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Big Data Technology in Corporate Financial Analysis: A Systematic Literature Review

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Abstract

In the digital era, the rapid advancement of information technology and the deepening of corporate digital transformation have made big data technology an indispensable tool for supporting financial analysis. This paper presents a comprehensive review of the application of big data technology in corporate financial analysis, systematically synthesizing relevant studies from both domestic and international literature. First, it outlines the fundamental concepts of big data technology and corporate financial analysis, followed by a critical examination of existing research from three perspectives: technology types, application domains, and research methodologies. Building on this analysis, the paper proposes a "technology – data – decision" mechanism of action and elaborates on specific application scenarios within corporate financial analysis, including refined cost management, decision-support analytics, risk management and early warning, as well as customer value and profitability assessment. Subsequently, it synthesizes the limitations of current research and highlights promising avenues for future inquiry. The findings of this review offer valuable insights for enterprises seeking to achieve a deeper integration of financial analysis and big data technologies in the information age.

Keywords: Big Data Technology; Financial Analysis; Data Integration; Decision Support

1. Introduction

With the rapid development and in-depth application of big data intelligent technology (Li, 2020), the application of big data technology has become a non-trivial and valuable research topic in the field of corporate financial analysis. As a key link in the enterprise operations, financial analysis, with its accuracy and guidance, directly affects an enterprise's strategic decisions and crucial development plans. Amid the wave of digital transformation, traditional financial analysis, which involves massive data calculations and cumbersome steps, is facing numerous challenges

and threats. Therefore, the development and application of big data technology provide new methods and ideas to solve this problem (Abawajy et al., 2018).

This paper focuses on expounding the application of big data technology in enterprise financial analysis through the "technology-data-decision" mechanism of action. Its primary purpose is to systematically sort out the current research status of the application of big data technology in corporate financial analysis, provides an in-depth discussion of existing research results, mainstream application scenarios, and key technical paths in this field. On this basis, the paper will comprehensively analyze the significant advantages brought by big data technology to enterprise financial analysis, such as improving the accuracy of financial forecasting, enhancing the efficiency of risk identification, and optimizing the rationality of resource allocation. At the same time, it will also explore the limitations that cannot be ignored, including problems related to data quality, technical bottlenecks in data processing, and challenges in talent team building. Furthermore, the paper will look forward to the future development trends of this field from a forward-looking perspective.Through such a comprehensive research framework, this paper strives to provide valuable reference for deepening theoretical research in the academic community and guiding specific practices of enterprises in financial management.

2. Basic Overview of Big Data Technology and Corporate Financial Analysis

In the tide of the information age, big data technology has increasingly become a hot topic of concern for enterprises. Nowadays, big data technology has developed relatively maturely, with richer databases and more advanced technical operations. Technologies such as data mining (Werner et al., 2021), data warehouses, cloud computing, and machine learning are continuously developing (Wang, 2019) and have been widely applied in enterprises gradually, with the integration of financial intelligence and management accounting functions (Zhang et al., 2019). On this basis, integrating big data technology with corporate financial analysis business can process massive corporate financial data at a high speed (Bach and Mirjana, 2019) and present real and scientific analysis results to enterprise decision-makers in various visualized forms, injecting new vitality into enterprise development decisions and management. Zhu (2024) proposed that big data based on financial analysis has the following characteristics: massive data, multi-type data, data mining, data insight, and the characteristic of "social transformation".

Financial analysis is an important and non-trivial step in enterprise operations. It is a process of systematically analyzing and evaluating an enterprise's financial status, operating results, and cash flows based on the enterprise's financial statements and other relevant materials, using a series of specialized analysis methods and techniques. China's financial analysis has gone through four stages: financial statement analysis,capital market financial analysis,business-finance comprehensive analysis, and big data financial analysis (Jin et al., 2023). Traditional financial analysis simply relies on sample data, with large data volume, cumbersome and complex processing steps, and low efficiency. With the in-depth development and application of computer technology and big data technology, traditional financial analysis has been gradually impacted to a certain extent, have been challenged (Zhang et al., 2022), and the external market environment

of enterprises has also undergone profound and ineluctable changes. More and more enterprises have gradually begun to continuously integrate big data technology with financial analysis, breaking through the limitations of traditional financial analysis. They can conduct real-time analysis of enterprise financial data, comprehensively and scientifically process a large amount of financial data (Chen et al.,2014), significantly accelerate the speed of data acquisition, and significantly improve the efficiency of data processing, in order to create greater and vital value for enterprises. Jin et al. (2023) pointed out that, for example, ChatGPT can generate visual charts, demonstration documents, etc., according to user natural language instructions, which to a certain extent improves the intelligence and automation of financial analysis, and promotes the evolution of financial analysis towards the trends of multi-dimensional data sources, improved visualization, and enhanced automation and intelligence.

Based on a comprehensive review of existing domestic and foreign research, the following analyses are presented:

At the technical type level, most literatures only focus on the application of big data analytical technologies such as data mining and machine learning in enterprise financial analysis, while research on technical aspects like data governance technology and real-time data processing technology is relatively insufficient. This emphasis leads to an incomplete depiction of the full application chain of big data technology in enterprise financial analysis, neglects the overall perspective, and results in weak persuasiveness of conclusions.

At the application field level, most literatures take industry-leading enterprises such as financial institutions and large Internet companies as research objects, with insufficient research covering traditional manufacturing industries as well as small, medium, and micro enterprises. They fail to fully consider the characteristics of different industries, making it impossible to effectively promote single-case findings to the entire industry.

At the research method level, some literatures use small samples or static data for analysis, or their samples are mostly from large enterprises and public data, with insufficient coverage of small and medium-sized enterprises and private data. This makes it difficult to reflect the dynamic impact of the "real-time, massive, and multi-dimensional" characteristics of big data technology on enterprise financial analysis. In addition, most theoretical research in the literatures only stays at the simple superposition of principles, leading to over-generalized conclusions with insufficient differentiation and lack of in-depth integration with actual enterprise application scenarios. Some assumptions of research models are disconnected from the actual financial scenarios of enterprises, failing to provide accurate action guidelines for different enterprises.

3. Mechanism of Big Data Technology in Financial Analysis: Technology-Data-Decision

In response to the above research, this paper proposes a "technology-data-decision" mechanism of action. That is, through the application of big data technology, massive enterprise financial data is analyzed to generate new and instructive actionable insights , which assist enterprise managers in making scientifically sound and effectively supported decisions.

The main contents of big data financial analysis include: first, accounting statement analysis, analyzing balance sheets, profit statements, cash flow statements, and identification of financial statement window-dressing; second, financial analysis capabilities, including solvency analysis, operating capacity analysis, profitability analysis, development capacity analysis, and comprehensive financial performance analysis (Jin et al., 2023). In today's digital era, with the continuous development of big data technology, the innovative application scenarios of big data technology in corporate financial analysis are constantly expanding, such as refined cost analysis, decision support analysis, risk management and early warning (Hu and Tsai, 2024), customer value and profitability analysis, etc. The logical mechanism of "technology-data-decision" plays a role in all of them, continuously injecting new creative vitality into enterprise decision-making.

3.1. Refined Cost Analysis

Cost control is a key factor in enterprise operations, and low cost helps enterprises gain a competitive advantage. Big data technology can help enterprises trace the cost of each step of enterprise expenditure's data. All links of enterprise operations, from raw material procurement, production and processing to product sales, logistics and transportation, are closely connected with big data technology (Li, 2020). Financial personnel systematically analyze various implicit indicators of enterprise operations by using big data technology, and conduct a vertical comparison between the enterprise's historical data and the current operating financial data, thereby identifying potential areas for cost optimization , thereby adjusting procurement strategies, reducing production costs, optimizing cost structures, and enhancing the market competitiveness of enterprises (Zhang, 2022),providing support for enterprise decision-making and realizing the "technology-data-decision" mechanism of action.

3.2. Decision Support Analysis

The ultimate goal of big data financial analysis is to provide useful and valuable financial analysis information to the management teams of enterprises. In accordance with the "technology-data-decision" mechanism of action, big data models are capable of conducting in-depth analysis and making predictions about the future development orientations of the enterprise as well as the shifting market trends based on historical financial data of the business, evolving trends in the market, and data concerning consumer demands, thereby supplying decision-makers within the company with scientific and reliable financial information (Kumar et al., 2025). By means of such comprehensive and detailed information, the management of the enterprise can acquire a profound and thorough understanding of the company's current status and operational conditions, and further formulate scientific and rational strategic decisions that are conducive to the long-term strategic development of the enterprise.

3.3. Risk Management and Early Warning

Financial risk management runs through the entire process of enterprise operations. By leveraging big data technology, enterprises can conduct real-time monitoring of their financial status, achieve financial sharing, pay close attention to technical risks within the enterprise, and avoid excessive reliance on data (Ding and Cui, 2017).It enables in-depth analysis of diverse financial indicators of enterprises, such as asset-liability ratio, current ratio, and accounts

receivable turnover rate (Jin et al., 2023). Once these indicators deviate from the normal range, big data technology can promptly issue alerts, allowing enterprises to make scientific decisions and to take timely remedial measures. This not only helps reduce bad debt losses but also effectively prevents and resolves potential risks, thereby maintaining the stable operation of the enterprise (Lin, 2022).

3.4. Customer Value and Profitability Analysis

The value interaction between customers and enterprises stands as the core goal of business operations. By leveraging big data technologies, enterprises are able to integrate diverse types of consumer data, including the volume of consumers, their geographical distribution, varying preferences, and credit-related information. Through analyzing the profit contribution degrees of different consumer groups, these enterprises can facilitate the implementation of differential pricing strategies, better promote diversified marketing approaches, create value while delivering it effectively, and constantly enhance the precision of corporate customer management as well as the overall profitability of the business.

The process of big data analysis and mining can be divided into data acquisition, data preprocessing, analysis and mining (Firmansyah & Harsanto, 2023), and data visualization (Qiao et al., 2021). Relying on the advantages of big data technology in deep data value mining and large-scale data processing (Zhang,2021), big data financial analysis can efficiently process financial data, make financial data clear and systematic, thereby effectively integrating data, analyzing enterprise operating performance, accurately refining the enterprise's market positioning, and promoting enterprises' strategic transformation and upgrading in the digital era.

In accordance with the "technology-data" mechanism of action, big data financial analysis can efficiently process financial data, making it clear and systematic. This enables effective data integration, analysis of enterprise operating performance, implementation of scientific decision-making, precise refinement of enterprise market positioning, and promotion of enterprises' strategic transformation and upgrading in the digital era. Ant Group is a good example here. Its micro-lending business (Huabei, Jiebei) relies on big data technology to analyze multi-dimensional data such as consumers' spending habits and credit records, build an accurate credit evaluation model for corporate decision-making, realize automated lending, effectively identify credit risks in financial analysis, and optimize capital allocation.

These application scenarios of big data technology in financial analysis, by virtue of the massive data processing capability and in-depth research and analysis capacity of big data technology, enable enterprises' financial analysis to be more forward-looking, accurate, scientific and guiding. Specifically, the powerful data processing functions of big data allow enterprises to efficiently integrate and process huge volumes of structured and unstructured financial data, while its advanced analytical models can dig out hidden patterns and potential trends behind the data. This not only makes financial analysis break through the limitations of traditional methods relying on fragmented data and experience judgment, but also promotes it to move steadily towards the direction of intellectualization,where it keeps pace with cutting-edge technological developments, thus providing more solid decision-making support for enterprise development.

4. Existing Problems and Challenges of Big Data Technology in Corporate Financial Analysis

Opportunities and challenges coexist. While big data financial analysis has demonstrated remarkable advantages, it is also confronted with a variety of risks and challenges, and encounters multiple practical bottlenecks in the process of practical implementation.

Some research points out that enterprise financial transformation is a systematic project. At present, China's accounting informatization still remains in the stage of data storage and integration, and there is still a huge gap between current practices and the requirements of the financial shared service model. Specifically, the existing informatization construction is mostly limited to the simple accumulation and basic integration of financial data, lacking in-depth mining and efficient utilization of data value, which makes it difficult to meet the high standards of financial shared services for data timeliness, accuracy and collaborative application, thus restricting the further advancement of big data financial analysis in practice.

Challenges such as information security issues, lack of professional talents, and gaps in data security-related laws have set certain obstacles for enterprises to fully realize big data financial transformation. Firstly, in the era of big data, information security issues have received more and more attention. The protection of enterprise information and data has become a key link in enterprise development in the big data era. Enterprise financial data may involve commercial secrets of enterprises. In the application process of big data technology, deviations will inevitably occur in the collection, processing, and dissemination of financial data. Once financial data is leaked or maliciously stolen by competitor enterprises, it will cause immeasurable losses to enterprises. Therefore, how to protect enterprise data security in the data era has become an issue that enterprises must pay attention to currently (Zhang and Wang, 2016). Secondly, the gap in professional talents also affects the modernization process of enterprise financial analysis. Traditional financial personnel have low data literacy, and there is a lack of compound talents with both financial analysis and big data technology. Financial personnel have incomplete professional skills and do not have relevant theoretical knowledge of big data financial analysis, so they cannot truly implement the application of big data technology in the field of financial analysis. Finally, Qi and Deng (2019) proposed that the inverted U-shaped relationship between enterprise R&D investment and financial performance will be adjusted by environmental regulations. The country has relatively blank legislation in the field of big data and financial analysis, and there are few laws and regulations to protect the security of enterprise legal financial data, making most enterprises lack effective means to safeguard their legitimate rights and interests and enterprise data security cannot be strongly guaranteed.

5. Future Research Directions

Research on the integration of financial analysis and big data is relatively scattered, lacking a systematic theoretical system, and the theoretical framework has not yet been fully constructed. To promote the in-depth application of big data technology and corporate financial analysis, we should focus on the above problems and challenges to think about countermeasures, and actively

explore and innovate paths suitable for the technological progress of enterprise financial analysis. Future research directions should focus on the following aspects:

To promote the digital transformation of financial analysis and develop financial intelligence, enterprises should strengthen the protection of financial data security. With the rapid development of big data intelligent technology and the in-depth integration of key technologies such as data mining, machine learning, and deep learning in the field of financial analysis, enterprises should accelerate the formulation of protection rules for core data. Build big data models, clarify the channels and usage standards for financial data collection, storage, and transmission, improve operational capabilities and information construction, continuously improve the risk early warning system, and protect data security in an all-round way.

Cultivate a team of big data financial talents, optimize and upgrade enterprise big data technology tools, improve the technological level of enterprises, train employees' professional skills, and train high-quality financial talents (Li et al., 2018). Highlight the innovative content of financial analysis in strategic decision-making functions, cash flow support functions, capital securities market functions, and material and intellectual integration efficiency, and increase the depth of integration between enterprise financial analysis and big data technology (Zhou and Yang, 2023). Financial personnel themselves should have a strategic overall view beyond financial thinking. Enterprises should be brave in innovation, build an intelligent talent team, cultivate intelligent financial talents (Li et al., 2018; Zhang et al., 2022), cultivate compound talents with both financial analysis and big data technology, and actively learn the scientific theoretical system of financial analysis and big data technology and apply it to enterprise production practice.

The government should adopt an overall and balanced approach, accelerate legislative protection for big data financial analysis, and strengthen policy guidance in this field. It needs to establish data security management systems, continuously fill gaps in relevant legal aspects, and improve the legal framework governing big data technology and financial analysis.These efforts aim to provide legal safeguards for enterprises developing big data financial analysis, encourage them to pursue an innovative path in this area, and enhance their core competitiveness in the digital era. Such measures will create a standardized and secure environment, enabling businesses to fully leverage big data in financial analysis while ensuring compliance and sustainable development.

In addition, to vigorously promote the in-depth,all-round and far-reaching application of big data technology in corporate financial analysis, it is not only absolutely necessary for all parties mentioned above to make arduous and continuous efforts, but also highly imperative for society to further significantly enhance the overall data literacy of the entire populace to a much higher level. It is of essential importance to strengthen professional and precise technical guidance for small and medium-sized enterprises,which are the backbone of the economic entity. Actively promote the open, transparent and orderly opening of public data to enterprises and the public, ensuring that the data is not only accessible but also of high quality and reliability. Integrate diverse, scattered and heterogeneous data across various departments, breaking down data silos and promoting seamless data flow. Urge enterprises to strictly ensure the absolute fairness,

complete transparency and unshakable authenticity of their own financial data, leaving no room for doubt or ambiguity. We should accelerate the process of comprehensively reshaping the value chain of corporate financial analysis through advanced big data technology, continuously strengthen technical integration at a deeper level and carry out innovative algorithm innovation, break down the long-standing business barriers between financial and big data systems with determination, promoting smooth integration. Moreover, have regulatory authorities intensify strict, impartial and uncompromising supervision, using sophisticated monitoring means to prevent any form of data fraud. In this way, we can gradually form a strong, widespread and lasting social consensus of "technology for good", where technology serves the public interest and promotes the healthy development of the economy and society.

6. Conclusion

With its profound and all-encompassing impact, big data technology is profoundly and thoroughly reshaping the complex and evolving landscape of enterprise financial analysis. In the era dominated by big data, it plays an absolutely pivotal and irreplaceable role in smoothly promoting the profound and comprehensive modernization transformation of enterprise financial analysis. This review clearly shows that enterprises have achieved truly remarkable results in applying big data technology to various financial analysis scenarios in accordance with the "technology-data-decision" mechanism, including refined cost analysis, decision support analysis, risk management and early warning mechanisms, as well as customer value evaluation and profit analysis. However, they still face challenges in several aspects: prominent information security vulnerabilities, an obvious shortage of highly specialized talents proficient in both big data and finance, and huge gaps in the legal framework related to data security, all of which hinder the further development of big data-driven financial analysis.

Future research ought to conduct in-depth exploration into the systematic theoretical analysis concerning the fusion of big data technology and financial analysis. It should attach great importance to accurately grasping the orientation of enterprises' economic transformation. As big data technology advances with each passing day at a rapid pace, the financial transformation of China's enterprises is expected to progress steadily toward digitalization and intelligent transformation. digitalization and cutting-edge development.

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Conflict of Interest:

The author declares no conflict of interest.

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