Problems and Countermeasures of Financial Statistical Analysis In Colleges and Universities Under the Background of Big Data

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Abstract: In the current era of information and digitalization, big data technology has deeply permeated various sectors of society, continuously reshaping our lifestyles and work practices. As a vanguard in knowledge and technological innovation, universities are naturally profoundly influenced by the wave of big data. Financial statistical analysis in higher education institutions is an integral component of institutional management. Against the backdrop of ongoing developments in big data technology, it presents new opportunities and challenges. However, there are numerous existing issues in financial statistical analysis within higher education institutions that urgently require effective solutions to enhance management efficiency and decision-making capabilities. This paper will examine some prevalent issues in financial statistical analysis within higher education institutions under the influence of big data and propose potential remedies.

Keywords: Big data background; University finance; Statistical analysis

Introduction

The so-called big data technology is a new technology that mining valuable information and knowledge from massive data through rapid, comprehensive and in-depth analysis of massive data. It has the core characteristics of large data scale, multiple data types, fast data processing, low data value density, and strong authenticity. In recent years, big data technology has been increasingly applied to the field of education, bringing new perspectives and new methods to university management and decision-making.

1. Overview of financial statistical analysis of colleges and universities under the background of big data

Big data technology is being increasingly widely and deeply applied in the financial statistical analysis work of higher education institutions, which involves the sourcing, application, management and supervision of funds in various aspects. It occupies an important position in the management of higher education institutions. With the continuous progress of information technology, the sources of financial data in higher education institutions have become increasingly diverse, covering tuition fees, scientific research funding, donations, etc. At the same time, with the popularization of financial management information systems, the total amount of data has also shown an exponential growth trend. The emergence of big data technology has brought strong data processing and analysis capabilities to the financial statistical analysis work of higher education institutions, enabling the integration and analysis of massive heterogeneous data to provide a more accurate grasp of the financial operation status and trends of higher education institutions, thereby promoting the level of management and decision-making. However, although big data technology has shown great potential in the financial statistical analysis work of higher education institutions, its application still faces many challenges, such as insufficient data collection, complex data processing, relatively single analysis methods, and greater data security risks, etc. Therefore, conducting in-depth research and application of big data technology to enhance the scientificity and effectiveness of financial statistical analysis work in higher education institutions has become an important development direction in the reform of higher education management.

2. Analysis of problems existing in the financial statistical analysis of colleges and universities

2.1 Data collection problems

Under the environment of big data, the problems in the collection of financial statistical analysis data in colleges and universities include the data sources being complicated and not comprehensive enough, and the quality of the data being mixed. University financial data covers many sources such as tuition income, scientific research funds, donations, etc. However, because various data are distributed in different systems and platforms, data integration is difficult, and there are often data loss or duplication. In addition, in the data collection, due to the

limitation of the acquisition equipment and technical level, some data quality is low, and the phenomenon of incorrect data entry and inconsistent format appears. This will not only increase the workload of data cleaning and processing, but also affect the accuracy and reliability of data analysis. In order to improve the comprehensiveness and quality of data collection, advanced collection technology and equipment must be introduced, and standardized data management must be strengthened to ensure accurate and timely collection and integration of various financial data, which lays a solid foundation for the following analysis.

2.2 Data processing problems

There are limitations of technical tools in the data processing of financial statistical analysis in colleges and universities, and the processing efficiency is not high. The financial data of colleges and universities has the characteristics of wide sources and complex structure, and the traditional data processing technology and tools are difficult to deal with the effective data such as massive data and heterogeneous data, resulting in slow processing speed and insufficient precision. Data processing involves the integration and cleaning of various formats and types of data, which is cumbersome, time-consuming, error-prone and easy to miss. In addition, some universities lack professional talents and technical support in data processing, which further increases the difficulty and efficiency of data processing. These factors comprehensively restrict the improvement of financial data processing ability of colleges and universities, affect the comprehensiveness and accuracy of financial statistical analysis work, and bring adverse effects to management decision-making. The limitations of technical tools and the low efficiency of processing have become an important bottleneck restricting the work of financial statistics analysis in universities.

3. Countermeasures for financial statistical analysis of colleges and universities under the background of big data

3.1 Improve data acquisition methods

It is of great significance to improve the method of data collection to promote the accuracy and effectiveness of financial statistical analysis in colleges and universities. It is an effective strategy to collect data from multiple sources, such as tuition revenue, research grants, and endowments. As far as tuition income is concerned, each student's payment can be collected in real time by docking with the student management system to ensure accurate and timely data. For scientific research funds, it can be linked with the scientific research management system to realize the automatic collection of information such as application, approval, allocation and use of project funds, avoiding manual input errors. For donations, the amount, purpose and purpose of each donation can be fully recorded through the integration with the alumni Association and the donation management system.

In addition, standardized data management is also a crucial step to ensure data quality. By establishing a unified data entry standard and format requirements, the problem of difficult data integration caused by inconsistent formats is avoided. For the collection of tuition income data, the fields that can be set include "student ID", "name", "major", "grade", "payment amount", etc. (Table 1). In the data records of scientific research funds, fields such as "payment date" can contain multiple options such as "Project number", "Project name", "Responsible person", "Total funding", "amount spent" and "remaining amount" (Table 2).

Table 1. Sample table of tuition income

Student ID	Name	Major	Grade	Payment Amount	Payment Date
2021001	San Zhang	Computer Science	Freshman year	10000 yuan	2023-09-01
2021002	Si Li	Electronic Engineering	Sophomore year	9800 yuan	2023-09-05

Table 2. Statistical examples of scientific research funds

Project Number	Project Title	Responsible Person	Total Fund	Amount Spent	Remaining Amount
2021A001	Artificial Intelligence Research	Wu Wang	500000 yuan	200000 yuan	300000 yuan
2021A002	Environment Protection Technology	Liu Zhao	300000 yuan	150000 yuan	150000 yuan

3.2 Improving data processing Capabilities

Improving the ability of data processing is of great significance to the financial statistical analysis of colleges and universities, which is manifested in the introduction of advanced data processing technology and tools and the optimization of data processing flow. With the increasing amount of financial data in colleges and universities, conventional data processing methods can no longer meet the needs. For example, big data processing technologies such as Hadoop and Spark can significantly improve the speed and efficiency of data processing. Hadoop can handle terabytes or even petabytes of data with its own distributed storage and computing power. Spark uses advanced in-memory computing technology to process data hundreds of times faster than traditional methods. The introduction of these technologies can effectively deal with the large and complex characteristics of university financial data.

In addition, optimizing the data processing process is the focus of improving the data processing capacity. Through the construction of automatic data processing system, manual intervention can be reduced and the accuracy and efficiency of data processing can be improved. Taking tuition income data processing as an example, the data can be cleaned and integrated automatically through scripts and programs to reduce errors and omissions caused by manual operation. In terms of data processing of scientific research funds, data warehouse technology can be used to store and manage data from different sources in a unified manner, and the integrity and consistency of data can be ensured through the ETL (Extract, Transform, Load) process.

Another important aspect of data processing is the ability to process and analyze data in real time. Real-time data processing technology can be used to realize real-time analysis and feedback of financial data. Stream Processing, for example, enables continuous analysis of real-time data streams, which helps the management of higher education institutions understand financial status in real time and make immediate financial decisions based on it. Stream processing tools such as Apache Kafka can process millions of data records per second, ensuring timely and accurate financial data processing.

Effective data processing capabilities also require professional data processing talents and teams as support. All colleges and universities should strengthen the training and education related to data processing, and strive to improve the data processing skills and professional level of employees. Through the introduction and training of data scientists, data engineers and other professionals, it can provide powerful technical support for data processing work.

Data security is also important to enhance data processing capabilities. Data encryption, access control and other security measures ensure data security and privacy protection during processing. As an example, we use the SSL/TLS protocol to encrypt data transfers and maintain the data storage and processing environment with the help of firewalls and intrusion detection systems (IDS) to ensure the security and reliability of financial information.

4. Conclusion

In the era of big data, the financial statistical analysis of colleges and universities has ushered in unprecedented opportunities and challenges. Although there are many problems in data collection, processing, analysis and security, they can be overcome from the perspective of introducing advanced technology, optimizing management process, strengthening data security measures and training professional personnel. The use of big data technology can not only improve the efficiency and accuracy of financial statistical analysis, but also provide university administrators with more comprehensive and profound financial insight to support scientific decision-making and effective management. In the future, all colleges and universities should continuously strengthen the research and application of big data technology, explore new data processing methods and means, promote the continuous improvement of financial management level, and promote the sustainable and healthy development of colleges and universities.

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