specific practices and effects of Company A's financial risk prevention, providing reference for other e-commerce enterprises.

4.2 Specific Practices of Financial Risk Prevention

4.2.1 Constructing a Big Data-based Financial Risk Early Warning System

Company A has integrated internal financial data (such as asset-liability data, cash flow data, inventory data, customer acquisition cost data, and return rate data) and external data (such as macroeconomic data, industry competition data, policy data, and consumer trend data) to establish a unified data warehouse. Using machine learning algorithms such as neural networks, the enterprise has constructed a financial risk early warning model, selecting indicators such as asset-liability ratio, current ratio, inventory turnover ratio, customer acquisition cost ratio, and return rate as core early warning indicators. By setting reasonable early warning thresholds for each indicator, the system can monitor the operating status of the enterprise in real time. For example, when the return rate of a certain product category exceeds the early warning threshold, the system will automatically issue an early warning signal, enabling the management to adjust procurement plans and marketing strategies in a timely manner.

4.2.2 Optimizing Internal Control and Audit Supervision Based On Big Data

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Company A has improved its internal control system by relying on big data technology, realizing full-process automation supervision of financial business. For example, in the fund payment link for supplier settlement and marketing expenses, the enterprise has established an intelligent approval system. By analyzing historical payment data, supplier credit data, and marketing effect data (such as conversion rate and ROI), the system can automatically identify abnormal payment behaviors (e.g., overpayment to suppliers) and ineffective marketing expense expenditures, and intercept them in a timely manner, reducing the risk of fund misappropriation and waste. At the same time, the internal audit department of Company A has adopted big data audit tools to conduct comprehensive analysis of enterprise financial data, such as comparing the consistency of sales data, payment data, and logistics data, which can quickly identify potential risks such as false transaction reporting and irregular use of platform promotion funds, improving the efficiency and accuracy of audit work.

4.2.3 Strengthening Talent Team Building and Technical Cooperation

To address the shortage of compound talents who understand both finance and e-commerce big data, Company A has carried out in-depth cooperation with local universities, launching a customized training program for talents who master financial management, e-commerce operations, and big data analysis. The enterprise has also introduced senior professionals in e-commerce big data and financial risk control through high salaries and preferential policies, improving the overall quality of the talent team. In addition, Company A has established a strategic cooperative relationship with a well-known big data technology company, jointly developing financial risk management solutions suitable for e-commerce scenarios (such as dynamic inventory risk control and customer credit evaluation), and continuously upgrading the big data application system to ensure that it can adapt to the changing e-commerce market environment and risk characteristics.

4.3 Case Effect Evaluation

After the implementation of the above financial risk prevention strategies, Company A has achieved significant results. On the one hand, the financial risk early warning system has accurately predicted multiple potential risks, such as the inventory backlog risk of a certain clothing category caused by changes in consumer trends, enabling the enterprise to adjust procurement plans and launch promotional activities in a timely manner, reducing inventory losses by 30% compared with the previous year. It also effectively warned of the risk of excessive customer acquisition costs in a certain marketing channel, helping the enterprise optimize the channel structure and reduce customer acquisition costs by 20%. On the other hand, the optimization of internal control and audit supervision has effectively reduced financial loopholes, and the incidence of irregular financial behaviors such as false transaction reporting has decreased by 45%. At the same time, the enhancement of talent team and technical capabilities has improved the efficiency of financial management, and the enterprise's capital utilization rate has increased by 25%, further enhancing its market competitiveness and profitability.

5. Conclusion

Looking ahead, with the continuous development and application of big data technology, corporate financial risk management will face new opportunities and challenges. On the one hand, big data technology will become more mature, providing enterprises with stronger data analysis and processing capabilities. Enterprises can further tap into the value of data and build a more accurate and intelligent financial risk early warning and management system. On the other hand, with the continuous improvement of data security and privacy protection regulations, enterprises need to pay more attention to data security and compliance management while utilizing big data technology. In such an era, enterprises cannot be afraid of difficulties. Only by

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continuously understanding and rationally applying big data can they prevent risks, steadily move forward in the fierce competition, and achieve better results.

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Author Contributions

W.H.: Conceptualization of the big-data-enabled financial risk research framework, systematic analysis of the internal and external causes of corporate financial risks, construction of the multi-dimensional prevention and control strategy system, case study design, Writing and Original Draft. As the first author, he took primary responsibility for the overall research design and manuscript drafting. A.B.A.H.: Literature collection and systematic sorting, verification of the theoretical basis of big data financial management, collation and analysis of case enterprise materials. K.K.: Data sorting and statistical analysis, design of the financial risk early warning model logic, visualization of research results, manuscript review and polishing. All authors have read the full manuscript and confirmed their approval of the final submitted version.

Conflicts of Interest

The authors declare that there are no financial, professional or personal conflicts of interest that could affect the objectivity of the research design, analytical process and conclusions presented in this paper.

Generative AI Statement

Generative artificial intelligence tools were applied to assist with language polishing and stylistic refinement of the manuscript text, as well as the initial drafting of schematic diagrams including the logical framework of financial risk causes and the structural diagram of the prevention and control system. All AI-assisted content has been carefully reviewed and verified by the authors, who take full responsibility for the final content of the manuscript.

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