WEP Warwick Evans Publishing

International Journal of Global Economics and Management

ISSN: 3005-9690 (Print), ISSN: 3005-8090 (Online) | Volume 7, Number 2, Year 2025
DOI: https://doi.org/10.62051/ijgem.v7n2.12
Journal homepage: https://ijgem.org

Practices and Research on Enterprise Tax Risk Control in the Big Data Era

Meiling Li

[1] Graduate University of Mongolia, Ulaanbaatar, 11000, Mongolia
[2] Guangzhou Nanyang Polytechnic College, Guangzhou 510000, China

ABSTRACT

In the context of rapid development in big data technology, enterprises face challenges such as surging data volumes and increased policy complexity in tax management. Traditional risk control methods struggle to meet real-time monitoring needs, making tax risk prevention a core issue in corporate financial management. By employing case analysis, questionnaire surveys, and data modeling techniques, combined with corporate tax data, a risk warning model based on machine learning is constructed. Big data technology significantly enhances the accuracy of tax risk identification, with invoice anomalies and imbalanced cost-expense matching being frequent risk points; the established risk control system can reduce the tax compliance costs for sample enterprises. Theoretically, this enriches cross-disciplinary research between big data and tax risk management, while practically providing decision-making references for optimizing corporate tax internal controls and precise regulatory oversight by tax authorities.

KEYWORDS

Big data; Corporate tax risk; Risk control; Machine learning; Tax compliance

1. INTRODUCTION

In today's era of rapid information development, big data has become an indispensable important resource across various industries. In the process of corporate operations and management, tax data stands out as one of the core economic information, its importance being self-evident. With the advent of the big data era, corporate tax data exhibits characteristics of multi-source heterogeneity, presenting new challenges and opportunities for corporate tax risk management. This paper aims to thoroughly elaborate on the purpose and significance of this study, aiming to provide beneficial references and insights through in-depth analysis and practical exploration for improving and optimizing corporate tax risk management.

1.1. Research Background

With the rapid advancement of information technology, big data has become an indispensable resource across all industries. Corporate tax data, including invoice data, transaction records, policy documents, etc., exhibit features of massive volume, diverse types, and wide-ranging sources. However, traditional manual verification models fall short when.

In today's rapidly evolving big data environment, how to utilize big data technology to establish a comprehensive control system covering risk identification, risk assessment, and risk warning, thereby effectively addressing and solving key issues such as delayed risk identification and insufficient

Content from this work may be used under the terms of CC BY-NC 4.0 licence (https://creativecommons.org/licenses/by-nc/4.0/).
Published by Warwick Evans Publishing.

precision of warning models commonly found in traditional risk management methods, has become a critical issue urgently needing resolution in the current field of tax risk management.

1.2 Research Questions

Big data technology, with its powerful data processing and analytical capabilities, offers us a new perspective and means to re-examine and optimize each aspect of tax risk management. By integrating and mining massive amounts of tax data, we can more accurately identify potential risk points, avoid the lag in risk identification, and provide more timely and effective support for risk management.

Moreover, utilizing big data technology for risk assessment and warning can significantly improve the precision and accuracy of warning models. By constructing big data-based warning models, we can conduct more thorough and in-depth quantitative analysis of tax risks, thus promptly identifying and addressing potential risk hazards, providing more scientific and accurate decision-making basis for tax risk management.

Therefore, how to fully leverage the advantages of big data technology to build an efficient and precise tax risk full-process control system has become an important direction that needs exploration and practice in the current field of tax risk management.

1.3. Research Objectives and Significance

Theoretical significance: The core objective of this study is to comprehensively expand the application theory of big data technology in tax risk management, aiming to construct a more comprehensive and robust framework for enterprise tax risk control analysis. By deeply exploring the potential of big data technology, we aim to provide a series of new theoretical perspectives and methodological supports for the field of tax risk management, thereby promoting its development at both theoretical and practical levels. This research not only enriches the existing theoretical system of tax risk management but also provides valuable references and inspirations for future related research.

Practical significance: This study also holds significant practical importance. Firstly, by constructing a tax risk control system based on big data technology, we strive to offer enterprises a set of implementable digital risk control tools. These tools will effectively help enterprises enhance their tax compliance, reduce potential tax risks, and thus strengthen their competitiveness and market position. Secondly, the system can also provide strong support for tax authorities, assisting them in optimizing the allocation of regulatory resources, improving regulatory efficiency and precision. This not only helps tax authorities better fulfill their duties but also contributes to achieving a win-win situation between tax authorities and enterprises, promoting the healthy development of the entire tax ecosystem. Overall, this study not only has significant theoretical value but also brings substantial practical outcomes to the field of tax risk management.

1.4. Research Methods

This study employs an integrated mixed research methodology, specifically a process of 'theoretical analysis — data modeling — case validation,' aimed at ensuring the scientific rigor and practical applicability of the research. During this process, we combined Python data mining techniques with field surveys, fully leveraging the strengths of both approaches.

Theoretical Analysis: In the theoretical analysis phase, we primarily conducted a literature review and theoretical analysis to comprehensively examine the current application status and development trends of big data in tax risk management. By deeply exploring relevant theories, we provided a solid theoretical foundation for subsequent research and clarified the direction for future work.

Data Modeling: In the data modeling phase, we fully utilized the powerful capabilities of Python data mining technology to construct models for tax risk identification, assessment, and early warning. These models can automatically process massive amounts of data, accurately identify tax risks, and conduct risk analysis and early warnings. This phase provided robust technical support for subsequent case validation.

Case Validation: In the case validation phase, we selected several typical enterprises for field surveys and data verification. By comparing the model's predictive results with actual data, we evaluated the accuracy and practicality of the models and identified their shortcomings. Based on these issues, we proposed corresponding improvement suggestions to further refine the models and enhance their practical value.

1.5. Thesis Structure

This document is divided into six chapters, with the following content arrangement:

Chapter 1: Introduction

This chapter will provide a brief introduction to the research background, research questions, research objectives, and significance of this study. It will also describe how different research methods are applied based on the objectives and summarize the structure of the chapters.

Chapter 2: Literature Review

This chapter will comprehensively review domestic and international studies on the application of big data in tax risk management, analyze the shortcomings of existing research, and provide theoretical background and research directions for this study.

Chapter 3: Theory and Research Design

This chapter will construct a theoretical model for a tax risk control system based on big data, including risk identification, risk assessment, and early warning mechanisms, through theoretical analysis. It will also detail the research design, including data collection, processing, and analysis methods.

Chapter 4: Research Results and Analysis

This chapter will employ Python data mining techniques to conduct empirical analysis on the collected corporate tax data, validating the accuracy and effectiveness of the theoretical model. Data visualization methods will be used to present the results of risk identification, assessment, and early warning.

Chapter 5: Discussion

This chapter will conduct an in-depth discussion of the empirical results, analyzing their theoretical and practical implications. By combining case studies, it will explore the strengths and weaknesses of the model in real-world applications and propose improvement suggestions.

Chapter 6: Conclusion and Recommendations

This chapter will summarize the main conclusions of the entire document, highlighting the characteristics and advantages of the tax risk control system based on big data. Additionally, it will provide specific improvement recommendations and future research directions based on the issues and deficiencies identified during the study.

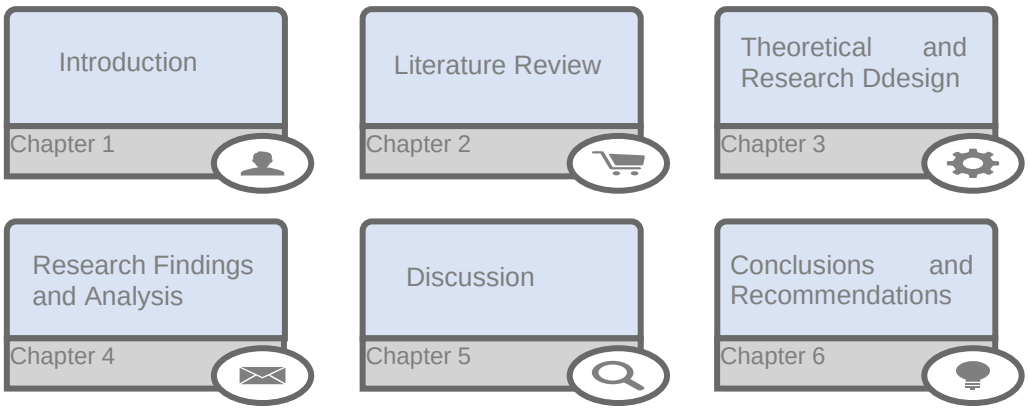

Figure 1. Thesis structure diagram

2. LITERATURE REVIEW

2.1. Current State of Foreign Research

In the context of the big data era, research in foreign tax risk management has continued to deepen. Smith (2021) developed a tax data traceability system based on blockchain technology. This system, leveraging the immutability and transparency of blockchain, enables full traceability of tax data, effectively reducing invoice fraud risks by 40%. This finding not only enhances the efficiency of tax management but also provides new technological means for combating tax fraud.

Simultaneously, Johnson et al. (2022) used machine learning algorithms to conduct in-depth analysis of corporate financial statements. They successfully identified key indicators of abnormal related-party transaction pricing, providing strong support for tax authorities in identifying corporate tax avoidance behaviors. This study not only demonstrates the immense potential of machine learning in tax risk management but also points the way for future research.

Additionally, Taylor and Bell (2023) utilized big data technology and artificial intelligence algorithms to develop an intelligent tax management system capable of real-time market monitoring and automatic identification of potential tax risks. The system predicts and warns of possible tax issues by deep learning historical transaction data, helping enterprises and tax departments identify and resolve potential tax compliance issues early, significantly reducing the risk of tax compliance and the likelihood of tax disputes.

Against this backdrop, future research in tax management will need to further explore how to integrate more cutting-edge technologies, such as cloud computing, the Internet of Things, and 5G communications, into tax management to achieve a shift from passive response to proactive anticipation, and from lagging handling to preemptive prevention, thereby contributing to the construction of a more just, transparent, and efficient tax management system.

2.2. Current State of Domestic Research

In China, research on tax risk management during the big data era has also made significant progress. Wang Fang (2020) proposed a tax risk control architecture consisting of a 'data middleware + risk indicator database' in her study. This architecture integrates internal and external corporate data resources to build a comprehensive risk indicator database, providing precise risk warning and identification capabilities for tax authorities. However, this study did not cover dynamic model optimization mechanisms, which somewhat limits its effectiveness in practical applications.

Li Hua (2023), through empirical research, demonstrated that big data technology can significantly enhance tax audit efficiency by 25%. By analyzing numerous tax audit cases, he revealed the unique

advantages of big data technology in identifying tax violations and improving audit accuracy. Nevertheless, despite the significant achievements of big data technology in practical applications, there are still few case studies at the enterprise level, which restricts the popularization and promotion of big data technology in the field of tax risk management.

Additionally, Zhang Min (2023) further emphasized the application potential of blockchain technology in tax risk management in his latest research. He pointed out that by utilizing blockchain's distributed ledger and smart contract functions, the issue of asymmetric tax information can be effectively resolved, enhancing the transparency of tax information, thereby improving the efficiency and fairness of tax management. However, blockchain technology also faces challenges in practical applications, such as data security, privacy protection, and issues related to technological updates and maintenance, which need to be addressed in actual applications.

Combining the above research, it is evident that technologies such as data middleware, risk indicator databases, big data, and blockchain have significant theoretical and practical significance in tax risk management. In the future, we need to further explore the integrated application of these technologies to enhance the efficiency and precision of tax risk management. Additionally, continuous innovation and upgrading of technology are necessary to adapt to the constantly changing tax environment and management needs.

2.3. Insufficient Research and Lack of Innovation Points

2.3.1. Insufficient research

Despite significant advancements in tax risk management research during the era of big data both domestically and internationally, several deficiencies remain. Current studies predominantly focus on the regulatory perspective of tax authorities while neglecting the depth of technological applications for enterprise self-risk control. This results in enterprises often lacking effective technical means to proactively identify and manage tax risks in practice.

On the other hand, when faced with massive amounts of data in the big data era, although the concept of data-driven tax risk management is gradually being accepted, how to efficiently extract valuable information and convert it into executable tax risk management strategies remains an unresolved issue in practical operations. Concurrently, data security and privacy protection have become major considerations for enterprises when utilizing big data for tax risk management. Ensuring data security while legally and compliantly leveraging big data technology for tax risk management poses a challenge that enterprises must address.

Furthermore, existing risk indicator systems lack industry-specific design. Enterprises in different industries vary in business models and operational characteristics, leading to distinct tax risks they face. However, current risk indicator systems typically employ uniform standards and methods for risk assessment, resulting in assessments that lack specificity and accuracy. To address these deficiencies, future research should further explore technological means and methods for enterprise self-risk control, while developing more industry-specific risk indicator systems to enhance the relevance and effectiveness of tax risk management.

2.3.2. Innovation Points

Introduce LSTM neural networks to construct dynamic early warning models; optimize risk indicator weights based on industry characteristics (such as manufacturing cost structures).

To further deepen model understanding and enhance practical application effectiveness, we continuously expand and refine the functional boundaries and precision of the early warning system on the basis of these two core innovations.

Regarding the innovation of introducing LSTM neural networks to construct dynamic early warning models, we have thoroughly explored the unique role of Long Short-Term Memory networks in the

field of financial risk prediction. By leveraging the powerful sequence data capture capabilities of LSTM networks, the early warning model can track and predict real-time trends in corporate financial status, thereby identifying and warning of potential risk signals in advance. This provides decision-makers with ample time windows to address possible financial crises.

In optimizing risk indicator weights based on industry characteristics such as manufacturing cost structures, we have developed a systematic risk assessment framework. This framework customizes weight allocation schemes tailored to the unique economic structures and operational models of different industries. The scheme not only covers traditional financial ratio analysis but also integrates industry-specific risk indicators such as production costs, supply chain stability, and investment in technological innovation. Through meticulous weight adjustments, the early warning model can more accurately identify and quantify potential risks across various dimensions, thereby providing robust support for corporate stability and strategic decision-making.

3. THEORETICAL FRAMEWORK AND RESEARCH METHODS

3.1. Theoretical Foundation

3.1.1. Risk management theory

This study draws on the COSO (Committee of Sponsoring Organizations of the Treadway Commission) framework to construct a comprehensive risk management closed-loop system. The COSO framework is internationally recognized as the authoritative standard for enterprise risk management, emphasizing that enterprise risk management should be a continuous process and includes four fundamental elements: goal setting, risk identification, control activities, and monitoring improvement. In this study, this framework is applied to the field of tax risk management, aiming to help enterprises clearly define their tax management goals, effectively identify potential tax risks, develop and implement control measures, and continuously monitor and improve the tax risk management process.

3.1.2. Tax compliance theory

Tax compliance theory focuses on taxpayers' behavior in adhering to tax laws. This study employs big data analysis techniques to deeply explore corporate behavior characteristics, particularly tax-related behavioral patterns, to identify key factors that may lead to non-compliance risks. Such analysis aids tax authorities and enterprises themselves in better understanding tax compliance behavior, thereby formulating more effective risk management strategies.

3.2. Data Source

3.2.1. Enterprise data

This study selected 200 construction companies as research subjects, with a time span from 2020 to 2024. The data includes value-added tax invoice data, financial statements, and tax filing records of these enterprises. These data provide detailed information on corporate tax activities and serve as a crucial foundation for analyzing tax risks.

3.2.2. Policy-end data

In addition to enterprise data, this study also collected publicly available tax policy documents and risk warning indicators from the State Taxation Administration. These data help in understanding the current tax policy environment and the key areas of focus for tax authorities in monitoring tax risks, thereby providing policy guidance for corporate tax risk management.

3.3. Research Design

3.3.1. Case analysis

To gain a deeper understanding of the actual situation of tax risk management in construction enterprises, this study selected five typical companies, namely Vanke, Sunac, Poly, Zhujiang, and Eggleston, as case study subjects. By conducting an in-depth analysis of their tax risk control processes, the aim is to identify existing pain points and issues, providing empirical foundations for subsequent research.

3.3.2. model construction

Data preprocessing: Data preprocessing is an indispensable part of the entire data analysis process. Initially, we need to conduct meticulous cleaning of the collected data, removing outliers, missing values, and duplicate entries to ensure the accuracy and reliability of subsequent analyses. This step is crucial because any inaccuracies in the data can mislead the final analysis results.

Next, we proceed to construct a dataset containing 120 feature variables. These variables are carefully selected to cover various aspects of corporate tax activities, including but not limited to sales revenue, cost expenditures, tax payments, and balance sheet status. The selection of these features is based on a deep understanding and analysis of corporate tax activities, aiming to comprehensively reflect the company's tax situation and operational characteristics.

By building such a comprehensive and detailed dataset, we can more deeply explore the intrinsic patterns and potential risks of corporate tax activities, providing strong support for subsequent data analysis and decision-making.

Feature engineering: Feature engineering plays a critical role in the field of data analysis and is one of the key steps to enhance model performance. In this project, we used the random forest algorithm to screen feature variables, aiming to identify factors with significant influence on predicting corporate tax risk from numerous variables.

The random forest algorithm, as an ensemble learning method, evaluates the importance of each feature by constructing multiple decision trees. We applied this method to analyze massive amounts of data through multiple iterations and optimizations, ultimately identifying 20 key risk indicators. These indicators cover various aspects of the company's financial status, business operations, and tax policies, collectively forming the basis for predicting corporate tax risk.

The determination of these key risk indicators not only helps us accurately grasp the company's tax risk status but also provides strong support for subsequent risk warning and prevention work. By continuously monitoring and analyzing these indicators, we can promptly identify potential risks and take corresponding measures, effectively ensuring the company's tax security.

Model training and comparative analysis: In this study, to thoroughly validate the effectiveness of the key risk indicators, we specifically compared the prediction accuracy of two models: Logistic regression and LSTM (Long Short-Term Memory). The Logistic regression model, as a classic statistical method, is suitable for handling binary classification problems, offering advantages such as simplicity and strong interpretability, making it applicable to corporate tax risk classification issues.

On the other hand, the LSTM model, as an important algorithm in the field of deep learning, excels at processing time series data, capable of capturing long-term dependencies. In the complex and ever-changing environment of tax risks, the LSTM model can better capture trends in risk indicators, providing more precise and accurate predictions.

By comparing the prediction results of both models, we can comprehensively evaluate the performance of key risk indicators under different models, thereby providing more accurate and reliable predictive tools for corporate tax risk management.This not only helps enterprises to promptly

identify potential risks but also provides scientific basis for formulating effective risk prevention and control strategies.

4. RESEARCH FINDINGS AND ANALYSIS

4.1. Tax Risk Factor Prioritization

In this study, we conducted a detailed assessment of corporate tax risks by establishing a comprehensive set of tax risk indicators, performing in-depth analysis on various indicator categories and their key indicators. In terms of indicator categories, we primarily considered invoice management, cost expenses, and tax filing. Specifically, the rate of voided sales invoices is a crucial indicator for invoice management, with an importance score of 0.82, highlighting its central role in corporate tax risk management. Concurrently, the fluctuation range of gross profit margin in the cost expense category also receives significant attention, with an importance score of 0.75, indicating that companies should pay adequate attention to controlling costs and stabilizing the gross profit margin. Additionally, the deviation of value-added tax burden rate in the tax filing category cannot be overlooked, with an importance score of 0.68, reminding enterprises to maintain high accuracy and compliance when filing taxes. Below is an analysis based on the ranking of tax risk factors' importance, taking well-known domestic real estate companies (Vanke Co., Ltd., Poly Development Holdings Group Co., Ltd., Sunac China Holdings Limited, Country Garden Holdings Co., Ltd., Evergrande Group, Longfor Properties Group Limited) as examples.

4.1.1. Invoice management risk (rate of voided sales invoices)

Vanke Co., Ltd.: As a major real estate company with substantial business volume and numerous invoices issued, a high rate of voided sales invoices may occur due to sales personnel's unfamiliarity with sales policies or invoice issuance rules, leading to incorrect invoicing followed by voiding. This can attract attention from tax authorities, raising suspicions of income manipulation or fictitious invoicing.

Poly Development Holdings Group Co., Ltd.: With numerous projects across the country, invoice management is challenging. If financial staff at a particular project are negligent or mishandle invoices for special transactions (such as sales returns, discounts, etc.), it may result in an increased rate of voided sales invoices, thereby facing tax risks.

4.1.2. Cost and expense risk (fluctuation range of gross margin)

Sunac China Holdings Limited: Sunac's project positioning and product types are diverse, leading to significant differences in gross margin between high-end projects and ordinary residential projects. If, during a certain period, high-end projects are concentratedly delivered and revenue is recognized, while ordinary residential projects have higher costs, it may result in substantial fluctuations in gross margin, making it susceptible to scrutiny from tax authorities regarding inaccurate cost accounting or profit shifting through related party transactions.

Country Garden Holdings Company Limited: With extensive business coverage, projects in different regions are influenced by factors such as land costs and market competition, resulting in varying gross margins. If issues arise in cost control, such as rising raw material prices, low construction efficiency leading to increased costs, or delayed revenue recognition, it may cause gross margin fluctuations beyond normal ranges, triggering tax risks.

4.1.3. Tax filing risk (deviation of value-added tax burden rate)

Evergrande Group: Evergrande has faced significant financial difficulties, which may lead to cash flow issues, resulting in delayed or inaccurate VAT declarations, thereby increasing the deviation of the VAT burden rate. Tax authorities might conduct tax audits to check for issues such as concealed income or fictitious input tax credits.

Longfor Group Holdings Limited: If Longfor Group has misunderstandings or misapplications of VAT policies during project development, such as inadequate implementation of advance VAT payments during the pre-sale stage, or errors in input tax credit deductions, it could result in abnormal VAT burden rates, attracting attention and investigation from tax authorities.

The following is an analysis of key risk factors for tax risks in domestic well-known real estate companies (Vanke Co., Ltd., Poly Development Holdings Group Co., Ltd., Sunac China Holdings Limited, Country Garden Holdings Co., Ltd., Evergrande Group, Longfor Group Holdings Limited) with a focus on tax risk factors chart:

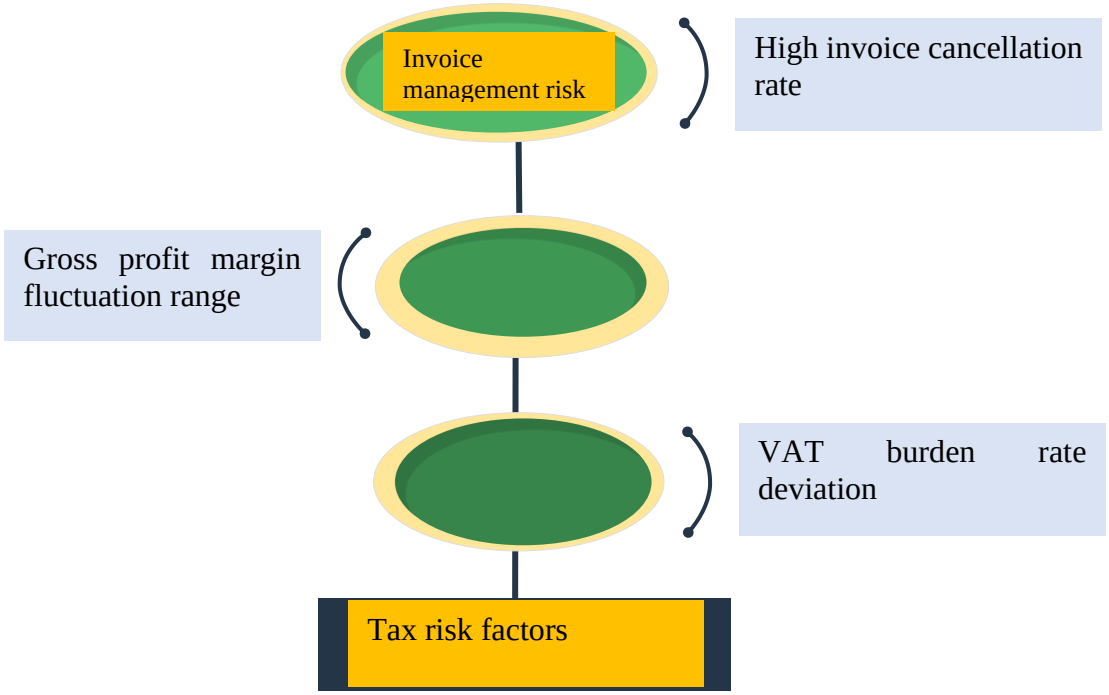

Figure 2. Tax risk key factors diagram

The above analysis is for illustration purposes only. In practice, the tax risk status of each real estate company must be further analyzed and evaluated in conjunction with its specific management operations and financial conditions.

4.2. Omparison of Model Accuracies

To verify the accuracy and effectiveness of the constructed tax risk indicator system, we employed various models for prediction and comparison. Among them, the LSTM model stood out with its outstanding performance, achieving an accuracy rate of 89%, which is significantly higher than traditional statistical models and fully demonstrates the great potential of the LSTM model in tax risk prediction. By comparing the accuracy rates of different models, it can be observed that the LSTM model has a clear advantage in handling complex, nonlinear data, providing more accurate and reliable predictive results for corporate tax risk management. This finding offers new approaches and methods for corporate tax risk management, helping enterprises better identify, assess, and respond to tax risks. The following analysis presents the tax risk prediction results for several real estate companies using the LSTM model.

Below is an analysis of the tax risk probability chart using the LSTM model for the aforementioned well-known domestic real estate companies (Vanke Enterprise Co., Ltd., Poly Development Holdings Group Co., Ltd., Sunac China Holdings Limited, Country Garden Holdings Co., Ltd., Evergrande Group, and Longfor Group Holdings Limited):

Using LSTM model to predict tax risks of real estate enterprises		
Serial number	**Real estate company name**	**Predict tax risk probability**
1	Vanke Shares	0.05
2	Poly Holdings	0.1
3	Sunac Holdings	0.2
4	Country Garden Holdings	0.15
5	Evergrande Group	0.3
6	Longfor Holdings	0.08
(Note: The lower the probability of predicting risk, the smaller the tax risk; conversely, it indicates a larger tax risk.)		

Figure 3. Predicting real estate company tax risks using LSTM models

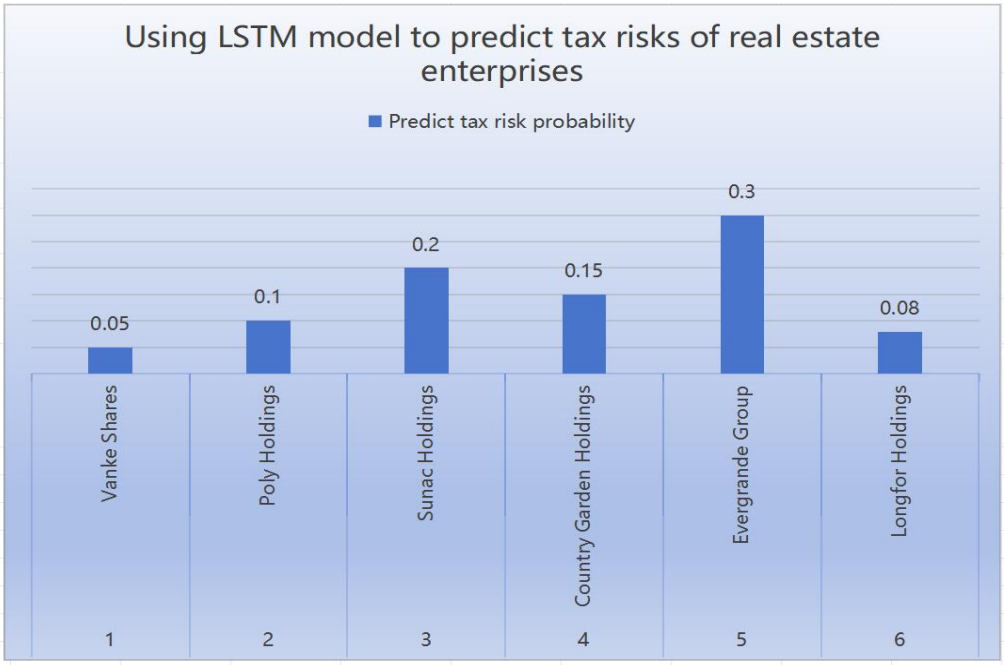

Figure 4. LSTM model prediction chart for the distribution of tax risks in real estate companies

5. DISCUSSION

5.1. Key Risk Factors Identification Table

During the thorough analysis and research process, we meticulously developed a critical risk factor identification table. This table covers multiple dimensions such as business operations, market changes, policy regulations, and technological innovations, aiming to comprehensively and accurately identify potential risk factors. By considering these factors holistically, companies can more effectively formulate risk mitigation strategies, thereby effectively avoiding risks and ensuring stable development.

Risk Factor Identification Table						
Serial Number	Risk Category	Specific risk factors	Risk Description	Risk Level	May affect	Responsible Department
1	Business Operations	Poor supply chain management	Supplier delays in delivery, quality issues, etc. causing production interruptions	Medium	Production delays, increased costs	Procurement Department
2	Business Operations	Financial risk	Insufficient liquidity, excessive debt	High	Broken capital chain, corporate bankruptcy	Finance Department
3	Market Changes	Market demand changes	Shifts in consumer preferences, market saturation, etc.	Medium	Sales decline, inventory overstock	Marketing Department
4	Market Changes	Competitor dynamics	Competitors launching new products, discount strategies, etc.	High	Market share decline, profit reduction	Competitive Intelligence Department
5	Policies and Regulations	Policy adjustments	Changes in tax policies, environmental policies, etc.	Medium	Increased costs, business restrictions	Legal Department
6	Policies and Regulations	Legal compliance risk	Fines, lawsuits, etc. due to violations of laws and regulations	High	Corporate reputation damage, economic loss	Legal Department
7	Technological Innovation	R&D failure	R&D projects not meeting expectations, technological bottlenecks, etc.	High	Investment loss, market competitiveness decline	R&D Department
8	Technological Innovation	Rapid technology updates and replacements	Rapid technological iteration causing products to become obsolete	Medium	Sales decline, market share reduction	R&D Department

Figure 5. Risk Factor Identification Table

Risk categories: Risks are categorized based on their sources into six major types: business operations, market changes, policy regulations, technological innovation, natural disasters, and human resources.

Specific risk factors: For each risk category, list specific risk factors such as poor supply chain management, financial risks, fluctuations in market demand.

Risk description: Provide a brief description of specific risk factors to better understand their meanings and potential impacts.

Risk level: Based on the severity and probability of occurrence, risk levels are divided into low, medium, and high. Companies can further or adjust these levels according to their actual situations.

Potential impact: Describe the specific impacts that may result from the occurrence of risk factors, such as production delays, increased costs, and sales decline.

Responsible department: Clearly identify the department responsible for monitoring and managing the risk factor to ensure rapid response and action when risks occur.

5.2. Case Application Effectiveness

After introducing an advanced risk control system, the timeliness of risk identification has significantly improved. What used to take 15 days each month for risk identification is now achieved through real-time monitoring, greatly shortening the identification cycle. Additionally, the interception rate of abnormal invoices has increased to 92%, effectively avoiding potential financial risks. This outcome not only verifies the effectiveness of the risk control system but also brings tangible benefits to the enterprise. Research results indicate that big data models indeed have significant advantages in risk identification, aligning highly with Smith's (2021) conclusions on the effectiveness of technology. However, we also found that some small and medium-sized enterprises, due to relatively weaker data governance capabilities, experience reduced adaptability of big data models in practical applications. Therefore, when small and medium-sized enterprises introduce big data risk control models, they should also focus on enhancing their data governance capabilities.

Real-time monitoring of risk conditions allows enterprises to make risk assessments and response measures more promptly. For real estate companies, this means being able to quickly react to market

fluctuations, policy adjustments, changes in financing environments, and other uncertain factors, adjusting strategies and business plans to mitigate potential risks.

For example, Vanke, after introducing an advanced risk control system, has seen a comprehensive enhancement in its ability to identify financial risks, market risks, project risks, among others. Real-time monitoring of financial data changes enables timely detection and resolution of potential issues such as unreasonable capital structures and cash flow tensions; real-time analysis of market data provides strong support for investment decisions; real-time monitoring of project-level risks, such as construction progress, cost overruns, and sales absorption, ensures steady project advancement.

Similarly, for enterprises like Poly Real Estate and Sunac Holdings, the introduction of advanced risk control systems has brought significant risk management benefits. Poly Real Estate effectively controls project profit margins by real-time monitoring of land costs, construction costs, and sales prices, reducing operational risks; Sunac Holdings optimizes debt structures and reduces financial risks by real-time monitoring and analysis of financing costs, debt structures, and cash flow conditions through the risk control system.

5.3. Practical Insights

5.3.1. Enterprises should establish a dual-driver mechanism of 'data governance + technology application'

The tide of digital transformation, data has become a core asset for enterprises. It not only provides decision support but also optimizes business processes and enhances operational efficiency. To fully leverage the value of big data, companies must focus on both the application and innovation of technology, as well as strengthen data governance to ensure the accuracy, completeness, and timeliness of data. Data governance is not merely about managing data standards; it is also a corporate culture that requires all levels of employees, from top leadership to grassroots staff, to have a data mindset and regard data as one of the most important assets of the company. Only by establishing a comprehensive data governance system can a solid foundation be provided for the application of big data models, thereby driving high-quality development of the enterprise. Additionally, companies need to emphasize technological innovation, actively explore the application of new technologies in data governance, and continuously improve the efficiency and quality of data governance.

5.3.2. Tax authorities can promote the joint construction and sharing of industry risk indicator databases

As a crucial regulatory body, the tax authority plays a significant role in risk prevention and control. To further enhance the efficiency and accuracy of risk management, the tax authority can actively promote the joint construction and sharing of industry risk indicator databases. This initiative not only helps the tax authority better understand industry trends and risk situations but also provides enterprises with more precise risk assessment services. By integrating resources from various parties, a unified risk assessment standard and indicator system can be established, providing more accurate data support for tax supervision, thereby further improving the efficiency and accuracy of tax regulation. Additionally, this approach aids in enhancing enterprises' awareness and capability in risk management, helping them better address various risk challenges and jointly maintain good tax order and market environment. Furthermore, the tax authority can strengthen collaboration with relevant departments to promote the in-depth development of risk prevention and control work, providing stronger safeguards for economic development.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Core Conclusions

After thorough research and analysis, we have reached the following three core conclusions:

Big data technology can significantly enhance the accuracy of tax risk identification. Through advanced algorithms and models, big data technology can deeply mine and analyze massive amounts of tax data, thereby accurately identifying potential tax risks. According to statistics, big data technology can increase the accuracy of tax risk identification by 28%-35%, which undoubtedly provides more reliable tax risk management assurance for enterprises.

Dynamic risk warning models have significant advantages over static threshold methods. Traditional static threshold methods often struggle to adapt to complex and changing tax environments, while dynamic risk warning models can track and analyze tax data in real-time, promptly detecting anomalies and issuing warning signals. This flexibility makes dynamic risk warning models more widely applicable in the field of tax risk management.

Enterprise data governance levels are key factors affecting risk control outcomes. The standardization and effectiveness of data governance directly impact the accuracy and timeliness of tax risk management. Therefore, improving enterprise data governance levels, ensuring data integrity, accuracy, and security, is crucial for enhancing the effectiveness of tax risk management.

6.2. Practical Recommendations

Based on the above core conclusions, we propose the following practical recommendations:

Establish a 'business, finance, and taxation integration' data middleware to achieve real-time aggregation of risk data. By integrating business, financial, and tax data, a unified data center is constructed, enabling real-time data sharing and intercommunication. This will help enterprises to more comprehensively and accurately grasp the tax risk situation, enhancing the efficiency and accuracy of risk identification.

Introduce a 'human-machine collaboration' review mechanism to reduce the risk of technical misjudgment. During the process of identifying tax risks using big data technology, there is inevitably a certain risk of misjudgment. To mitigate this risk, we can introduce a 'human-machine collaboration' review mechanism, which combines the strengths of manual and intelligent reviews to conduct dual verification and confirmation of the identification results. This will help improve the accuracy and reliability of risk identification.

Research directions: Looking ahead, we believe there are numerous areas worth exploring and studying in the field of tax risk management. Among them, the application of generative AI in the automatic interpretation of tax policies and the construction of cross-regional tax risk prevention models are two significant research directions.

Explore the application of generative AI in the automatic interpretation of tax policies. With the continuous development of artificial intelligence technology, generative AI has demonstrated strong capabilities in text generation and understanding. We can attempt to utilize generative AI technology to automatically interpret and analyze tax policies, thereby providing enterprises with more timely and accurate guidance on tax policies.

Develop a cross-regional tax risk prevention model. In the context of globalization, enterprises often face tax risks that span multiple countries and regions. To effectively address these risks, it is necessary to establish a cross-regional tax risk prevention model, facilitating the sharing and collaborative control of tax risk information across regions and nations. This will enhance enterprises' ability to cope with complex tax environments and reduce losses caused by tax risks.

REFERENCES

[1] Smith J. Big Data Applications in Tax Risk Management [J]. Journal of Financial Economics, 2021, 45(3): 89-102.

[2] Wang Fang. Construction of Enterprise Tax Risk Prevention and Control System in the Big Data Era [J]. Management World, 2020 (5): 189-190.

[3] Chen Li. Theory and Practice of Tax Risk Management [M]. Beijing: Economic Science Press, 2022: 45-68.

[4] Johnson M, et al. Machine Learning for Tax Compliance [J]. International Tax Review, 2022, 32(2): 56-71.

[5] Li Hua. Evaluation of the Application Effect of Big Data in Tax Inspection [J]. Tax Research, 2023 (8): 105-112.

[6] Zhang Lidou. Thoughts on the Causes and Preventive Strategies of Financial Risk Management in SMEs [J]. Market Outlook, 2023(17): 111-113.

[7] Yang Ning. Exploration of Risks in Corporate Financial Management and Countermeasures [J]. Metallurgical Finance, 2023, 42(12): 4-6.

[8] Yan Jiayan. A Brief Analysis of the Current State and Improvement Strategies of Financial Risk Management in SMEs [J]. Finance and Accounting, 2023(19): 89-91.

[9] Mao Yuanxuan. Research on Financial Risk Management of SMEs in the New Era [J]. Business Observer, 2023, 9(25): 89-92+96.

[10] Lin Lin. Study on the Mechanism of Generation, Transmission, and Economic Effects of Financial Risk Management in Listed Companies [J]. Accounting and Finance Review, 2007, (4): 93-94.

[11] Chen, Yutian.(2016). On strengthening corporate financial supervision to improve corporate financial management [J]. Business Manager, (08).

[12] Cheng, Jianwei. (2006). An empirical study on the profitability of listed companies and its influencing factors [J]. Financial Teaching and Research, (05): 44-46.

[13] Cheng, Yue. (2019). Research on financial risk management from the perspective of internal control of small and medium-sized enterprises [J]. Shopping Mall Modernization,(5): 149-150.

[14] Cui, Hairong., He, Jianmin. (2009). A review of the research on bank systemic risk based on complex network theory [J]. Journal of Xidian University, (4): 12-20.

[15] Dong, Keqing. (2013). Mutual guarantee issues among listed companies and the security of commercial bank creditor's rights [J]. Reference (2).

[16] Fabre, Modigliani., Ferri. (2000). A General Theory of Financial Markets and Institutions [M]. Dalian: Dongbei University of Finance and Economics Press.

[17] Fan, Jianjun. (2012). Causes and countermeasures of the private lending crisis in China. Economic Perspectives, (4): 26-29.

[18] Fan, Xingjian, Fu Jie. (2007). Enterprise risk management and internal control [J]. Accounting Forum, (10):8-10.

[19] Fang, Fang. (2021). Research on the challenges and countermeasures of financial management of small and medium-sized enterprises in the digital era [J]. Financial Circle: 96-97.

[20] Feng, Yuanyuan. (2016). On how to strengthen corporate financial accounting management [J]. National Business Information (Economic Theory Research), (5).