Original Research Article

Research on the financial decision support system of small and medium-sized enterprises in the era of big data

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Abstract: This study examines the financial decision support systems for small and medium-sized enterprises (SMEs) in the big data era. By exploring the implementation of big data technologies in the financial decision-making processes of SMEs, it highlights how these technologies enhance the scientific accuracy and effectiveness of financial decisions. The paper offers detailed recommendations at the policy, enterprise, and technical levels, providing both theoretical insights and practical guidance for SMEs to optimize their financial decision-making in the context of big data.

Keywords: Big data; Small and medium-sized enterprises; Financial decision support system; Implementation strategy

1. Introduction

Amid an increasingly intricate global economic landscape and intensifying competition, small and medium-sized enterprises (SMEs) are encountering unprecedented challenges. As a pivotal component of enterprise management, the scientific rigor and precision of financial decision-making directly influence the survival and growth of businesses. The swift advancement of big data technology offers new opportunities for SMEs. By collecting, processing, and analyzing vast amounts of data, businesses can gain more comprehensive and precise information support, thereby enhancing the quality of financial decision-making. This paper discusses strategies and recommendations for establishing and refining the financial decision support system for SMEs in the big data era, providing a reference for enterprises aiming to achieve sustainable development in this context.

2. Theoretical Basis of the Financial Decision Support System for Small and Medium-Sized Enterprises in the Era of Big Data

2.1. An Overview of the Big Data

Big data is a collection of data that exceeds traditional data processing power in terms of quantity, speed and diversity. Its core features include mass (Volume), speed (Velocity), diversity (Variety), and authenticity (Veracity), often referred to as the "four V". Big data technology covers all aspects of data collection, storage, processing and analysis. Through advanced algorithms and tools, valuable information and model can be extracted from massive data[1]. With the rapid development of the Internet, the Internet of Things, mobile communication and other technologies, the speed of data generation and accumulation has been greatly improved. Big data has not only had a profound impact in scientific research, medical care, social governance and other fields, but also revolutionized changes in the business decisions of enterprises. In enterprise management, particularly for small and medium-sized businesses, big data technology enables a more comprehensive understanding of market trends, customer demands, and internal operations, leading to more informed and precise decision-making.

2.2. Overview of the Financial Decision Support System for Small and Medium-Sized Enterprises

The financial decision support system of small and medium-sized enterprises is a system that uses information technology to help enterprise managers provide necessary data and analysis support in the financial decision-making process. This system typically encompasses data collection, storage, processing, analysis, and presentation, with the goal of enhancing the precision and efficiency of enterprise financial decision-making. [2]. For small and medium-sized businesses, financial decision support systems can not only provide real-time financial data, but also help enterprises to find potential problems and opportunities through data analysis tools. For example, the system can help companies optimize resource allocation and cost control by analyzing sales data and cost structure. In addition, the financial decision support system can also support multi-dimensional data analysis, such as data visualization tools, showing the financial health of the enterprise, cash flow and the change trend of various financial indicators. These capabilities render the financial decision support system a crucial instrument for the management and decision-making processes of small and medium-sized enterprises. It can significantly enhance their financial management standards and market competitiveness.[3].

2.3. The Correlation Between Big Data and the Financial Decision Support System for Small and Medium-Sized Enterprises

The implementation of big data technology has significantly broadened the functionality and application range of financial decision support systems for small and medium-sized enterprises. By utilizing big data technology, these enterprises can efficiently process and deeply analyze vast and diverse datasets, thereby offering more comprehensive and precise information support for financial decision-making. For example, through big data analysis, enterprises can monitor market changes and competitors' dynamics in real time, and adjust their financial strategies in time[4]. Big data technology can also help enterprises in risk prediction and management, such as by analyzing historical data and market trends, predicting future financial risks and uncertainties, so as to take countermeasures in advance. The introduction of big data technology can also improve the intelligence level of financial decision support system. For example, machine learning algorithms can automatically identify and mine potential modes and relationships in data, so as to provide intelligent suggestions for enterprise decision-making.

2.4. Related Theoretical System

The theory underlying the financial decision support system for small and medium-sized enterprises encompasses information system theory, data mining theory, and decision support theory. Information system theory highlights the crucial role of information systems in enterprise management, asserting that they can enhance an enterprise's information processing capabilities and decision-making efficiency. Data mining theory concentrates on the methodologies and techniques for extracting valuable information and insights from large datasets, emphasizing that data analysis and mining can uncover hidden patterns and rules to support enterprise decision-making[5]. Decision support theory, from the perspective of the decision-making process, examines how to utilize information technology and data analysis tools to aid enterprise managers in making scientific and rational decisions within complex decision-making environments. By integrating these theories, SMEs can develop a comprehensive and efficient financial decision support system, providing robust assurance for the sustainable development of the enterprise.

3. Analysis of Financial Decision-Making Challenges and Needs for Small and Medium-Sized Enterprises in the Big Data Era

3.1. Financial Decision-Making Status of Small and Medium-Sized Enterprises

In the realm of financial decision-making, small and medium-sized enterprises (SMEs) often encounter issues such as information asymmetry, low data utilization rates, and a reliance on managerial experience for decisions. These businesses typically lack comprehensive information management systems and possess limited capabilities in collecting, processing, and analyzing financial data, leading to a reliance on managers' experience and intuition, which affects the scientific and precise nature of decisions. Additionally, financial managers in SMEs often juggle multiple roles, making it challenging to concentrate on financial data analysis and decision support, further diminishing the efficiency and quality of financial decisions. Limited funding and technical resources also pose common challenges for SMEs, hindering their ability to adopt advanced information technologies and hire skilled professionals, making it difficult to establish an effective financial decision support system. As market competition intensifies, the financial decisions of SMEs face increasing uncertainties and risks, necessitating an improvement in the scientific rigor and accuracy of financial decisions to maintain competitiveness and achieve sustainable development.

3.2. Difficulties Faced by Small and Medium-Sized Enterprises in the Era of Big Data

Small and medium-sized enterprises (SMEs) frequently lack a robust data collection system, making it difficult to acquire comprehensive and accurate market data and customer information, which in turn leads to financial decisions lacking reliable data support. Despite the advanced data analysis tools available through big data technology, SMEs often struggle due to a shortage of professional data analysts and adequate technical support, impeding their ability to fully leverage these tools for data mining and analysis. Furthermore, many SMEs underinvest in data management and security, exposing them to risks of data breaches and cyber-attacks, which can compromise financial security and the reliability of their decision-making processes. Additionally, there is often a limited internal understanding and application of big data technology within SMEs, with low acceptance and proficiency among management and employees, leading to suboptimal use of big data in financial decision-making. These challenges collectively hinder SMEs' capacity to enhance their financial decision-making capabilities and competitiveness in the era of big data. To overcome these obstacles, SMEs need to focus on building a comprehensive data collection system, investing in professional training and technical support for data analysis, and strengthening their data management and security frameworks. By addressing these areas, SMEs can significantly improve their financial decision-making processes, ensuring better accuracy, reliability, and competitive edge in the market.

3.3. Demand Analysis of the Financial Decision Support System for Small and Medium-Sized Enterprises

Small and medium-sized enterprises (SMEs) need efficient capabilities for data collection and processing to acquire comprehensive and precise market and customer data, providing reliable support for financial decisions. Utilizing intelligent data analysis tools enables enterprises to extract valuable insights and models from vast amounts of data, thereby enhancing the scientific rigor and accuracy of financial decisions. In addition, robust data security measures are essential for the financial decision support system of SMEs. It is imperative for businesses to establish a sound data security management framework to safeguard sensitive financial data from

breaches and attacks. Furthermore, SMEs must receive professional technical support and training. By recruiting and training big data professionals, they can significantly improve their internal data management and analysis capabilities, ensuring the effective application of big data technology in financial decision-making. Additionally, SMEs should focus on building a comprehensive financial decision support system with complete functionality and efficient operation. This involves continuous investment in technology and talent development, creating an environment where big data can be effectively utilized to drive financial decision-making processes. Furthermore, SMEs should foster partnerships with research institutions, universities, and technology suppliers to stay updated with the latest advancements and best practices in big data technology. By participating in technology innovation projects and industry seminars, SMEs can enhance their technical capabilities and application proficiency. In conclusion, SMEs must comprehensively enhance their technology, talent, and management strategies to build a robust financial decision support system, achieving sustainable development in the era of big data. This holistic approach will ensure long-term success and growth in their respective industries, driving better decision-making processes and fostering overall business improvement.

4. Implementation Strategies and Suggestions of the Financial Decision Support System for Small and Medium-Sized Enterprises in the Era of Big Data

4.1. Policy-level Recommendations

The government should develop and enhance pertinent laws and regulations to provide a legal safeguard for the utilization of big data, ensuring the protection of enterprise data security, preventing data breaches and misuse, and safeguarding enterprises from unlawful infringements during big data application. It is crucial to define the ownership and usage rights of data, mitigate legal risks, and protect the lawful rights and interests of enterprises. The government also needs to increase financial support for the informatization construction of small and medium-sized enterprises, and encourage enterprises to introduce advanced big data technology and equipment by setting up special funds or tax incentives, so as to reduce the financial pressure, promote more enterprises to participate in the application of big data technology, and improve the technical level and competitiveness of the industry. The government should set up and enhance the data-sharing framework, encourage the open exchange of data resources, assist small and medium-sized enterprises in accessing valuable data, and support financial decision-making. Through the formulation of standards and norms to guide enterprises to standardize data collection, processing and analysis, improve the standardization and effectiveness of big data application.

The government should also amplify the promotion and education of big data technology, thereby enhancing the comprehension and application capabilities of small and medium-sized enterprises. Through the organization of training courses, seminars, and other activities, to help enterprises to understand the technology dynamics and application prospects, enhance the operational ability. Support scientific research institutions and institutions of higher learning to carry out big data technology research, promote technological innovation, provide technical support for enterprises, and promote technological development by funding scientific research projects and establishing industry-university-research cooperation platforms, so as to bring continuous technological innovation and support to small and medium-sized enterprises. The government's comprehensive policy support will effectively guide small and medium-sized enterprises to use big data technology to optimize financial decision-making, improve management level and market competitiveness, not only assist enterprises in preserving their competitive edge in the big data era but also foster social and economic growth and technological

advancement.

4.2. Suggestions at the Enterprise level

Businesses must prioritize developing a comprehensive data strategy and regard data as a crucial asset. This entails the creation of detailed data management policies and processes to ensure consistent standards and accountability throughout the entire data lifecycle, from collection to processing. The utilization of advanced data management systems and tools is essential for facilitating the efficient collection, storage, and processing of data, thereby providing a robust foundation for sound financial decision-making. Implementing systems like ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management) further enhances data management by standardizing processes and improving accuracy. Moreover, strengthening data analysis capabilities requires the formation of dedicated teams comprising big data professionals. These teams should focus on enhancing their data mining and analysis skills through targeted recruitment, comprehensive training programs, and ongoing education. By investing in these areas, enterprises can ensure that their data is managed effectively and leveraged to its fullest potential, driving better decision-making and overall business success.

Promoting data sharing and collaboration across departments breaks down data silos, maximizing data utilization for comprehensive financial decision support. Cross-departmental data sharing platforms facilitate seamless data flow and collaborative analysis, enriching decision-making insights.Establishing robust data security management mechanisms is crucial to safeguard financial data integrity. Strict protocols for data collection, storage, transmission, and usage, alongside encryption and access controls, prevent unauthorized access and data breaches. Regular data security training enhances employees' awareness and operational competence in maintaining data security protocols.

Further, SMEs should explore comprehensive applications of big data in financial management, including budgeting, cost control, and risk management, to enhance precision and intelligence in financial operations. Case studies and pilot projects offer insights into best practices and innovative uses of big data, supporting continuous improvement in financial management practices.

4.3. Technical Recommendations

Small and medium-sized enterprises (SMEs) should adopt big data platforms and analysis tools like Hadoop and Spark to establish efficient systems for processing and analyzing massive data. These tools handle structured, unstructured, and semi-structured data, enhancing enterprises' data analysis capabilities. Implementing data warehouse and data lake technologies is crucial for centralized storage and management of diverse data sources and types, improving integration and utilization efficiency. Data warehouses support efficient storage and querying of structured data, while data lakes store raw data in various formats, providing rich resources for in-depth analysis.Introducing artificial intelligence (AI) and machine learning (ML) technologies enables automatic data analysis and prediction through intelligent models, enhancing the precision of financial decisions. These algorithms identify complex data patterns and trends, supporting accurate forecasting of market demand and financial performance for better budgeting and investment planning.

Small and medium-sized enterprises (SMEs) should prioritize adopting data visualization tools such as Tableau and Power BI to present complex analysis results intuitively, transforming data into understandable charts and dashboards to aid managers in quick decision-making. Continuous investment in big data technology R&D is crucial, with SMEs collaborating with research institutions, universities, and technology suppliers

to stay updated with the latest advancements. Participation in technology innovation projects and industry seminars allows SMEs to leverage emerging trends and best practices, enhancing their technical capabilities and application proficiency. Additionally, developing robust financial decision support systems grants SMEs significant competitive advantages in the big data era, improving financial management and supporting sustainable development. By focusing on these areas, SMEs ensure they are well-equipped to handle the challenges and opportunities presented by big data, leading to long-term success and growth in their respective industries, thereby driving better decision-making processes and fostering overall business improvement.

5. Conclusion

The big data era has introduced new opportunities and challenges for the financial decisions of small and medium-sized enterprises. By leveraging big data technology, these enterprises can achieve efficient processing and in-depth analysis of vast amounts of data, thereby enhancing the scientific rigor and precision of financial decisions. However, challenges such as data acquisition difficulties, limited analytical capabilities, and high data security risks remain significant obstacles in the application of big data. To address these issues, the government should provide comprehensive policy support, while enterprises must strengthen their information infrastructure and data management capabilities, actively adopting advanced big data technologies and tools. Only through the combined efforts of policies, enterprises, and technology can small and medium-sized enterprises build a robust and efficient financial decision support system in the big data era, achieving sustainable development and enhanced market competitiveness.

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