Scientific Archiving and Visual Application of Financial Professional Data in the Context of Big Data

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Abstract With the development of the big data era, the amount of enterprise financial transaction data continues to grow, bringing new challenges to financial transactions. It also brings new solutions based on modern Internet science and technology. The rapid development of big data and the improvement of information resource processing efficiency can create greater economic value for the company. In the era of big data, the company's financial development is faced with a large number of data resources. The combination of these information resources has brought not only development advantages to the company, but also challenges. Therefore, this paper studied the characteristics, functions and existing problems of enterprise financial data under big data by analyzing the significance, application status and influencing factors of financial data visualization. Some scientific archiving strategies have been proposed to improve the visualization of financial data. The financial resource integration of enterprises under the new model was 8.7% higher than that under the traditional model. The data cognitive ability of enterprises has improved by 8.9% compared with the traditional model. The data visualization effect after data archiving was 11.2% higher than that before data archiving. The data processing effect after data archiving was 8.5% higher than that before data archiving. The information sharing rate after data archiving was 7.5% higher than that before data archiving. In a word, big data can promote scientific archiving and data visualization of financial data.

Index Terms Scientific Archiving, Financial Data, Big Data, Data Visualization

I. Introduction

In the age of big data, financial data visualization has reached maturity. The basic starting point of financial data visualization and business management, especially in combination with financial management, is to visualize a large amount of financial information in various forms to provide effective and appropriate data support for the company's management decisions, thus improving the company's profitability. The overall selection of visual information management can improve the accuracy of financial data, and reduce the information on the financial blackboard, which significantly improve the growth capacity. However, the current research has continuously promoted the vision of enterprise financial information from abstract to specific, from boring to vivid. Therefore, how to make a breakthrough in the application trend to improve the availability and intuitiveness of financial information is the latest analysis of the future trend of financial data visualization.

Scientific archiving of financial data is conducive to rapid data processing. Trelewicz Jennifer Q discussed the correlation between big data method and financial sector, and outlined the challenges of adopting big data method and the opportunities for future technology development, making it a promising focus of new technology [1]. Zeater Sandra collected the existing evidence to solve the financial analysis provided by community pharmacies from a commercial perspective, and classified and expanded the key measures and indicators used for financial evaluation services [2]. Altman Edward I evaluated the classification performance of the model in predicting bankruptcy and other types of corporate distress. The purpose was to test the usefulness of the model to all parties, especially banks that operate internationally and need to assess the risk of enterprise failure [3]. Baker Scott R obtained more and more data from relevant consumer financial accounts, which might greatly expand the research potential, and tested the consumption elasticity of households with different debt levels and types [4]. Drake Michael S investigated a wide range of professionals who considered financial statements as part of their work to assess the extent to which they believe financial statements are affected by disclosure overload [5]. By measuring financial quality and dividing it into basic financial quality and advanced financial quality, Chu Zhong investigated the potential impact of financial quality on portfolio selection and household investment income [6]. Rabbani Abed recorded the impact of the epidemic on the use of professional financial advisers in a wide sample of financial decision-makers. The results showed that financial knowledge played an important role in describing the use of

financial advisers in the United States before and during the pandemic [7]. The above studies all described the important type of financial data, but did not combine big data.

Big data plays an important role in financial data visualization. Hasan Md showed the current pattern of financial processing big data, and the impact of big data on different financial sectors, financial markets and financial institutions [8]. Bach Mirjana Pejic, supported by big data technology, collected information stored in semi-structured and unstructured data from various sources. How and to what extent data mining research in financial sector develops and what tools are used for these purposes have not been explored to a large extent [9]. Krstic Zivko believed that these insights could be further utilized by making better future business decisions. The described system used data from social media and Italian tweets related to Bank of Italy [10]. Against the background of big data, Gao Jun examined the transition from operational financial accounting to management accounting, and fully considered the functional characteristics of financial accounting. He paid special attention to the value application of management accounting, which accelerated the transition from operational financial accounting to management accounting, thus giving full play to the role of enterprise accounting [11]. The above studies have all described the application of big data in financial data processing, but there are still some deficiencies in financial data archiving.

In the age of big data, enterprise financial data also includes financial data or software files stored on computers, mobile hard disks, network hard disks and other storage media for enterprise financial management. Under the background of more intuitive presentation in the form of tables, financial information users can understand financial information and monitor the company's activities and financial status. Therefore, this paper focuses on the scientific storage and effective utilization of enterprise financial data in the age of big data. The innovation of enterprise financial data analysis method is promoted to better adapt to the requirements of modern opening, so as to continuously optimize the financial operation of the company.

II. Contents of Financial Data Visualization

II. A. Significance of Financial Data Visualization

With the rapid development of the information age, users of financial statements have more and more diversified requirements for financial data analysis results and other forms of expression. Simple table data no longer meets the needs of users of financial statements. Financial data visualization technology can meet this requirement. Basic data is optimized to help enterprises calmly identify value and opportunities. Through more flexible and faster cloud systems, the changing market demands are met. The cloud system is improved in the data environment to supplement the integration of financial types and business progress, so as to constantly challenge and develop the business system. The financial data visualization process mainly includes the following contents. The first is the collection of financial data. Financial reports and reports prepared by financial personnel are used to provide necessary financial data. The second is financial data visualization. Different data are transmitted and recorded by desktop software or data analysis software, and displayed in different colors or charts. Then, according to the basic categories of financial information, different methods are selected to intuitively convert and reflect the results of the company's financial information. Big data also has an impact on the quality of financial reports in current business intelligence in terms of dimensions [12]. The third is financial data processing. The data of different data information users are classified to meet the needs of different data information users, so as to quickly correct and improve the identified gaps and problems. The fourth is the verification of financial data. The software checks the visual information of the data for many times. After the financial data is verified successfully, the data is displayed to external users and internal managers.

II. B. Application Status of Financial Data Visualization

Visualization opens the visualization feast of financial data. It uses icons, lines, colors and other common visual formats to display the original appearance of the elements behind the data, making it easier for interested users to identify and understand the state of things and display information. At present, the visualization application of enterprise financial data presents a general trend, but there are also application obstacles, as shown in Figure 1. The first is the market factor. Financial management is the manager who decides the development of the company, and is also the key factor to limit and balance. Financial data visualization is the financial part of the company's strategic development history, as well as the technical support to more clearly describe the important decisions and key basic issues related to enterprise operations. Financial visualization needs to integrate logic into applications based on basic data extracted from daily financial work, and provide visualization solutions for business growth for the first time. Therefore, enterprises allow simplified financial data exchange based on data visualization features. As an important verification tool, improved financial audit can use visualization to verify the feasibility of complying with financial data. In the future, with the expansion of the application environment, it is expected that financial data

visualization would be fully implemented in the entire industry and all fields. The second is the internal factors of the company. The attitude and quality of financial personnel are becoming another threshold for the popularization of data visualization. Under this threshold, relatively conservative and complacent financiers do not accept anything new and have different views on the visualization of big data. In order to promote the visualization of financial data, enterprises must be supported by employees and executives. They also need to work with all departments to precisely improve the database and standards, so as to enrich the rendering and good modern business management.
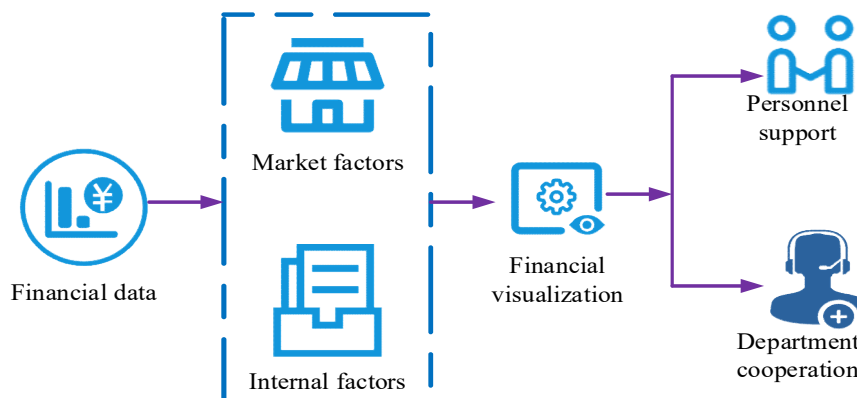

Figure 1: Application status of financial data visualization

II. C.Influencing Factors of Financial Data Visualization

The influencing factors of the application of financial data visualization are shown in Figure 2. The first is the limitation of operation mode. In order to visualize the financial data of enterprises, financial personnel must have a fairly high professional level. This has become more obvious in financial data and other performance, invisibly raising the threshold of enterprise financial data visualization, and causing some restrictions. The visualization of enterprise financial data requires that financial personnel not only have financial expertise, but also have intelligent systems and databases. The financial situation may affect the economy of the enterprise [13]. The difficulties that people unfamiliar with computer applications encounter when dealing with visual applications undoubtedly increase the complexity of enterprise financial data visualization. The second is the lack of financial awareness. Financial personnel can well understand the visualization and analysis of enterprise financial data. Especially in the field of big data visualization with weak cognitive ability and typical functions, the development and application of financial data visualization are limited to a certain extent. The third is the limitation of business scale and product category. Some small and medium-sized enterprises have limited scale and product categories, so they do not need to apply and promote financial data visualization technology. Ranking and tournament incentives have increased the risk-taking behavior of underperforming professionals [14]. They rarely provide financial data. Only through the financial statements can the company's activities and financial situation be directly understood. Therefore, the vast majority of SMEs still choose relatively simple financial management accounting information systems, which hinders the development and dissemination of corporate financial data visualization to some extent.
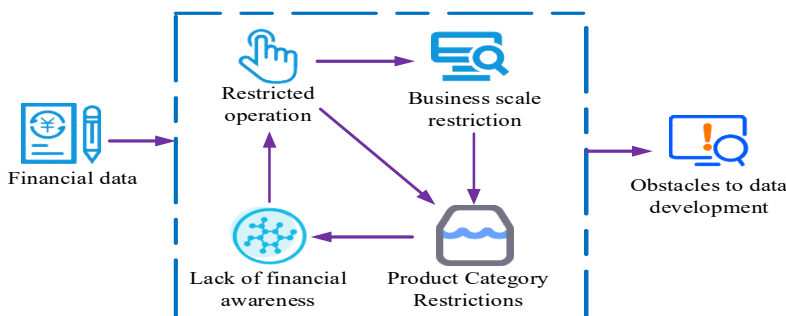

Figure 2: Factors affecting the application of financial data visualization

III.   Impact of Big Data on Financial Data Archiving

III. A.   Features of Enterprise Financial Data under Big Data

The characteristics of enterprise financial data under big data mainly include the following, as shown in Figure 3. The first is the lack of intuition. Under the influence of big data, the company's current financial data has gradually turned to electronic data. Compared with traditional professional paper data, big data lacks transparency and intuition, and the financial data of big data is generally electronic data. Only certain hardware and software conditions can be effectively used, which leads to a lack of harmonious relationship between enterprise data and financial data archiving in the age of big data. The second is dependence on the environment. In the era of big data, financial data of enterprises rely more on storage than traditional paper data. For data security, the data storage environment needs to be waterproof, fireproof, dust-proof, which has its own characteristics. There is no doubt that in the age of big data, the storage environment of enterprise financial data has become more and more complex. This shows that enterprise financial data is "fragile" in the age of big data, and data can be easily damaged or lost without taking appropriate security measures. The third is the lack of effective security of data. In the age of big data, financial data is usually stored electronically, rather than traditional paper financial data. Data is highly centralized, easy to manage, but easy to disclose. Electronic data stored in magnetic media is stored in various media in the form of digital coding. Although the storage capacity is small, it is easy to lose and be stolen, which not only affects the normal financial operation of the company, but also directly threatens the operation and development of the company.
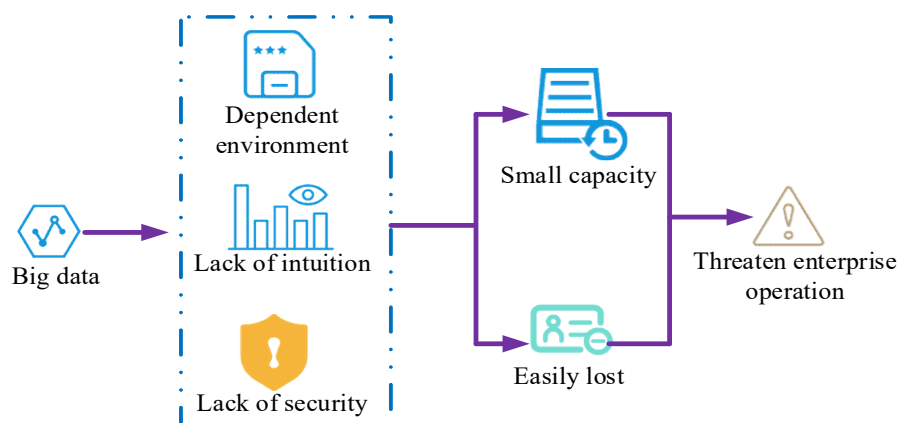

Figure 3: Features of enterprise financial data under big data

III. B.   Role of Financial Data Visualization under Big Data

Enterprise financial data visualization plays an important role in promoting the accurate expression of big data information in the big data environment. The first is to fully implement enterprise financial management. Company's financial budget is the basis for realizing and ensuring the smooth operation and management of the company. The main condition of the company's core business is the visualization of the company's financial data. The information is converted from data to visual applications, and the company's income and expenditure data are displayed in charts, tables, etc. The data is more intuitive and accurate. The second is to meet the information needs of different users for financial data. The company's relevant personnel mainly reflect and master the company's solvency, profitability, operational capacity and data development capacity. These production data are provided in the form of tables or rows to meet the different needs of data users. The third is to master the financial situation. Through financial data visualization, the company's actual operation and financial status can be effectively and accurately understood, enabling operators to quickly identify gaps and potential problems. Effective measures and methods are taken to control the financial situation of the company. The fourth is to maximize enterprise value. The application of financial data visualization can comprehensively improve the company's financial budget preparation and implementation ability to achieve economic benefits. Relevant resources such as human and material resources are reasonably allocated and utilized to deeply tap the company's business potential and opportunities, so as to maximize the company's economic value.

III. C.   Problems in Financial Data Archiving

The problems in financial data archiving mainly come from the following aspects. The first is backward work consciousness. The arrival of the big data era has stimulated the company's financial transformation and growing business initiative. Among them, the basic work of accountants is simple financial accounting, auditing, recording

and storage. Influenced by the development of big data, the company is facing exponential growth of financial data resources, and financial data fraud has also changed. Financial personnel must actively collect and use financial data. The market environment is changing rapidly. If high-quality information is not collected in a timely manner, it is bound to have a negative impact on the company's financial work and misunderstanding of business decisions. The second is the low level of technology. What cannot be ignored is that diffusion barriers and other issues are also important factors hindering the development of enterprise financial data. On the one hand, the company's independent technology development and development capabilities are relatively low, which hinders the effective adoption of big data methods and restricts business related activities. On the other hand, software equipment development is insufficient. The financial software cannot meet the financial needs of enterprises, and cannot meet the needs of enterprise financial data analysis and big data integration. In addition, in the age of big data, there is a serious shortage of talents in the enterprise complex. There are still some gaps in the cultivation of high-level talents, leading to insufficient development of financial employment in enterprises. Professional financial planners legitimize their professional knowledge by building and maintaining the difference between short-term economic uncertainty and the inevitability of long-term economic growth [15]. Third, the efficiency of information sharing is low. Most companies have isolated financial information systems, and most financial information is isolated. Even if there is no contact with the financial department of the company, it also leads to the problem of handling the company's financial information and prevent the exchange of financial data and financial information feedback. In addition, due to the lack of connection between the internal financial data of the company and the data resources of external large companies, it is impossible to conduct correct real-time data exchange inside and outside the company. With the continuous changes of the market, enterprises may not be able to obtain changes in financial data in a timely manner, which may lead to economic growth of enterprises.

IV. Application of Neural Network Algorithm in Financial Data Archiving

In order to study the effect of scientific archiving and visual processing of financial data under big data, this paper analyzes the weight correction function and deviation correction function of financial data through neural network algorithm to study the input layer and transfer function of financial data visualization. First, the weight correction function of scientific filing of financial data is analyzed as follows:

$$A(x+1) = A(x) + \beta(x)\left[(1-b)B(x) + bB(x-1)\right] \tag{1}$$

Among them, $A(x)$ is the weight correction function and β is the learning rate of financial data. Then, the deviation function of financial data is studied as:

$$C(x+1) = C(x) - \beta(x)\frac{\lambda T}{\lambda C} \tag{2}$$

$$T = \frac{1}{2}\sum_{i=1}^{m}(d_i - x_i) = \frac{1}{2}\sum_{i=1}^{m}r_i^m r_i \tag{3}$$

Among them, T is the square error of the network. r_i is the actual output error. Then, the output model of financial data visualization is analyzed as follows:

$$g_n = \frac{y_n - \min\{y_n\}}{\max\{y_n\} - \min\{y_n\}} \tag{4}$$

y_n is the sample value of financial indicators, and $\max\{y_n\}, \min\{y_n\}$ is the maximum and minimum value of financial data ratio respectively. Then, the transfer function for analyzing financial data is analyzed as:

$$\log sig(x) = \frac{1}{1 + e^{-x}} \tag{5}$$

V. Effective Strategies for Scientific Archiving of Financial Professional Data under Big Data

Effective strategies for scientific archiving of financial professional data under big data mainly include the following, as shown in Figure 4.
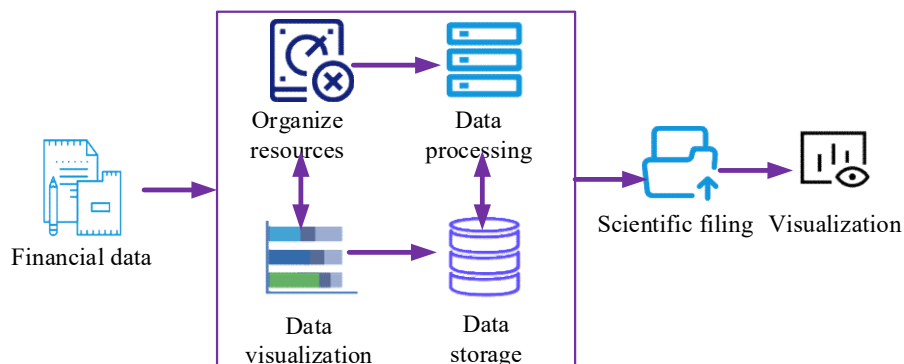
Figure 4: Effective strategies for scientific archiving of financial professional data under big data

V. A.   Integration of Data Visualization Resources
In order to visualize enterprise financial data in the big data environment, existing and mature data visualization technologies are used to integrate it with the company's financial data. In order to meet the relevant data needs of different data information users, financial data visualization software is developed after the secondary development or migration of source data visualization technology. Modern data visualization applications have simple workflows, powerful data processing capabilities and a wide range of data representation methods. Simple sorting allows access to financial data visualization pages.

V. B.   Strengthening of Financial Data Processing
Financial expertise is combined and cooperated with the computer skills of financial personnel. Accounting and financial management are combined with computer operation, programming and design to provide expert support for the implementation of data visualization applications. Different requirements in different fields are analyzed and handled to achieve financial standardization and. Data visualization also requires translating relevant knowledge such as financial data into general data language and computer language integrated into existing data visualization technology.

V. C.   Enhancement of Data Visualization Cognition
First of all, the CFO of the company should change their views and change the functions of financial management. In the era of big data, companies should improve their financial data processing capabilities and their data visualization awareness, and extend their financial management functions from financial accounting to management accounting. The financial director of the company shall fully understand the relevant knowledge of financial data visualization, and promote the application and promotion of data visualization. At present, data visualization technology is still developing, and the combination of financial management and data visualization technology is between financial personnel and financial data. Finally, not only the accuracy of financial information should be improved, but also the staff's ability to store and judge should be improved. The intuitive application of financial data makes the company's financial data more intuitive and simple, so that people who lack the company's activities and financial knowledge can improve their financial cognition, thus promoting the visualization of financial data.

V. D.   Optimization of Financial Data Storage
In the age of big data, most business financial data can be stored electronically. However, in fact, even in the context of big data, companies must also store some paper data. In the data era, enterprises should not only rely on electronic data files, but should adopt the method of coexistence of electronic and paper data files. If electronic documents and paper documents are placed together, they can be used to recover paper data files when electronic documents are damaged or lost. However, in practice, the management of corporate financial data must still take electronic data processing as the main task. This is mainly because the data processing of professional enterprises through the cloud platform is very efficient, which can improve the scientificity and accuracy of enterprise financial data management, and reduce the professional cost of enterprise data management to a certain extent.

VI.   Experiment on Scientific Archiving of Financial Professional Data
In order to study the specific use effect of financial professional data archiving and visualization under big data, this paper studied the deviation value of financial professional data by analyzing financial resource integration and data cognitive ability. Finally, by comparing traditional and new archiving methods, the financial data visualization effect

and data processing effect under big data were obtained. To this end, this paper first investigated the specific satisfaction of employees in three enterprises with the archiving of financial professional data. Among them, 50 people were investigated for each enterprise, and the proportion of the number of each enterprise was calculated respectively. The specific investigation is shown in Table 1.

Table 1: Specific satisfaction of employees in three enterprises with archiving of financial professional data

	Satisfied	Commonly	Dissatisfied
Enterprise1	37	6	7
Enterprise 2	39	5	6
Enterprise3	43	3	4
Total	119	14	17

According to the data described in Table 1, the employees of the three enterprises were generally satisfied with the archiving of financial professional data. There were 37 satisfied employees in Enterprise 1, accounting for 74% of the total survey population of the enterprise. There were 6 employees in general, accounting for 12% of the total survey population of the enterprise. Seven employees were dissatisfied, accounting for 14% of the total survey population of the enterprise. There were 39 satisfied employees in Enterprise 2, accounting for 78% of the total survey population of the enterprise. There were 5 employees in general, accounting for 10% of the total survey population of the enterprise. Six employees were dissatisfied, accounting for 12% of the total survey population of the enterprise. There were 43 satisfied employees in Enterprise 3, accounting for 86% of the total survey population of the enterprise. There were 3 employees in general, accounting for 6% of the total survey population of the enterprise. There were 4 dissatisfied employees, accounting for 8% of the total survey population of the enterprise. On the whole, the satisfied employees of the three enterprises accounted for 79.4% of the total survey population. The average employee accounted for about 9.3% of the total survey population. The number of dissatisfied employees accounted for 11.3% of the total survey population. Satisfied employees believed that after scientific archiving of financial data, it was more convenient to conduct data collection and data storage. At the same time, it can also make the financial data of the enterprise more visual and reduce the related work of financial personnel. The dissatisfied employees thought that after the financial data was archived, the financial data might be leaked due to the backward technical level. Then, the resource integration ability and data cognition ability of the three enterprises for financial data archiving were analyzed and compared with the original model. The specific comparison is shown in Figure 5.

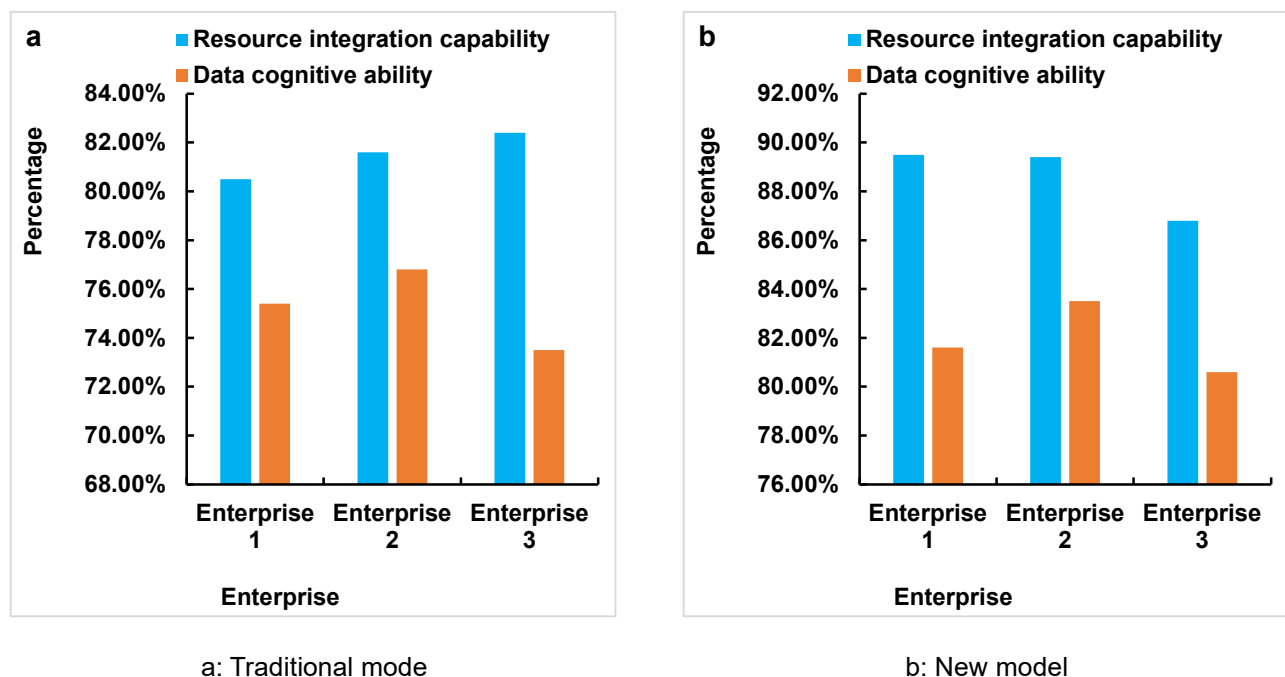a: Traditional mode　　　　　　　　　　b: New model

Figure 5: Comparison of resource integration ability and data cognitive ability between the traditional and new models

Figure 5a shows the traditional model and Figure 5b shows the new model. The financial resource integration and data cognitive ability of the new model were higher than those of the traditional model. It can be seen from Figure 5a that under the traditional mode, the financial resource integration of Enterprise 1 was 80.5%, and the data cognitive ability was 75.4%. Enterprise 2's financial resource integration was 81.6%, and its data cognitive ability was 76.8%. Enterprise 3's financial resource integration was 82.4%, and its data cognitive ability was 73.5%. It can be seen from Figure 5b that under the new model, the financial resource integration of Enterprise 1 was 89.5%, and the data cognitive ability was 81.6%. Enterprise 2's financial resource integration was 89.4%, and its data cognitive ability was 83.5%. Enterprise 3's financial resource integration was 86.8%, and its data cognitive ability was 80.6%. Among them, the average value of financial resource integration of three enterprises under the traditional mode was 81.5%, and the average value of data cognitive ability was 75.2%. Under the new model, the average value of financial resource integration of the three enterprises was 88.6%, and the average value of data cognitive ability was 81.9%. It can be seen from the comparison that the financial resource integration of enterprises under the new model was 8.7% higher than that under the traditional model, and the data cognitive ability of enterprises was 8.9% higher than that under the traditional model. The improvement of financial resource integration ability and data cognition ability shows that big data can improve the financial data sharing ability between enterprises, and also help employees to process and analyze data in a timely manner. Then, 100 enterprises' index changes before and after data archiving were investigated, and their average values were taken for research. Then, the neural network algorithm was used to analyze the deviation value, output value and transfer value under the financial data archiving, and compare with the data before archiving. The specific comparison is shown in Figure 6.

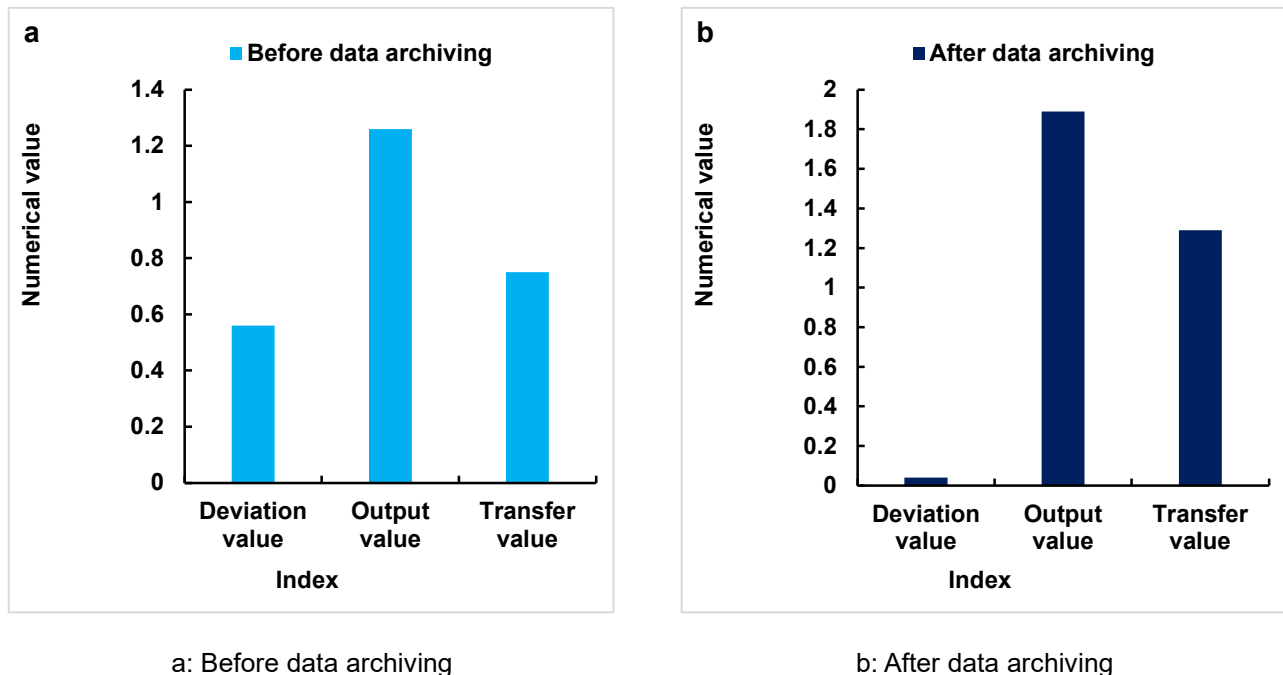a: Before data archiving   b: After data archiving

Figure 6: Changes of deviation value, output value and transfer value before and after financial data archiving

Figure 6a shows the financial data before archiving, and Figure 6b shows the financial data after archiving. The deviation value after data archiving was lower than that before data archiving, and the output value and transfer value after data archiving were higher than that before data archiving. It can be seen from Figure 6a that the deviation value before data archiving was 0.56, the output value was 1.26, and the transfer value was 0.75. It can be seen from Figure 6b that the deviation value after data archiving was 0.04, the output value was 1.89, and the transfer value was 1.29. It can be seen from the comparison that the deviation value after data archiving was 92.9% lower than that before data archiving, and the output value after data archiving was 50% higher than that before data archiving. The transfer value after data archiving was 72% higher than that before data archiving. This shows that data archiving can not only reduce the deviation value of financial data processing, but also improve the efficiency of data processing. In addition, data archiving can also provide the effect and scope of financial information data transfer between enterprises. Finally, the data visualization effect, data processing effect and

information sharing rate of 100 enterprises before and after data archiving were investigated, and their average values were compared before and after. The specific comparison is shown in Figure 7.

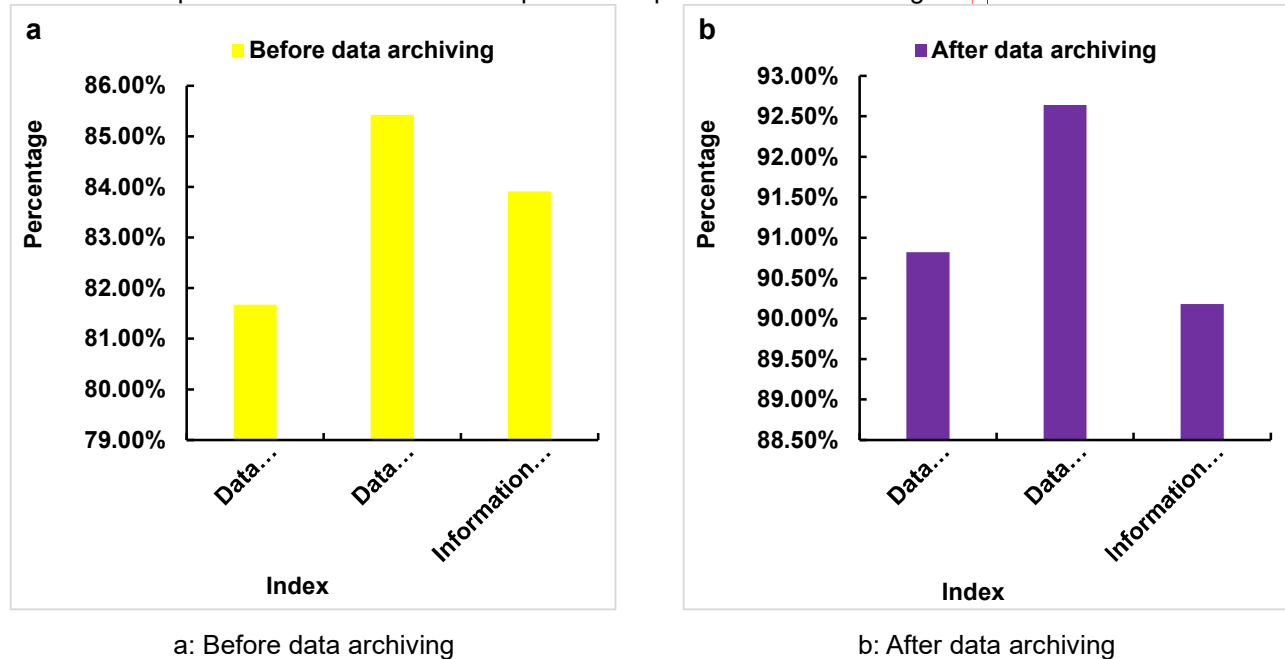a: Before data archiving

b: After data archiving

Figure 7: Data visualization effect, data processing effect and information sharing efficiency before and after data archiving

Figure 7a shows the financial data before archiving, and Figure 7b shows the financial data after archiving. The data visualization effect, data processing effect and information sharing rate after data archiving were higher than those before data archiving. It can be seen from Figure 7a that the data visualization effect before financial data archiving was 81.67%, the data processing effect was 85.42%, and the information sharing rate was 83.91%. As shown in Figure 7b, the data visualization effect after financial data archiving was 90.82%, the data processing effect was 92.64%, and the information sharing rate was 90.18%. It can be seen from the comparison between Figure 7a and Figure 7b that the data visualization effect after data archiving was 11.2% higher than that before data archiving. The data processing effect after data archiving was 8.5% higher than that before data archiving. The information sharing rate after data archiving was 7.5% higher than that before data archiving. After the comprehensive archiving of enterprise financial data under big data, the enterprise's own data processing and information resource sharing are better than before, which is mainly because the scientific classification of data can improve the data storage rate.

VII. Conclusions

In the age of big data, professional enterprise financial data gradually shows a trend of computerization. However, from an objective point of view, the computerization of financial data has improved the efficiency of financial management and reduced the company's financial costs. Electronic data storage needs to be changed according to specific environment and data security requirements. In practice, the company needs to improve the storage environment of electronic data files to strengthen the security management of electronic data files, so as to ensure the scientific storage and effective use of electronic data. In the competitive market, the visual transformation of enterprise financial data is inevitable, and better enterprise financial management is needed. Data visualization technology has been integrated into the company's financial management, which can accurately reflect the company's real financial information to help information users make business decisions. The visual management of enterprise financial data and the selection of application programs can not only improve the accuracy of financial information, but also increase the storage capacity of financial data, so as to clarify the business development direction and business objectives.

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