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Implementation of Big Data Technology in Budget Performance Evaluation in Vocational Colleges

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Abstract: *The rapid development of big data and its derived information technology such as the Internet of Things and cloud computing have brought new opportunities to the budget performance evaluation in vocational colleges. Therefore, it is necessary to innovate evaluation methods with big data technology to improve the objectivity and accuracy of performance evaluation results. In this context, we analyzed the necessity of the application of big data to budget performance management. Then, the construction mechanism of the big data-based budget performance management platform was proposed, including the construction ideas and methods and the application paths of conducting big data-based budget performance management. This study contributes to promoting the budget performance management work towards smarter processes in the background of big data technology.*

Keywords: *big data, vocational school, budget performance, performance evaluation*

1. Introduction

The Internet and cloud computing technology have been developing into mature intelligent solutions in many aspects and providing technical support and innovation opportunities for the innovation and development of all walks of life. At the same time, the characteristics of the big data era are increasingly showing their power in supporting intelligent decision-making. This also subtly affects the development of vocational colleges and gradually breaks the inherent management thinking and management mode of vocational college finance. Using the positive role of big data technology in the budget performance evaluation of vocational colleges is urgent for the budget reform of the financial revenue and expenditure budget of vocational colleges under the new situation [1]. In the new data environment, the traditional financial revenue and expenditure budget gradually changes into the performance budget, while it is the big data technology that plays the main role in promoting the transformation. Through the systematic mining and integration analysis of deep financial data, big data technology achieves effective use based on data transformation. At present, vocational colleges lack a perfect budget evaluation and assessment system. In the process of actual budget implementation, there are often budget additions and misappropriation of funds indicators, which increases the financial management risks. At the same time, the year-end financial analysis of the budget implementation results is insufficient [2]. Thus, it is imperative to seek the integration of big data technology and budget evaluation of vocational colleges. Based on the foundation of solid big data, actively building a scientific budget performance evaluation system can improve the intelligence and information level of financial management in vocational colleges, which is also the gap that financial personnel in vocational colleges need to address.

2. Necessity of Big Data for Budget Performance Management in Vocational Colleges

It is necessary to apply big data technology to budget performance management in vocational schools in three aspects. Firstly, it breaks the technical bottleneck of financial budget performance evaluation. The self-evaluation of internal performance or the transmission of budget performance information by all departments of vocational colleges needs to meet the operation requirements of the subject and the diversified needs of the public. The application value of big data technology is precisely reflected in the two aspects. It promotes the formation of a performance management network technology module, the establishment of a performance transmission basic information database, and the integration of network media, which is expected to break the technical bottleneck of financial budget performance evaluation. Based on the practical application of medium and big data, the

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diversified evaluation of the regulatory subjects concerning the information needs provides the actual needed performance evaluation content. It quickly adapts to the change in the information demand environment but also achieves the standardized implementation and dynamic tracking of budget performance evaluation [3]. Secondly, it allows the supervision and accountability of the budget performance evaluation system. Big data makes similar capital markets active and drives the formation of an active supply and demand relationship. Under the multiple effects of accurate network information technology and information media, the public clarifies the relationship between the development of strategic planning of vocational colleges and the financial risk and this relationship. Therefore, they can consciously carry out the overall supervision of the financial management of vocational colleges with a scientific outlook on development. This improves the efficiency of the use of funds, realizes the reasonable allocation of social resources, and ensures the safety of the use of funds. It makes the budget management of vocational colleges more transparent and standardized with benign development. Thirdly, it greatly reduces the friction cost of fiscal budget reform. Through the two-dimensional analysis of the scientific reform income distribution and the interest protection of the damaged parties, the interest groups and the new interest balance can be quickly found with the help of big data, resulting in the reduction of the friction cost of fiscal budget reform [4]. At present, the application concept of big data technology is relatively mature, and its penetration in the public field becomes thorough. It achieves the rapid identification of various loopholes in financial budget expenditure management and the reasonable prevention of unnecessary management mistakes. Therefore, the ability to identify major risks or hidden dangers further improves the level of budget management of vocational colleges, making the budget management of vocational colleges safer with enough ability to deal with the financial crisis.

3. Construction of Big Data Platform for Budget Performance Management

3.1. Thoughts and methods

The construction of a comprehensive budget management platform is proposed for vocational colleges under big data. The specific process and structure are shown in Fig. 1, which includes six parts: Data Collection (DC), Data Processing and Analysis (DPA), Budget Preparation Review (DPR), Budget Implementation Control (BIC), Budget Assessment and Evaluation (BAE), and Platform Service (PS).

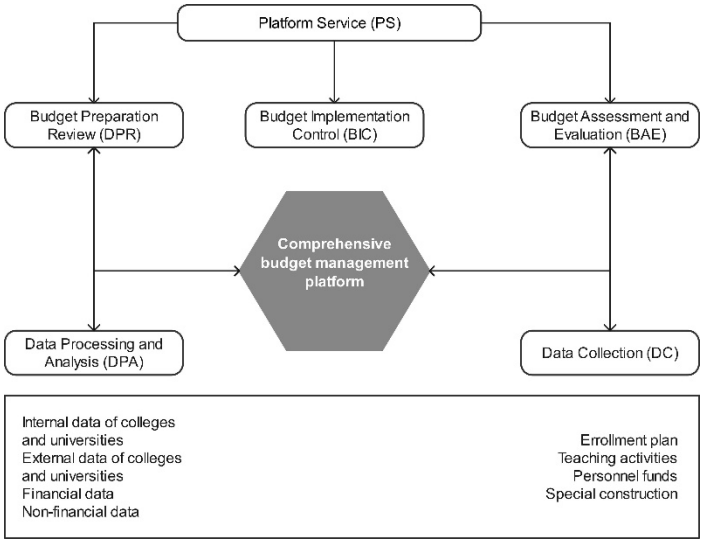

Figure 1: Overview of the comprehensive budget management platform.

The financial data required for the comprehensive budget management of vocational colleges mainly comes from the teaching, teaching assistance, logistics, student management, and other departments. The data are summarized to form an internal financial sharing database. The internal financial sharing database is combined with the financial data of external institutions to realize the internal and external linkage of the data. Databases are divided into the main databases and other databases for more convenient extraction, screening, integration, and application of information. For example, a special student payment database, teaching management database, and scientific research project database can be set up, thus multiple data can provide data basis for the financial management

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of vocational colleges. The data is real and reliable and can be traced back to the source. It comes from the daily work management of vocational colleges, serving the daily work management of vocational colleges. The establishment of an internal and external financial sharing database is the first step. In this way, the establishment of a data processing and analysis system can be more critical, which is directly related to data mining, extraction, and application. A data processing and analysis system is established to realize the data classification through classification and regression, association rules, and change and difference analysis, to realize the analysis and comparison of multidimensional data. The efforts are to provide the basis for vocational colleges to make next year's budget decision basis. The data processing and analysis system of the big data platform is based on the actual development of vocational colleges to help vocational colleges to make correct judgments through the analysis of historical data and the horizontal comparison with the data of other vocational colleges [5]. To guide vocational colleges to highlight their educational characteristics, make scientific predictions on the training cost and income of students of different disciplines, and ensure the scientific budget analysis of different levels, different colleges and different departments need to use the data advantages.

The establishment of a data processing and analysis system to achieve the effective extraction and application of data is inseparable from the audit support of the comprehensive budget management preparation audit system. The system intelligently and automatically processes all the information of the budget budgeting work at the present stage. This helps maintain the budget budgeting work and solve the problems in the budget budgeting process, budget method, and budget content at the present stage. In the formulation of the budgeting audit system, it is necessary to clear the budgeting target and control the general direction of budget management. Budget objectives are set based on the school development strategy and long-term planning [6]. Then, it is necessary to prepare the budget process to ensure that every step from the declaration to the release of the budget is informationized. This process needs to truly consider the needs of all departments of vocational colleges and complete the declaration of the budget plan within the prescribed time limit. Also, it needs to optimize different budget items to truly eliminate worthless miscellaneous links. Through the budget preparation audit system to each department's budget plan to conduct a summary audit, the whole process of information operation is greatly improved regarding the transparency of the budget audit. Through big data processing and analysis, the budget plan becomes more accurate and comprehensive, and the budget management work can be carried out orderly. Finally, it enters the budget implementation control stage. It requires the cooperation of all departments of vocational colleges to realize the connection of data collection, data processing and analysis, and budgeting and review to lay the foundation for data application. Multi-dimensional secondary analysis of key projects, priority projects, and innovative projects are carried out to ensure that the flow of each amount in the project database is clear within the scientific scope of early warning. Once the amount is abnormal, it needs to timely issue an early warning and reminds the person in charge so that the person in charge can refer to the warning line when approving the budget. The budget implementation control system establishes multi-dimensional connections between various projects and various departments to establish the correlation between each step of the budget implementation process, to achieve effective and comprehensive monitoring.

The information assessment and evaluation system of vocational colleges needs to be based on the budget, project setting, and budget implementation. This is not only to achieve the evaluation and assessment of each budget implementation department but also to pay attention to the evaluation and assessment of each project. It is required to focus on special construction projects, school-running projects, discipline construction projects, scientific research projects, school's key construction projects, priority development projects, and projects beyond the term so that each project corresponds to reasonable budget results. The application of big data platforms to the budget performance evaluation of vocational colleges cannot be achieved in a short time, and weak key links must be paid attention to. Data storage and output are crucial links [7]. The platform service mainly provides data storage services and output services, and the budget audit, implementation, control, assessment, and evaluation ultimately serve the teachers and students of vocational colleges. Therefore, a sharing platform software needs to be provided to facilitate teachers and students to obtain information and query information. The applicant sets the authority to query the budget surplus amount to do a good job in reporting the budget. Financial personnel can use their authority to analyze the fund declaration, execution, and audit within the authority from the perspective of different data methods. Sharing platform software realizes the rapid sharing of information and reduces the cumbersome requirements of cross-platform processing and the work pressure on financial personnel.

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3.2. Implementation paths

According to the actual situation of vocational colleges, we evaluate budget performance from four aspects: Finance Factor (FF), Customer Factor (CF), Internal Operation (IO), Growth and Development (GW) (Fig. 2). The target level is the financial budget performance of higher vocational colleges. The standard layer is composed of the FF, CF, IO, and GW. The index layer is composed of 1) A1: total school expenses, A2: total fixed assets at the end of the year, A3: per capita educational income of teachers, A4: per capita income of scientific research services for teachers, and A5: the number of students trained by financial input, 2) B1: teacher to teacher ratio, B2: teaching equipment per student, B3: number of books per student; B4: proportion of full-time teachers to all teachers, and B5: Signing the employment rate of graduates, 3) C1: the proportion of faculty construction expenditure in career expenditure, C2: completion rate of teaching planning, C3: borrowing rate of library books, C4: the ratio of teaching expenditure to the total expenditure, and C5: proportion of scientific research expenditure to the total expenditure, and 4) D1: number of teacher training sessions, D2: total revenue growth rate, D3: annual growth rate of expenditure on teaching activities, D4: annual growth rate of expenditure on scientific research activities, and D5: growth rate of teaching instruments and equipment.

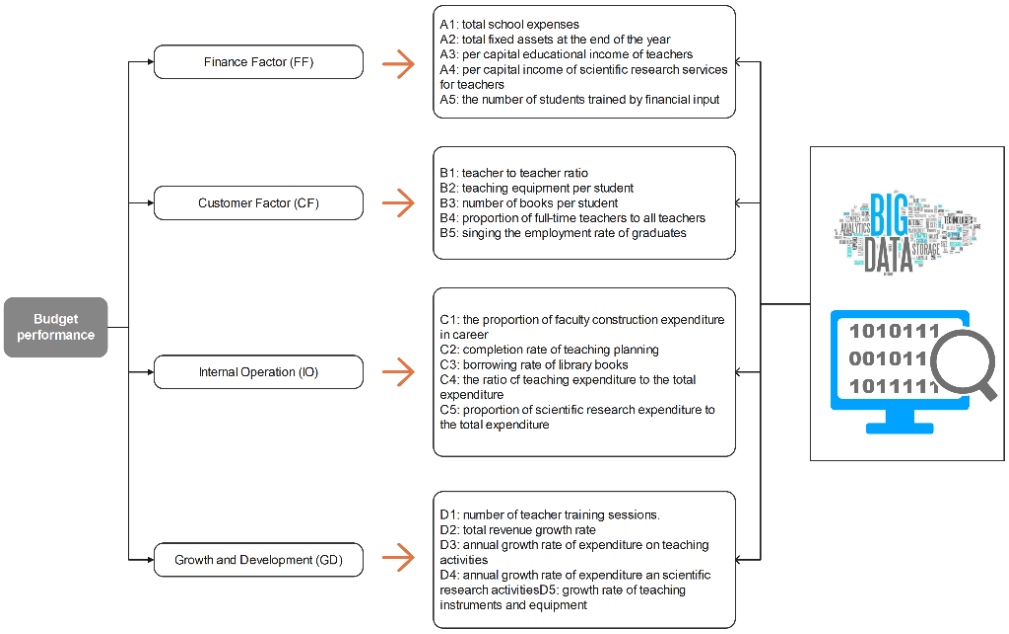

Figure 2: Framework of the budget performance assessment for the vocational colleges.

First, the Analytic Hierarchy Process (AHP) was used to score each of the indicators of the above four dimensions as per the values in the literature. Thus, the pairwise comparison matrix can be obtained, as shown in Table 1 for the primary indicators to Table 2 for the secondary indicators FF.

Table 1: Comparison of the primary indicatorsIII

/	**Pairwise comparison**			
	FF	***CF***	***IO***	***GW***
FF	1	1/4	2	1/4
CF	4	1	5	1
IO	1/2	1/5	1	1/5
GW	4	1	5	1

Table 2: Comparison of the secondary indicators (FF)

FF	**Pairwise comparison**				
	A1	**A2**	**A3**	**A4**	**A5**
A1	1	3	2	5	4
A2	1/3	1	1/5	3	2
A3	1/2	5	1	4	3
A4	1/5	1/3	1/4	1	1/2
A5	1/4	1/2	1/3	2	1

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By repeating the pairwise comparison, the weights of each indicator are calculated. For example, the weight of A1 is 0.454, and the weight of A1 for the whole budget performance system target layer is 0.114, so the weight of the total school-running funds in the total target of budget performance evaluation is 0.052 (0.454×0.114). The overall results are encapsulated in Table 3.

Table 3: Overall results for the budget performance assessment framework.

/	**FF**	**CF**	**IO**	**GW**	**Overall**
	0.114	0.407	0.072	0.407	/
A1	0.454	/	/	/	0.052
A2	0.109	/	/	/	0.012
A3	0.321	/	/	/	0.036
A4	0.042	/	/	/	0.005
A5	0.074	/	/	/	0.008
B1	/	0.135	/	/	0.055
B2	/	0.135	/	/	0.055
B3	/	0.032	/	/	0.013
B4	/	0.264	/	/	0.107
B5	/	0.434	/	/	0.177
C1	/	/	0.144	/	0.010
C2	/	/	0.454	/	0.033
C3	/	/	0.042	/	0.003
C4	/	/	0.318	/	0.023
C5	/	/	0.042	/	0.003
D1	/	/	/	0.155	0.063
D2	/	/	/	0.231	0.094
D3	/	/	/	0.451	0.184
D4	/	/	/	0.104	0.042
D5	/	/	/	0.059	0.024

4. Conclusion

With the development of modern education, the performance budget management of vocational colleges has gradually attracted attention with the focus on the rational allocation of funds or the improvement of use efficiency. However, the current vocational colleges have various sources of funds with a new trend of information development. If the traditional comprehensive budget management model continues, it is difficult to ensure the effectiveness of the use of funds and improve the efficiency of budget management. Under the impact of information technology, the effective application of information technology is the key. Thus, we must pay attention to the emerging big data technology to introduce it into the budget performance evaluation of vocational schools. It improves the level of budget management of vocational schools through the reorganization of the comprehensive budget management process and the elimination of miscellaneous nodes. Then, budget management better serves the development of schools. Through multi-dimensional analysis and guidance, we proposed the budget performance evaluation system for the vocational colleges supported by big data technology and the comprehensive budget performance index method to explain the application principle and process of the budget performance evaluation system and promote the budget performance management of vocational colleges in depth.

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