

Budget Performance Evaluation Model of Private Universities Based on Big Data

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Abstract: With the development of Internet, computer cloud and other communication technologies, massive data has brought precious opportunities and severe challenges to many fields. The arrival of the era of massive data and the requirements of the internal development of private colleges and universities gradually break the inherent financing ideas of private colleges and universities. The traditional tax revenue and expenditure budget can not meet the needs of economic work under the new situation. In the new environment, to transform the traditional budget of economic revenue and expenditure into performance budget, we must make full use of the concept and technical means of massive data to excavate and analyze deeply rooted economic data. On the basis of big data, this paper constructs the budget performance evaluation model of private undergraduate colleges and universities by using the grey correlation analysis method, and makes a comparative study on the development level of education and the performance of education expenditure by using the methods of literature research, qualitative and quantitative analysis, empirical analysis and normative analysis. In addition, this paper takes the financial data of the University from 2017 to 2019 for empirical research. The results show that in 2017, the annual income of our university is 684.29 million yuan and the annual expenditure is 670.73 million yuan; in 2018, the annual income of our university is 735.47 million yuan and the annual expenditure is 718.32 million yuan; in 2019, the annual income of our university is 772.19 million yuan and the annual expenditure is 758.78 million yuan. In addition, through the model analysis, the budget performance of our university in recent three years is analyzed. The results show that the calculation amount of the grey similarity correlation calculation model is small, which can reflect the actual performance level, and can be used for the financial budget performance evaluation of private undergraduate universities.

1. Introduction

The important foundation of financial management in Colleges and universities is the allocation of teaching resources[1]. In order to ensure the healthy and sustainable development of colleges and universities, colleges and universities should make a plan of medium and long-term fiscal revenue and expenditure according to the needs of their own professional development and the possibility of comprehensive financial resources[2-3]. Promoting budget performance management is an important part of the effectiveness of budget fund use, which is an important part of strengthening budget expenditure management and improving budget efficiency[4]. The quality of budget management in Colleges and universities will directly affect the completion of the business plans of colleges and universities, directly affect the effectiveness of the use of funds, and the healthy and sustainable development of university education[5].

Private higher education plays an important role in China's becoming a "great country of higher education", and will also make a unique contribution to the construction of a "powerful country of higher education" [6-7]. However, the performance evaluation of private colleges is not deep and detailed enough in China. The evaluation index system and methods of public universities are often used. This method can not reflect the performance of private colleges and universities. In the past, it will not be conducive to the further development of private colleges and universities [8-9]. Therefore, it is necessary to formulate the performance evaluation index system and method which conforms to the current situation of private colleges and universities, which can encourage and promote the private colleges and universities, and help them grasp the general direction of performance evaluation index system and methods[10].

At present, many private colleges lack budget evaluation and evaluation system. In the process of budget implementation, the increase of budget and insufficient indicators of capital occupation often occur. When big data collides with finance, how to establish a scientific budget performance evaluation system based on solid big data, so as to make financial management more intelligent in Colleges and universities, informatization is a problem worthy of further consideration. This paper compares the development level of education and the performance of educational expenditure funds in our university by means of literature research, qualitative analysis and quantitative analysis, empirical analysis and normative analysis. Finally, it puts forward suggestions to promote the effective use of financial funds in higher education, so as to improve the management level of Private Colleges and universities.

2. Big Data and Performance Evaluation of Private Universities

2.1. Definition and Characteristics of Big Data

Big data is also known as massive data, massive data or big data. The amount of big data is so large that people can't intercept, manage, process and organize information in a reasonable time. However, big data not only refers to a large amount of data, but also represents its potential data value.

(1) Massive data

Massive data, in other words, the range of data is very large, far more than traditional data. According to statistics, in 2011, the total amount of data of China's Internet industry reached 190 million EB, the total amount of generated data was 150 million EB, and the global replication was 1.8zb. More importantly, this data development trend has accelerated.

(2) Diversified sources

There are many types of data in big data collection. It includes structured data, unstructured data and personal behavior data. The sources of these information are various, including information downloaded from personal terminal platform, public information from various network subsystems, including social networks, and storage of back-end e-commerce platform. The situation of users is semi public or even confidential.

(3) Analysis and treatment speed up

The speed of processing large amounts of data analysis means that it takes a very short time to create data products from raw data. With the rapid expansion of data application, the speed and scope of big data production are also expanding geometrically. From the analysis and processing of traditional statistical data to the generation of dynamic real-time data and the development of final data products, the speed should be improved accordingly. This possibility is a significant difference between massive data analysis technology and traditional analysis methods.

2.2. Performance Evaluation

(1) Performance is the relative performance level of an organization to achieve its goals under specific circumstances, which can be described from multiple dimensions, including competition, time, quality, innovation, efficiency, effect, etc. Because private colleges and universities are a special non-profit organization, we can not use profit as a tool to measure the performance of the organization, but must use other methods to measure its performance.

(2) According to the "public welfare" and "private" characteristics of China's private colleges and universities, when designing the performance evaluation model of China's private colleges and universities, we can not only consider their profitability like the enterprise performance evaluation, nor can we only consider the school running results and ignore the school running cost like the public colleges and universities. We need to pay attention to the efficiency and efficiency, input and output, just the output of colleges and universities It not only refers to the economic profits, but also refers to the high-quality students who can promote social development.

(3) The overall performance of private colleges and universities is reflected in three aspects: first, education performance, second, business performance and third, management performance. Educational performance reflects the teaching strength, teaching quality and student quality of a university; business performance reflects the operation ability, financial status and sustainable development ability of private universities; management performance reflects the management system, organization operation process and operation cost of private universities.

2.3. Basic Principle of Grey Correlation Analysis and Establishment of Evaluation Model

(1) The basic principle of grey relational analysis

Grey relational analysis is an important part of grey system theory. Its basic idea is to determine the ideal optimal sequence according to the actual situation of the problem, and then determine whether it is closely related to geometry. The more discrete the curve is, the smaller the correlation between the corresponding series is, and vice versa. In the case of insufficient data, grey correlation analysis method can find the law reflecting the internal evolution of the system according to the chaotic time series of the system, and determine the primary and secondary factors better by calculating the correlation between the systems.

(2) Grey relational analysis model

Definition: let system behavior sequence $x_0 = [x_0(1), x_0(2), \dots, X_0(n)]$

$$X_1 = [x_1(1), x_1(2), \dots, x_1(n)] \quad (1)$$

$$X_i = [x_i(1), x_i(2), \dots, x_i(n)] \quad (2)$$

The grey correlation coefficient is as follows

$$\text{sgn}_k = \begin{cases} 1 & \Delta_0(k) \Delta_i(k) \geq 0 \\ -1 & \Delta_0(k) \Delta_i(k) \leq 0 \end{cases} \quad (3)$$

3. Ideas and Methods

3.1. Research Methods

This paper adopts the methods of literature research, qualitative and quantitative analysis, empirical analysis and normative analysis, in order to improve the use efficiency of budget funds in private colleges and universities, promote the healthy development of private colleges and universities, and make a comparative study on the development level of education and the performance of education expenditure funds in our university.

(1) Literature research. By combing and summarizing the relevant literature at home and abroad, this paper has some understanding of the achievements and gaps in the research field, based on which we can find our own research perspective and formulate the research framework.

(2) Qualitative and quantitative analysis. In this paper, we use qualitative analysis method to analyze the education situation of our university and the categories of education financial expenditure of private colleges and universities, and make quantitative analysis on the scale of education expenditure of private colleges and universities.

(3) Empirical analysis and normative analysis. This paper makes an empirical analysis on the performance of our school's education financial expenditure and the factors influencing the performance evaluation, establishes the evaluation model, and obtains the indicators and values. According to the results of empirical analysis, this paper finds out the problems existing in the budget expenditure of private universities and puts forward some policy suggestions.

4. A Financial Data and Correlation Analysis

4.1. Financial Data Analysis

In order to analyze and more truly reflect the actual situation, this paper selects the budget performance data of our school as the research object, and evaluates according to the above methods. In order to avoid the deviation caused by the calculation of single year data, this paper collects the relevant data from 2017 to 2019 for empirical research, and the original data are shown in Table 1 and Table 2.

Table 1. Income from 2017 to 2019(Unit: ten thousand yuan)

Project	2017	2018	2019
Annual income	68429	73547	77219
Income from education	37275	39231	38746
Other revenue	13412	16108	17250

It can be seen from Table 1 and Table 2 that in 2017, the annual income of our school was

684.29 million yuan and the annual expenditure was 670.73 million yuan, including 372.75 million yuan of education income, 390.83 million yuan of education expenditure, 134.12 million yuan of other income and 72.7577 million yuan of teaching expenditure; in 2018, the annual income of our school was 735.47 million yuan and the annual expenditure was 718.32 million yuan, including 392.31 million yuan of education income, The expenditure on education is 413.91 million yuan, other income is 161.08 million yuan, and the expenditure on teaching is 85.1608 million yuan. In 2019, the annual income of our school is 772.19 million yuan, and the annual expenditure is 758.78 million yuan, including 387.46 million yuan, 446.32 million yuan, 172.5 million yuan, and 90.1253 million yuan.

Table 2. Expenditure in 2017-2019(Unit: ten thousand yuan)

Project	2017	2018	2019
Annual expenditure	67073	71832	75878
Expenditure on education	39083	41391	44632
Expenditure of teaching funds	7275.77	8516.08	9012.53

4.2. Calculation and Analysis of Grey Correlation Coefficient and Correlation Degree

In this paper, we use the grey correlation model proposed above to calculate the grey correlation coefficient and correlation degree of University original data according to the average index value of our university in three years. The research results are shown in Figure 1 and Figure 2.

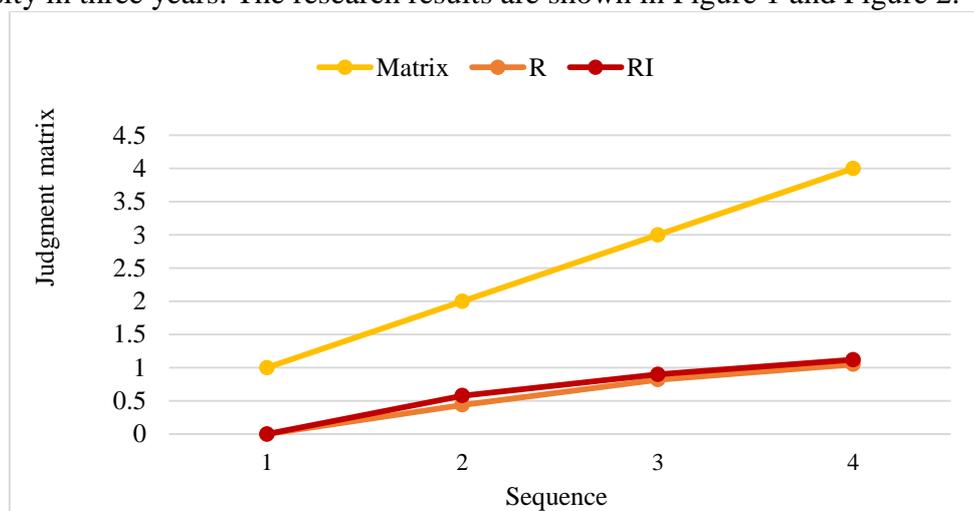


Figure 1. Same-order average random consistency index

As can be seen from Figure 1, the judgment matrices of order 1 and order 2 are always identical. When the sequence is greater than 2, the corresponding RI value in Figure 1 is used to calculate the random consistency ratio. When $CR < 0.10$, the table is considered to have satisfactory consistency, that is, through the consistency test, when $CR > 0.10$, the results should be returned to experts, and the evaluation results are reliable.

As can be seen from Figure 2, the budget performance of our school for three consecutive years from 2017 to 2019 is generally good. The proportion of teaching expenditure in business expenditure, budget implementation rate and other indicators show an optimization trend year by year. Under the general requirements of connotation development, our school actively broadens the

sources of funds to ensure the stable development of school teaching. Budget performance management is a budget management system which is goal oriented and responsible for the results. Effective performance evaluation of the budget of private colleges and universities is helpful to clarify the use of education funds, promote the construction of performance budget system, and improve the level of running a school and social benefits.

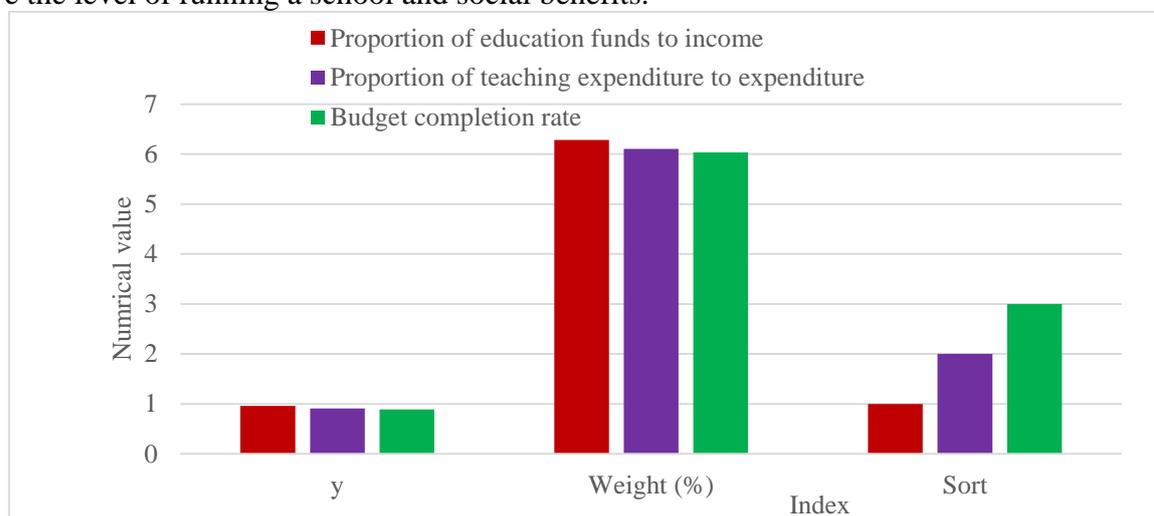


Figure 2. Calculation results of correlation degree

4.3. Relevant Measures to Improve Budget Performance Management of Private Universities

In order to ensure the effective implementation of the budget in private colleges and universities, and maintain the scientific, reasonable and serious budget management, we must put the financial funds into practical use to maximize the role of funds.

(1) Promote the improvement of budget management mechanism

In order to adapt to the rapid development of China's higher education, private colleges and universities should improve the budget management mechanism, develop and improve their own budget management system. The acquisition, expenditure and adjustment of budgetary revenue should follow the rules, and the procedures, methods and principles of budgeting should be scientific and reasonable. The budget department is responsible for the preparation of the school budget, the Department in charge of the budget is responsible for the implementation of the budget, the budget supervision and evaluation organization is responsible for the supervision and management of the whole process of budget management, and each department performs its own duties.

(2) Strengthen the control of budget implementation process

Budget implementation monitoring is an important part of university budget management. In order to ensure the effective implementation of the budget, private colleges and universities should establish a strict and standardized authorization system, set up a budget management committee, which is responsible for approving the budget amount, formulating various financial indicators, adjusting budget indicators, controlling and implementing budget analysis, so as to ensure the completion of the annual teaching and ensure the healthy and sustainable development of education in combination with the medium and long-term development goals and plans.

(3) Establish a strict performance appraisal system

Through the combination of assessment and reward, the performance appraisal and reward and

punishment system will be incorporated into the budget process, and punishment can avoid the randomness of University (Department) and department costs, maintain the seriousness and effectiveness of the University, improve the level of budget management, and promote the better development of colleges and Universities. Private colleges and universities can consider linking the evaluation results with the budget of the next financial year, or adopt the following measures Take the appropriate mechanism, provide compensation and reward, and establish a flexible salary system on the basis of performance, that is, make appropriate salary adjustment according to the results of performance appraisal.

5. Conclusion

In recent years, with the development of China's higher education, the development level of China's higher education has been significantly improved, and the demand for education funds is also growing. Budget management is an important part of university financial management. How to make full use of big data to build budget information, so that universities can use limited education funds, optimize resource allocation, and improve school running vitality is particularly important . On the premise of ensuring the quality of education, we should strictly control the expenditure and make the best use of the limited investment in education, so as to obtain economic and social benefits, so as to realize "reasonable structure, personnel utilization, cost reduction and efficient operation", and make the cause of higher education develop healthily and rapidly. Of course, performance evaluation is all-round, how to define and evaluate the whole process before, during and after the event is a very difficult thing, and the rationality and integrity of index selection are also worth further discussion.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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