

Research on Financial Performance of Colleges and Universities Based on the Perspective of Value Chain

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ABSTRACT. Value chain accounting is an extension of management accounting. It is accounting confirmation, measurement, recording and reporting of value-added information in accounting management. It effectively applies value chain accounting measurement methods to financial performance management of colleges and universities. From the perspective of examining the shortcomings of financial performance management, it helps colleges and universities to allocate resources more effectively, pay more attention to the coordination of value increase, more effectively improve the value management mechanism of colleges and universities, and ultimately improve the efficiency of the use of financial resources. By studying the application of value chain in high-efficiency financial performance, the paper analyzes its application feasibility and management methods, and analyzes the potential problems and corresponding measures put into use, and proposes new management ideas for efficient financial performance evaluation.

KEYWORDS: Financial performance, efficient financial performance management, value chain

1. Introduction

The internal and external environment of university management and management is accompanied by the rapid changes in the pace of reform and innovation. How to improve the financial performance of colleges and universities to realize value creation has become an important topic in the financial management of colleges and universities today. As the core of university management, financial performance evaluation has become the focus of university management activities. However, due to its limitations, traditional financial analysis cannot form a comprehensive assessment of business operations and faces serious challenges. Value chain accounting is a system to realize value appreciation. It can effectively control the various tasks of colleges and universities in real time around the whole process of university management and management, and realize comprehensive financial management in the space and time dimension. Applying the value chain

theory to the financial performance evaluation of colleges and universities can form a systematic financial evaluation system, make up for the shortcomings of traditional financial analysis, and seek the core competence of the enterprise in the value chain, thus providing guidance for the formulation and implementation of organizational strategy.

2. Domestic and foreign literature review

2.1 Value Chain Accounting

The introduction of "value chain accounting" originated from the value chain theory of Professor Michael Porter of the United States. Porter believes that "the value creation of an enterprise is formed by a series of mutually different but related economic activities, and its dynamic process is the value chain", while the value chain accounting is to confirm the accounting information in the process of value creation. Metering, recording and reporting to achieve efficient financial management objectives. China's research on value chain accounting originated from the famous accounting scientist Prof. Da Dawu, who defined value chain accounting as "an information system that coordinates and optimizes the value chain and realizes value-added, a feature characterized by real-time control. Management activities, a concept that refactors the traditional management accounting framework from both time and space dimensions [1]. From the perspective of time dimension, value chain accounting expands a single accounting object and extends it to the whole process of organization production and management. From the spatial dimension, value chain accounting subverts the original single currency measurement method and extends the accounting object to Everything that exists in the form of a value chain can quantify accounting information.

Corporate value activities are divided into basic activities and auxiliary activities. The basic activities include material creation and sales, after-sales service, etc. The auxiliary activities include infrastructure, human resources, finance, etc. These value activities and profits together constitute the total value. Through the analysis of the value chain, it can help enterprises determine the value and cost of each link in the value chain, and clarify and strengthen the competitive advantage of the enterprise.



Figure 1 Enterprise value chain composition

2.2 University financial performance

Financial performance management belongs to the scope of performance management. Its content and process mainly include performance planning, performance coaching, performance evaluation and performance feedback. It is actually a process that reflects what kind of results are achieved in a certain way in a certain period of time. At present, performance appraisal indicators at home and abroad have become the main means for government departments to formulate education policies, divide educational resources, and strengthen school management. Huang Ying et al. conducted research on the related issues of financial performance management in colleges and universities, and found that financial performance evaluation and activity cost accounting can directly reflect the use efficiency and economic benefits of school financial funds. The direct impact indicators include teaching level and scientific research results [2]. Career development achievements, financing ability, solvency, etc., but failed to analyze the structure of financial resources from the perspective of efficient and comprehensive benefits. In view of the research on the financial performance management system of colleges and universities, there is still a lack of a systematic consideration.

3. Analysis of the Advantages of University Financial Performance Based on the Perspective of Value Chain

3.1 Shifting the focus from cost savings to value creation

Different from the traditional financial analysis, the efficient financial performance research based on the value chain perspective does not focus too much on improving revenue and saving costs, but shifts the focus to value creation and separates the business activities that affect the university value chain. The cost is distributed to each independent activity to distinguish the value-added operation activities and the non-value-added operation activities in the university operations, and then discover the source of university value creation and the existing problems, and then guide the future development strategy of the university.

3.2 Analysis of university performance from a global perspective

The financial analysis method in the perspective of value chain is more suitable for the development needs of colleges and universities. It not only realizes the evaluation of financial indicators, but also can pay attention to the non-financial indicators that have an impact on the development of colleges and universities [3]. Value chain and balanced scorecard model, hierarchical management of financial indicators and non-financial indicators, analysis of different types of non-financial factors such as teaching level, scientific research ability, career development evaluation, etc., improve the comprehensive and systematic financial analysis of colleges and universities .

3.3 Improve the quality of financial performance information assessment

In general, financial analysis generally records the financial status of colleges and universities in the form of financial statements. In order to absorb financing, there is generally a tendency to beautify statements. However, the university financial system based on the value chain will take the "student and teacher value" as the core, take the teaching activities of colleges and universities as the starting point of research, and then carry out the revision of the strategic goals according to the teaching activities and future plans, and eliminate the behavior of data beautification from the source, and improve The authenticity of financial data and the quality of financial analysis information.

3.4 Multiple methods to complete the financial performance assessment

Under the traditional financial analysis, the accounting of colleges and universities is based on accounting subjects. The financial system under the value chain collects various incomes and expenditures by value chain activities. In this process, it combines DuPont analysis, EVA model, and balanced scorecard (BSC), value chain theory and other methods form a comprehensive and comprehensive evaluation system.

4. University financial value chain system and performance evaluation method

4.1 Construction of the value chain indicator system

Professor Michael Porter of the United States has added value-added activities and non-value-added activities to the value activities in the corporate value chain. Value-added activities are substantive activities of colleges and universities in operation, which can bring benefits to business operations. Non-value-added activities are not directly related to the teaching management of colleges and universities [4], but they are important supporting activities for teaching management. In order to effectively reflect the value creation process of colleges and universities, the "financial management value chain" of colleges and universities can be constructed from three dimensions: horizontal, vertical and internal.

The horizontal value chain is an efficient value creation. It is a basic value creation link, covering teaching, scientific research, admissions, employment, social services, logistics support, etc. It is also the most direct resource consumption motivation of colleges and universities. The vertical value chain is the relevance of colleges and universities, students, faculty, society, state management and other stakeholders. It is a non-value-added link of the value creation of colleges and universities, including the social reputation, financing ability, human resources management, and schools of colleges and universities. Scale, etc., is an indirect cause of resource consumption in colleges and universities. The internal value chain

covers the management system and the establishment and implementation of internal control, campus comprehensive management, resource planning, and financial quality control.

Table 1 Financial performance management indicator system based on value chain

Financial management	Value management dimension	Specific indicators	Description
Financial resource acquisition (A1)	Horizontal value chain, vertical value chain, internal value chain	Self-raised income growth (A11)	Measuring the ability of colleges to raise funds
		Self-raised income share (A12)	
		Self-raised income source (A13)	
		Self-raised income structure (A14)	
Financial resource allocation (A2)	Horizontal value chain	Subject level (A21)	Financial resources serve the main value creation links such as teaching and research
		Teacher level (A22)	
		Research funding (A23)	
		Scientific research results (A24)	
		Talent Cultivation (A25)	
		Quality of employment (A26)	
		Social services (A27)	
	Vertical value chain	Asset investment (A28)	Financial resources serve the interests of students, faculty, society and other stakeholders
		Hardware facilities (A29)	
		Software Facilities (A210)	
		School level (A211)	
		National reputation (A212)	
		Social reputation (A213)	
		Human Resources (A214)	
Internal value chain	Solvency (A215)	Financial resources serve the sustainable development of colleges and universities	
	Operational Capability (A216)		
	Development capacity (A217)		
Use of financial resources (A3)	Horizontal value chain, vertical value chain, internal value chain	Financial system and implementation (A31)	Measuring the rational use and implementation of financial resources of colleges and universities in all operations
		Financial Management Quality Control (A32)	
		Comprehensive Campus Management (A33)	
		Evaluation and Audit (A34)	

4.2 Empirical Analysis Method of Financial Performance Evaluation in Colleges and Universities

In order to properly quantify the performance level of colleges and universities from the perspective of value chain accounting, based on the evaluation ideas and related index systems constructed in the previous section, it is necessary to design a feasible approach suitable for university performance evaluation. In order to make a reasonable evaluation of the financial performance of colleges and universities from the perspective of value chain, we should firstly analyze the indicators of different attributes through fuzzy processing to ensure that quantitative indicators and qualitative indicators can be effectively placed in the same research [5]. The evaluation is carried out under the framework. Secondly, the input and output values of each dimension index should be blurred to calculate the comprehensive weight value needed for the integrated evaluation. Finally, the data unit needed for the performance evaluation of the university through appropriate technical methods is needed. Quantitative evaluation with indicator groups. In order to achieve the above research purposes, the author introduces fuzzy mathematics evaluation and BP neural network as the mathematical processing tool for the empirical analysis of financial performance evaluation in colleges and universities.

4.2.1 Introduction to Fuzzy Evaluation Method

According to the membership theory of fuzzy mathematics, qualitative evaluation is transformed into quantitative evaluation, that is, fuzzy mathematics is used to make an overall evaluation of things or objects subject to various factors. It has the characteristics of clear results and strong system, which can solve fuzzy and difficult to quantify problems, and is suitable for solving various non-deterministic problems. The method steps are as follows:

Determine the factor domain of the evaluation object, P evaluation indicators, $u = \{u_1, u_2, \dots, u_p\}$ determine the comment level domain, $v = \{v_1, v_2, \dots, v_p\}$ is the level set; from the single factor, the membership degree of the evaluated item to the level fuzzy subset (R/u_i) , and then obtain the fuzzy relationship matrix,

$$R = \begin{Bmatrix} R/u_1 \\ R/u_2 \\ \dots \\ R/u_p \end{Bmatrix} = \begin{Bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{p1} & r_{p2} & \dots & r_{pm} \end{Bmatrix} \text{ in the fuzzy comprehensive evaluation,}$$

determine the weight vector of the evaluation factor: $A = \{a_1, a_2, \dots, a_p\}$. The element a_i in the weight vector A is essentially the degree of membership of the factor u_i to the important element of the fuzzy object. The appropriate operator is

used to synthesize A and R of each evaluated object to obtain a fuzzy comprehensive evaluation result vector B of each evaluated object. which is:

$$A \cdot R = \{a_1, a_2, \dots, a_p\} \begin{Bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ \dots & \dots & \dots & \dots \\ r_{p1} & r_{p2} & \dots & r_{pm} \end{Bmatrix} = \{b_1, b_2, \dots, b_m\} = B \quad (1)$$

Where b_j is computed from the j th column of A and R, which indicates the degree of membership of the v_j level fuzzy subset as a whole.

4.2.2 Neural Network Analysis

BP neural network is short for error back propagation neural network. It consists of an input layer, one or more hidden layers and an output layer, each composed of a certain number of neurons. These neurons are as interconnected as human nerve cells. The structure of the BP neural network analysis model is shown in Figure 2 [6]. The main advantage of BP neural network is its strong nonlinear mapping ability. In theory, for a BP network of three or more layers, as long as the number of hidden layer neurons is sufficient, the network can approximate a nonlinear function with arbitrary precision. Second, the BP neural network has the ability to associate external stimulus and input information. This is because it uses distributed parallel information processing methods, and the information must be extracted in a way that can be used to mobilize all relevant neurons. Again, the BP neural network has strong ability to identify and classify external input samples. Because of its powerful nonlinear processing capability, it can perform nonlinear classification well and solve the nonlinear classification problem in the history of neural network development. Therefore, BP neural network is essentially a nonlinear optimization problem, which can find a set of parameter combinations under known constraints, so that the objective function determined by the combination is minimized.

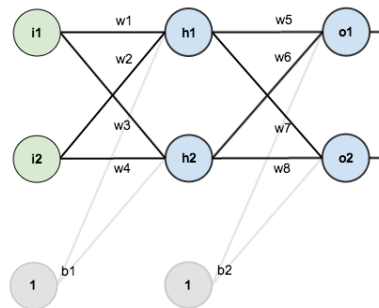


Figure 2 Principle of neural network

5. Empirical research

5.1 Selection of sample data

At present, the operating environment and business scope of different universities are very different. At the same time, we also lack some necessary industry standards and convinced experience values. All of these add some difficulty to our selection of sample data. This paper mainly verifies the feasibility and accuracy of the evaluation method. For the sake of simple explanation, we searched and collected a total of 20 sets of sample data, of which 10 samples were taken as training data. Ten groups of samples were taken as test data to train the network model [7].

5.2 Model verification

The BP neural network constructed by the financial indicators of this paper is a three-layer network structure, in which the number of neurons in the input layer is 21, the number of neurons in the output layer is 1 (the output is the financial status of colleges and universities), and the number of neurons in the hidden layer is determined according to Cole. The Mogolov theorem, combined with the verification-by-verification method, finally determined the number of hidden layer neurons to be 21. At this time, the BP neural network has the smallest training error and the training time is the shortest. The training error curve is shown in Figure 3.

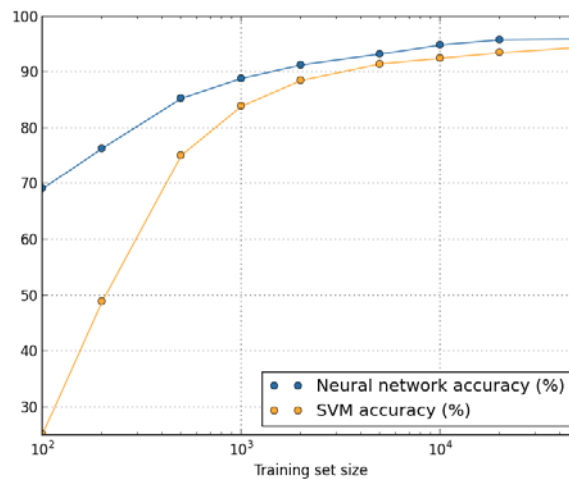


Figure 3 Training error map of BP neural network

After the completion of the fuzzy neural network training, the test samples are input into the trained fuzzy neural network to evaluate the performance of the

university. The expected output of the test results and the actual output of the network are shown in Figure 4. The average error is 0.0020. From Fig. 4, we can find that the fuzzy neural network model constructed in this paper can better accomplish the performance evaluation of colleges and universities, and the error between the network prediction output and the expected output is small. And from these 20 sets of test samples, we also found that the degree of university performance using the network evaluation is consistent with the actual degree reached 90%. Furthermore, it is verified that the fuzzy neural network is feasible in the field of university performance evaluation and has a high evaluation accuracy.

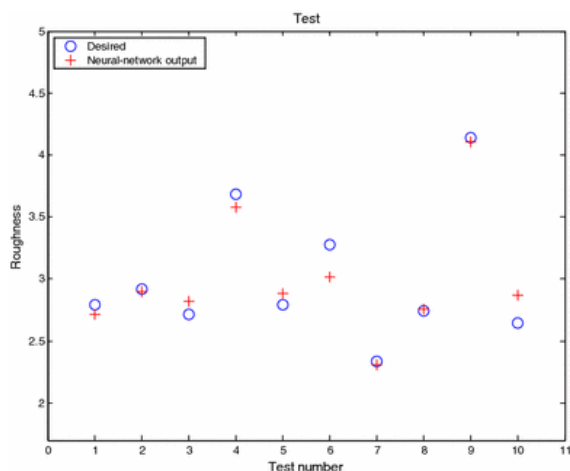


Figure 4 Actual output and expected output of the model

6. Conclusion

Value chain accounting is a new model, and it is not used for a long time. It is also used in the financial management of colleges and universities. However, the application of this method in the financial management of colleges and universities can indeed solve some of the shortcomings of the existing government perspective performance management. It is extremely beneficial to the resource allocation of universities and the coordination of value growth. It can play a good role and produce positive and far-reaching effects. The impact of it can not only improve the value management mechanism of colleges and universities, but also improve the efficiency of the use of financial resources, and maximize the value. On the basis of extensive research, colleges and universities should conduct value chain management for the whole school and explore measures to realize the application of accounting value in colleges and universities to promote the improvement of financial management level in colleges and universities.

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