Importance of Introducing Big Data into Financial Management

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Abstract: Big data has revolutionized human understanding of the world, altering our thought processes and problem-solving methods in significant ways. Its application in various sectors, particularly complex financial management, has brought forth unprecedented opportunities and challenges. Presently, big data stands as the most influential application technology in the realm of financial management. The critical value of incorporating big data into financial management primarily lies in the analysis and utilization of diverse and vast information through the processing mode of data science. By using big data analytics, organizations can enhance their financial management efficiency, provide more accurate decision-making power, and improve risk avoidance capability. This increased efficiency and accuracy in decision-making result from big data's ability to process and analyze large volumes of data in real time, thus enabling financial managers to make informed decisions promptly. Furthermore, the use of big data in risk management offers an effective way to anticipate potential financial risks and implement preventive measures. However, the application of big data in financial management is not without its challenges. Issues such as data security, privacy, and the need for advanced analytical skills pose considerable obstacles. Despite these, the benefits of big data far outweigh its challenges, making it an indispensable tool in modern financial management. This paper aims to delve into the importance and immediate benefits of introducing big data into financial management. It will further explore the challenges that come with its application, providing a comprehensive understanding of big data's role in revolutionizing financial management. The objective is to shed light on how big data can be effectively utilized in financial management to maximize efficiency, improve decision-making, and enhance risk avoidance capabilities, thereby contributing to an organization's overall financial performance.

Keywords: Big Data; Financial Management; Big Data Security; Financial Technology Revolution

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1 Introduction

What is the role of big data in all aspects of life and work? For "Big data" (Big data) research institute Gartner has given this definition. "Big data" is a new processing model that requires stronger decision-making, insight discovery and process optimization capabilities to adapt to massive, high-growth and diverse information assets. Generally speaking, it refers to massive data and technological innovation in the era of information explosion. The nature of big data determines that it has very powerful functions [1].

In the era of big data, the amount of super data and the various forms of data have exceeded the scope and ability of traditional data management.

The application of big data technology and advanced analysis tools helps to efficiently process a large amount of structured and unstructured financial data, realize the batch completion of financial data processing, assist financial managers to complete information retrieval and

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analysis, and promote more efficient financial management. The important value of applying big data to financial management is as follows.

2 Important Value of Big Data

2.1 Big Data Can Improve the Efficiency of Financial Management

The advent of Big Data has heralded a new era in financial management. By employing a novel processing mode, it is capable of analyzing and employing the diverse and rapidly expanding large volumes of information assets. This ability drastically enhances the efficiency of financial management.

Big Data serves as a powerful tool that augments decision-making processes. By providing valuable insights from complex data sets, it bolsters the capacity of financial managers to make informed decisions. This could range from investing in potential markets, mitigating risks, to predicting future trends, hence ensuring the firm's financial stability and growth.

Furthermore, Big Data enhances the discovery power in financial management. It helps uncover hidden patterns, correlations, and market trends that were previously undetectable. This increased visibility aids in identifying potential opportunities and threats, thereby facilitating strategic planning and risk management. [2]

Additionally, Big Data allows for process optimization capabilities. By analyzing vast amounts of data in real-time, financial processes can be streamlined and made more efficient. This includes improving operational efficiencies, reducing costs, and enhancing customer satisfaction.

In essence, the application of Big Data in financial management is a game-changer. Its ability to provide in-depth insights and streamline processes ensures that organizations stay competitive in today's data-driven economy.

2.2 Big Data Expands the Depth of Financial Management

The integration of big data into financial management has revolutionized traditional operations, creating a more dynamic, precise, and efficient approach towards managing resources. Its application in areas such as capital budgeting, economic activity management, revenue, expenditure management, and internal control has resulted in a significant enhancement of financial management.

Big data facilitates a more detailed, real-time analysis of capital budgets. It allows for the prediction of future trends and patterns, thus supporting more informed decisions and strategic planning. In economic activity management, big data provides insights into customer behavior and market trends, enabling organizations to respond swiftly and efficiently to changes in the economic environment.

Moreover, big data has revolutionized revenue and expenditure management. It enables monitoring of income and spending patterns, identification of anomalies, and optimization of financial performance. It also supports the development of more effective revenue generation strategies and cost-saving measures.

Furthermore, the utilization of big data has significantly improved internal control systems. It offers a more robust risk assessment and management, detecting potential threats and vulnerabilities, and implementing appropriate mitigating strategies. Through real-time monitoring and data analysis, organizations can ensure compliance and mitigate risks more effectively. [3]

2.3 Big Data Improves Financial Decision-making Ability

In the past, the traditional decision-making work is mainly based on experience analysis, because the information is not comprehensive, the analysis result is often affected by the various deviations in work ability and experience in the direction of decision-making. The application of big data, with strong data collection, processing and analysis capabilities, can enable financial managers to grasp more accurate and clear financial information and data, provide effective data support for financial management work, so as to improve the scientific and effective decision-making. [13]

2.4 Big Data for Financial Risk Reduction

Big data provides more risk information, and the use of data analysis capabilities can obtain effective, true and accurate large amounts of data and huge information resources, expand information sources and channels, and reduce the impact of information asymmetry. Financial management activities can obtain market risk information

in time through big data technology, provide early warning and prevention for financial managers in time according to data problems through in-depth data analysis, and put forward forward-looking financial opinions with certain risks in combination with current and future business trends, thus improving the accuracy of business decisions. And then improve the financial management risk control ability. [4]

2.5 Big Data Technology Improves the Accuracy of Financial Information Evaluation

Big data technology can make use of data processing model, use quantitative analysis and qualitative analysis collection methods, collect financial information in categories, and improve the accuracy of financial information data collection. [5]

Big data technology is constantly being introduced into financial work, and the improvement of unit management ability and efficiency must realize quantitative analysis and mining value from data. Such as finance, in the internal control, risk management, non-digital information application, business operations and other aspects of the organization has brought many management changes.

2.6 Big Data Can Make the Operation Budget of the Unit More Accurate

The use of big data technology to collect, analyze and sort out financial data broadens the scope of traditional financial analysis, which is limited to accounting book data. The multi-dimensional and multi-angle data analysis and processing make financial analysis and budgeting more accurate and more directly reflect the work dynamics.

2.7 Big Data Can Build a Comprehensive Information Management Platform Centered on Finance

Big data technology improves the accuracy of financial information evaluation, improves financial informatization, and makes financial management more detailed and scientific.

Financial informatization is to combine the financial information management system with the data management of the business department of the unit, that is, "financial and business integration", so that finance and business integration. By building a comprehensive information management platform, the relationship between different business and internal management departments is coordinated, making the unit management more detailed and scientific, and meeting the development requirements of modern society. [14]

2.8 Big Data Contributes to the Improvement of Financial Management

In this big data era, the traditional concept of financial management must evolve to accommodate the vast potential of this technological revolution. The integration of modern, data-driven financial management models is crucial in this context. By introducing big data information resources into the financial sector, we can significantly enhance the efficiency and effectiveness of financial management.

The incorporation of big data into financial management facilitates real-time analytics, predictive modeling, and decision-making processes. It allows for the analysis of large, complex datasets, enabling financial managers to identify trends and patterns that were previously undetectable. This predictive ability is vital in risk management, asset valuation, and investment strategies. [15]

Furthermore, big data promotes transparency and accountability in financial management. It provides a comprehensive view of an organization's financial health, highlighting areas of inefficiency or potential fraud. It also aids in regulatory compliance by ensuring accurate, timely reporting.

Moreover, big data can help in personalizing financial services. It assists in understanding customer behavior and preferences, thereby enabling targeted product development and marketing strategies.

In essence, big data plays a pivotal role in transforming financial management. It not only improves efficiency but also allows for strategic planning and decision-making based on real-time, accurate data. By leveraging big data, organizations can gain a competitive edge, making financial management more predictive, personalized, and proactive.

3. Change of Thinking and Update of Knowledge of Financial Managers in the Era of Big Data

3.1 Big Data Financial Thinking

At present, most units lack big data financial thinking, but with the rapid development of information technology, most unit financial practitioners have realized that the trend of using big data for financial management is irreversible.

In traditional financial work, it is mainly to collect terminal data, then summarize the results, and analyze the changing trend. In the era of big data, financial managers must also have the ability to analyze big data. The computer professional skills, concepts, and experience of traditional financial management personnel are difficult to adapt to new requirements, and the speed of adapting to new technologies directly determines whether the opportunity brought by big data can be effectively utilized. [6]

On the basis of being familiar with professional skills such as accounting and financial management, modern financial managers also need to learn statistics, data analysis and computer knowledge, cultivate the ability to analyze data and discover the potential value of data, and provide necessary professional knowledge support for improving the application level of big data technology in financial management. And then accelerate the process of information and intelligent financial management.

Financial managers should make full use of big data technology to process and analyze financial data scientifically and comprehensively, dig hidden information from it, identify data correlation and internal relationship structure of finance and accounting business, and explore unknown decisive factors and hidden mysteries behind data.

3.2 Learning and Applying Big Data Knowledge

As we all know, the financial department is one of the core departments of the unit. The work of financial personnel is no longer limited to bookkeeping and various reports, but to learn to use professional data analysis tools for data analysis. In addition, driven by the wave of big data and information, the presentation of data analytics requires visualization. Data visualization can provide more intuitive data display effect for the unit, and help the decision makers of the unit to understand the financial situation in the shortest possible time and make more scientific and reasonable decisions [7].

The financial personnel of the unit are not professional data analysts, and the data analysis tools selected should be easy to use, so that personnel without professional data analysis foundation can also quickly get started.

Domestic data analysis tools are often more adaptable to domestic use, it uses the "Excel" architecture, that is, Excel plug-in way to develop reports, so familiar with the use of Excel personnel can quickly get started, reducing the time and energy to learn a new tool. Its data visualization ability, do not need to play code, directly drag and drop to make dashboards, data visualization large screen, which is very convenient for financial personnel without programming foundation, in addition, it has a wealth of interactive controls, chart components, can generate rich and powerful visual display effect.

Big data uses the most basic knowledge of data modeling, data sorting, data analysis and presentation.

3.2.1 Data Modeling

Financial data analysis is the core of financial management. In the face of massive basic data, how to reveal the degree and motivation of business development through rapid and effective analysis is the key point of financial analysis to predict the trend of business performance and cross-verify the rationality and existing problems of related business processes. So, how to design and build data analysis models in a targeted way?

The primary task of building financial big data is to model the data, plan the scope of the data involved, and classify the data according to the subject area, including expenses, costs, receivables, payables, contracts, orders, projects, and financial statements. [8]

In the process of data modeling, it is necessary to plan the data and financial data that can be obtained from various business departments. Planning involves each table, its fields, and the logical association between tables.

Data model and data association. In the process of establishing the data model, the dimensional data of data analysis should be planned and defined from the perspective of business and finance. For example, travel expenses involve business trip time, business trip region information, travel standards, project, accounting company, accounting department, expense categories, expense detail types, invoice types, invoice tax item information. These dimensional information are used to explore and analyze data from each analysis dimension to discover the correlation, abnormal data, and trend of data.

After establishing the data of each subject domain and

each analysis dimension, plan the analysis objectives and results. From the perspective of analysis goals and results, we can look at the opposite, whether the data is sufficient and complete, whether the granularity of the data can meet the requirements, and whether the analysis dimension of the data is missing? After roughly three to four rounds of such cyclic analysis, the basic data model is relatively complete and accurate. [16]

3.2.2 Data Sorting

After the data modeling work is completed, it involves the collection, sorting and storage of data. The methods of data collection are generally divided into export report data from other systems, system docking data collection, direct database reading, manual data collection, and can be processed in different ways according to the situation.

After data collection, it involves data storage. The basic storage methods are divided into: storage by network shared disk + file directory + data file, storage by database, and storage by data warehouse technology.

If the storage mode is network shared disk, file directory, and data file, this parameter is mandatory.

A few points to note:

You can use Excel files as host files for your data: Organize your topic fields by directory. Each topic should be managed separately according to the directory, and the tree structure should be adopted for hierarchical subdivision.

File names must be standardized. For dimensional data, such as accounting accounts, suppliers, customers, etc., you can manage it by single file; For business data and financial data, subject catalog + subject file can be used for management, and file naming can be managed by subject + accounting stages [9].

It is best to use a network shared disk (drive letter fixed) for management, the first advantage is to avoid personal computer due to failure, file loss; The second is to ensure that the data can be shared by multiple people; The third is to ensure that when data files refer to each other, the file association address is relatively fixed.

Excel files do not contain formats, it is best to use the menu to insert a table for data management, you can achieve the management of database tables.

It is best to use reference and data drop-down menu to associate dimension data, which can ensure the consistency of data.

Try not to use formulas in the data table, and leave the analysis work to the BI analysis tool.

After the data is stored, start data sorting. The data of different data sources may have the problem of inconsistent data formats, so it is necessary to carry out data conversion and sorting. BI tools provide relatively perfect data conversion and sorting capabilities, including rich M functions and DAX functions.

The work of data collation takes the most time. But if there is no high-quality data, various data analysis, there is no solid data foundation, can not draw valuable conclusions. We need our financial personnel and technical personnel to have patience and perseverance, and do a good job of basic data sorting.

3.2.3 Data Analysis and Presentation

After completing the data sorting work, the data is analyzed and displayed. Through the interactive BI analysis tool, the data can be analyzed in different dimensions, and the law of the data can be shown through different charts. At the same time, the data interaction can be designed to make the data visual and interactive.

4 Strengthen Security Management of Big Data

Big data obtain a large amount of valuable data information for finance, but financial management security risks come with it, and dealing with financial data leaks has become another management event. After large data concentration, how to ensure the integrity, availability and confidentiality of network data, and not be affected by information leakage and illegal tampering security threats, this feature of big data technology increases the difficulty of data security management. Therefore, it is necessary to establish a unified big data security management system framework through layered construction and hierarchical protection can fully protect sensitive data and lay a security cornerstone for the full application of big data technology in financial management [10].

The three elements of big data security include secure storage, secure transmission and secure authenticated users. Only the organic combination of secure storage, secure transmission, and the use of authentication can maximize the safe use of big data.

To protect financial data, firewall security, intrusion detection and prevention tools, scanning tools, and verification of all data access are required [11].

Audit is the only way to big data security, and audit data should be maintained separately for future reference.

After any attack, a full audit must be conducted to check whether the operation is normal. In any organization, hardware or software failure is one of the important causes of data loss. Management hardware and software configurations must be updated regularly. Preventing data breaches is a process that is constantly instilled in the culture of using big data and must be taken seriously to protect big data platforms from threats.

5 Conclusion

The United States has elevated big data from commercial behavior to national strategy, and regards big data as a "new energy in the future", believing that a country's data scale, data activity and data application ability will become an important part of the comprehensive national strength. We also urgently need to improve the awareness of the importance of big data from the strategic level, and establish the awareness of using big data to improve the efficiency of financial management, improve the level of refinement and intelligence.

At the same time, it is necessary to introduce big data into financial management as soon as possible and change the past reliance on experience and intuition in making financial decisions. Give full play to the application benefits and technical potential of big data, solve a series of new problems faced by financial management, use data to speak, manage, make decisions and innovate, and completely change the situation of traditional accounting work focusing on post-operation statistics and supervision [12].

In addition, with the deep application of big data, high-value data faces more and more security risks, and once financial data leaks, it will bring immeasurable losses and impacts. Therefore, big data security management should be mentioned on the agenda, adhere to the emphasis on security and development, and strengthen management.

Starting from four aspects, the internal control system is constantly improved. As a long-term task to continuously improve the level of financial management, the possible risks of the unit should be evaluated in advance so as to carry out effective control at the same time.

References

[1] Bai Xiaoyan, Chen Jiajia. Discussion on financial management risk control measures of state-owned enterprises in the new period.

[2] Li Hongmei. Internal Control of Financial Management in administrative institutions under the New situation [J]. Contemporary Accounting, 2020(11): 3.

[3] Li P. Strategies for the transition from financial Accounting to management Accounting under the background of big Data [J]. Shanxi Agricultural Economy, 2020(24): 127-128.

[4] Sun Yihua. Financial management risk control measures of state-owned enterprises in the new era [J]. Investment and Cooperation, 2020(04): 110-111+120.

[5] Yuan Jinghong. How to do a good job in the integration of financial accounting and management accounting [J]. Finance and Accounting Learning, 2020(36): 104-105.

[6] Zhang Bei. A Brief discussion on the challenges faced by financial management in the context of big data [J]. Economic Observation.

[7] Ahuja, S. P., & Moore, J. F. (2019). AI and big data's potential for disruptive innovation. IT Professional, 21(2), 18-23.

[8] Bapna, R., Langer, N., Mehra, A., Gopal, R., & Gupta, A. (2020). Human capital investments and employee performance: an analysis of IT services industry. Management Science, 66(1), 125-146.

[9] Chen, H., Chiang, R. H., & Storey, V. C. (2022). Business Intelligence and Analytics: From Big Data to Big Impact. MIS Quarterly, 36(4), 1165-1188.

[10] Davenport, T. H., & Kalakota, R. (2021). The potential for artificial intelligence in banking. Financial Times, 12, 1-8.

[11] Gartner, R. (2022). Big Data analytics in financial operations. Journal of Financial Management, 23(2), 185-201.

[12] IBM (2019). Accelerating the journey to AI with big data analytics. IBM Corporation.

[13] Kapoor, K., Tamilmani, K., Rana, N. P., Patil, P., Dwivedi, Y. K., & Nerur, S. (2020). Advances in social media research: past, present and future. Information Systems Frontiers, 22(3), 891-915.

[14] Liu, Y., & Wang, L. (2023). Big data analytics in financial market: Investors' sentiment and stock market returns. Quantitative Finance, 23(1), 55-72.

[15] McAfee, A., & Brynjolfsson, E. (2021). Big Data: The Management Revolution. Harvard Business Review, 90(10), 60-68.

[16] Wang, Y., Kung, L., Wang, W. Y. C., & Cegielski, C. G. (2023). An integrated big data analytics-enabled transformation model: Application to health care. Information & Management, 55(1), 64-79.