Funding for the Construction of "Double First-Class" Universities in China Research on Core Performance Objectives and Indicator Setting

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Research Article

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Abstract

The performance evaluation of "double first-class" construction funds of colleges and universities in China reflects not only the necessary requirement of implementing comprehensive budget performance management, but also the realistic demand of colleges and universities to achieve their development goals. Performance objectives and indicator setting are the core and key to the full implementation of budget performance management. The framework of the core performance objectives and index system of the "double first-class" construction projects will be constructed in this study from the characteristics of the "double first-class" construction projects of Chinese universities. To realize this purpose, various performance evaluation tools such as Balanced Scorecard (BSC), Key Performance Indicators (KPI), etc. will be applied. Furthermore, we will take the process of formulating the performance indicators for the "double first-class" construction funds of university B as an example to verify the scientificity and operability of the constructed performance evaluation index system framework.

I. Background And Significance Of The Study

In 2015, the State Council of China issued the General Plan for Coordinating the Construction of World First-Class Universities and First-Class Disciplines, with the overall goal of promoting a large number of high-level universities and disciplines to be among or at the forefront of the world class. As an important national strategy in the field of higher education in China, the construction of "double first-class" has been emphasized in various documents as "formulating scientific and reasonable performance evaluation methods, carrying out mid-term and final evaluations, and making dynamic adjustments" and "insisting on performance-based evaluation". Therefore, the performance evaluation of "double first-class" university construction funds serves not only to implement the comprehensive implementation of budget performance management, but also to provide a basis for decision-making, optimize resource allocation and achieve the development goals of universities.

Performance target is the foundation and starting point of performance management. The fundamental purpose of budget performance management in government involves not only management of the government budget, but also a commitment to reaching policy goals and the budget performance goals that articulate those goals. The funds for "double first-class" construction projects are special funds invested to guide universities to accelerate the construction of world first-class universities and first-class disciplines as well as the development of characteristics, improve the quality of school operation and innovation ability. (In this study, this is generally referred to as "double-class" construction funding). The construction of a set of scientific and standardized core performance objectives and indicator system for project expenditures directly affects the quality and effectiveness of performance self-assessment and even overall performance management. At present, Chinese domestic universities have accumulated some practical achievements in the performance evaluation of "double first-class" construction funds. However, there is no consensus on some basic issues, such as "common model for setting performance objectives and indicators", "how to balance commonality and individuality in indicator setting", "who to evaluate, what to evaluate and how to evaluate" etc. The clarification of these issues is related to whether
we can promote the real quality and efficiency of performance management. It is also a major issue of general concern to the government, society and academia.

Therefore, this study will focus on the characteristics of the performance evaluation of "double first-class" construction projects in universities, and use various performance evaluation tools such as Balanced Scorecard (BSC) and Key Performance Indicator (KPI) to construct the framework of "double first-class" construction project expenditure The framework of performance objectives and index system of "double first-class" construction projects. In addition, we analyze the process of formulating performance indicators for the "double first-class" construction funds of Chinese B universities as an example to verify the applicability and reasonableness of the constructed performance indicator system.

II. Literature Review

The project expenditure performance indicator system is the core content of the performance evaluation technology system, including indicators, weights and grading standards. Its construction is generally seen as an important process of political games. The interest orientation of relevant subjects is often reflected in the indicator system. At the same time, there also exists a conflict between the unity and difference of the evaluation system. Because of this, “the government performance evaluation indicator system is regarded as a great problem of the world” [1]. At present, there is no systematic theory in this field, but the existing public goods theory, public sector performance evaluation theory and relevant practices at home and abroad can be used for reference to provide research ideas and directions.

1. Theoretical Basis

The theory of public goods is the basic theory of new political economics. Adam Smith (1776) first proposed the necessity for the government to provide public goods. Samuelson (1954) defined the core characteristics of public goods as non exclusivity and non competitiveness. Brown and Jackson (1978) gave the further definition that pure public goods have two core characteristics and quasi public goods just have only one of the two. “Financial projects of universities” are supported by the government finance, which makes its public goods have obvious characteristics. Therefore, this theory is naturally applicable. The theory of public sector performance evaluation mainly includes two aspects. The first is the principal-agent theory, which was proposed by Ross and others in the 1970s. Public projects is complex in such relationship and involves different types of stakeholders, and they will influence the performance level of project funds; The other main theory is the theory of public sector performance evaluation, which holds the believe that the basis for designing the indicator system is to sort out the relationship between various activities in public projects, so as to find the key factors affecting performance.

In view of the above, when constructing the expenditure performance indicator system of the “Double First-Class” project in universities, we can sort out and judge the key activities of different stakeholders to find the core indicators that truly reflect the project performance level.
2. Construction practice of performance indicator system

The government performance evaluation system in western countries has gradually matured since the 1970s, exploring the formation of a model framework for some specific projects. In the 1990s, the U.S. Government Accounting Standards Board proposed four types of indicators, including input, output, consequence, efficiency and cost-effectiveness, which are applied to the indicator system of government service performance evaluation. At the beginning of this century, American government designed “universal evaluation indicators” for seven types of projects according to the basic goal of “results-oriented government”. It is thus clear that establishing a universal indicator model is the technical experience of financial project performance evaluation in developed countries [2].

Since 2011, the Ministry of Finance of China has issued the Guidance Opinions on Promoting Budget Performance Management and the Interim Measures for the Management of Financial Expenditure Performance Evaluation, which divide indicators into two categories: common and individual; The Common Indicator System Framework of Budget Performance Evaluation released in 2013 systematically designed the indicator system framework; In 2015, the Measures for the Management of Budget Performance Objectives of Central Departments further strengthened the performance objective management of financial funds in combination with the actual development; In 2017, the Ministry of Finance and the Ministry of Education jointly issued the National University Construction of World-Class Universities (disciplines) and Special Funds for Guiding the Development of Special Features, which defined how colleges and universities carry out performance evaluation of relevant special funds in terms of policies. Take the importance of performance objectives into consideration, the Ministry of Finance has successively issued a series of supporting policies and regulations since 2018, such as the Interim Measures for the Monitoring and Management of Central Departments’ Budget Performance Operation, the Measures for the Management of Project Expenditure Performance Evaluation, the Guidelines for the Setting and Value of Central Departments’ Project Expenditure Core Performance Objectives and Indicators (for Trial Implementation) (hereinafter referred to as the Guidelines), which have standardized the types and setting requirements of performance indicators and clearly include costs, outputs There are four types of first level indicators, such as efficiency and satisfaction. The document emphasizes the requirements for cost control.

As the system in terms of budget performance evaluation continues to improve at the national level, the indicator system of financial performance evaluation has been optimized, including promoting the allocation of financial resources and strengthening cost-benefit analysis in the budget preparation process. However, there are still obvious problems in the existing indicator system, such as blurring relevant responsibility subjects, or shifting responsibilities down, failing to distinguish the differences between the regulatory and use performance, leading to the lack of pertinence of the indicator system. Some indicators have the problem of vague connotation.

3. Performance evaluation methods for university financial projects
Higher education financial projects are mainly invested by the government. The complexity of their performance evaluation in practice comes from the fact that there are not only economic benefits that can be measured, but also outputs, benefits and positive or negative externalities that cannot be specifically measured. The evaluation methods commonly used at home and abroad are Balanced Scorecard (hereinafter referred to as BSC), Key Performance Indicator (hereinafter referred to as KPI), Analytic Hierarchy Process (APH) and Efficacy Coefficient Method. In the above methods, BSC and KPI are used more frequently.

The BSC method is designed to reflect the achievement of performance objectives of the evaluated target, and decomposes performance management objectives in four dimensions: financial, customer, internal operation, learning and growth. As an important indicator system based on key factors, the KPI method reflects the degree of goal achievement with behavioral criteria or quantifiable data. Domestically, Yang Mei et al. tried to combine both BSC and KPI methods in the process of designing performance evaluation indicators suitable for the characteristics of university funds [3]. Peng Qiu-lian et al. discussed the path of constructing a performance evaluation mechanism for university budgets, and also adopted a comprehensive BSC and KPI approach, and then established a performance evaluation indicator system covering basic and project expenditures [4]. Li Ru et al. combined two performance evaluation methods, BSC and KPI, to establish an effective performance evaluation system for the characteristics of “double first-class guidance special” [5], and similar research was also conducted by Zhang Juanjuan et al [6].

Based on the construction of special funds in some universities obtained from field research, Wu Gaobo et al. constructed a performance evaluation indicator system by BSC method and proposed suggestions and countermeasures for the performance evaluation of special funds in universities [7].

The combination of Balanced Scorecard (BSC) theory and Key Performance Indicators (KPI) can not only overcome the shortcomings of the BSC method, but also resolve the deficiencies of the KPI indicators which are one-sided and have no logical correlation. The two approaches complement each other to achieve the combination of points, focus and practicality, so that the evaluation results can accurately reflect the real performance of financial project expenditures of universities.

### III. Framework Of Core Performance Objectives And Indicator

PDCA cycle was first proposed by Walter A. Shewhart who is an American quality management expert. The four letters respectively stand for plan, implementation, inspection and correction. Scholars learned from this cycle and formed the classic PDCA cycle theory of performance management: performance objectives, performance implementation, performance evaluation and performance feedback. In this cycle, performance objectives are the logical starting point of performance management, performance implementation and performance evaluation are two processes of the management, and performance feedback and optimization are the ultimate aim [8]. It is fair to say that performance management is a multi-dimensional dynamic evaluation system in the whole process, in which the setting of performance objectives and indicators is the core issue of the management and the technical tool to achieve the
evaluation purpose. The study will focus on the application of BSC and KPI methods in the process of building performance objectives and indicator systems. The specific process is as follows:

1. Clarify the overall policy objectives of the project. According to the project characteristics, medium and long-term work planning, project implementation plan, etc., the study will clarify the overall performance objectives of the project: total tasks, total outputs, total benefits, etc.

2. Use the balanced scorecard method to decompose the overall performance objectives into multiple sub-objectives, and divide them into four levels of core objectives: financial efficiency, customer effectiveness, internal management process, and learning and growth effects, and the four levels basically correspond to the first-level indicators of the Guidelines formulated by the Ministry of Finance.

3. Decompose the four first-level indicators around the overall project performance objectives and work tasks into second-level core indicators at each level with KPI methods, and refine the task list. According to the importance of the impact on project performance, design their correspondence and weights.

4. Set indicator values and assign points to indicators. After the performance indicators are selected, the indicator values are set scientifically. In order to give full play to the guiding and controlling role of performance targets, the indicators are set as strictly and highly as possible. If it is difficult to quantify the value of indicators, use measurable qualitative expressions, and use similar good, average, poor and other analytical ratings.

Finally, the performance evaluation results of the overall project are derived by synthesizing the performance of the indicators, and targeted management suggestions are made based on the results and the problems reflected.

Iv. Preparation Of Core Performance Indicators For "double First-class" Construction Funds Of University B

Based on the basic idea of constructing the index system of universities, the objectives of "double first-class" construction and the requirements of using funds, we adopt various performance evaluation tools such as Balanced Scorecard (BSC) and Key Performance Indicator (KPI) to verify the scientific and operability of the index design scheme by taking the process of compiling the specific performance indicators of "double first-class" construction funds of Chinese B universities as an example.

(1) Clarify the overall performance objectives of the "double first-class" construction project

The "double first-class" construction funds are special funds established to guide universities to accelerate the creation of world first-class universities and first-class disciplines, including five major categories: cultivation of top innovative talents, faculty construction, improvement of independent innovation and social service capacity, cultural heritage and innovation, international cooperation and
exchange. According to the characteristics of the project, medium and long-term work plan and project implementation plan, the overall performance targets determined by university B are shown in Table 1.

### Table 1

<table>
<thead>
<tr>
<th>Overall Performance Objectives</th>
<th>Objective 1: Optimize the structure of majors, strengthen the cross-fertilization among majors, reform the teaching mode, and consolidate the central position of talent cultivation in the work of the university.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Objective 2: Form a high-level discipline echelon and teaching and research team with orderly flow, reasonable structure and international competitiveness.</td>
</tr>
<tr>
<td></td>
<td>Objective 3: Build an international platform for talent cultivation, focus on supporting the cultivation of excellence in undergraduate and graduate students.</td>
</tr>
<tr>
<td></td>
<td>Objective 4: Strengthen basic and cross-sectional research, and comprehensively enhance the original innovation capability of the university.</td>
</tr>
<tr>
<td></td>
<td>Objective 5: Strengthen the brand building of the university and give full play to the role of multi-channel communication such as the university's integrated media matrix.</td>
</tr>
<tr>
<td></td>
<td>Objective 6: Implement global development strategies and build a global cooperation network system.</td>
</tr>
</tbody>
</table>

(2) Determination of hierarchical performance indicators for "double first-class" construction funds with BSC

According to the characteristics of the project, the four levels correspond to the first-level indicators in the guidelines issued by the Ministry of Finance in 2021 are: the financial efficiency level corresponds to cost indicators, the internal management process level corresponds to output indicators, the learning and growth effect level corresponds to effectiveness indicators, and the customer benefit level corresponds to satisfaction indicators. According to the requirements of the guidelines and the degree of impact of the first-level indicators at each level on project performance, their weights are set as follows: 20% for cost indicators, 40% for output indicators, 20% for effectiveness indicators, and 10% for satisfaction indicators. Budget execution rate indicators are not set for the time being when preparing the budget, but are used when the department carries out self-assessment, and their weight scores are 10%. Table 2 shows the level 1 indicators and weights of the BSC level.
Table 2  
BSC level indicators and weights

<table>
<thead>
<tr>
<th>No.</th>
<th>BSC Dimension</th>
<th>Corresponding Level 1 Indicators</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Financial efficiency</td>
<td>Cost indicators</td>
<td>20%</td>
</tr>
<tr>
<td>2</td>
<td>Internal management process</td>
<td>Output indicators</td>
<td>40%</td>
</tr>
<tr>
<td>3</td>
<td>Learning and growth effect</td>
<td>Efficiency indicators</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>Customer effectiveness</td>
<td>Satisfaction indicators</td>
<td>10%</td>
</tr>
</tbody>
</table>

(3) “Double first-class" construction funding key performance indicators

The KPI method is adopted to decompose the first-level indicators of “double first-class" construction funds into several second-level core indicators. They are further divided into third-level indicators to reasonably solve the problem of differentiation of evaluation objects.

1. Finance and accounting level. This level focuses on the cost of public goods or services expected to be provided by the "double first-class" construction projects, and strengthens cost management and cost control through the analysis of project cost effectiveness. The corresponding first-level cost indicators are further refined into three types of second-level core indicators, including economic, social and ecological environment, which represent the direct economic cost, the negative impact on social development and the negative impact on ecological environment respectively.

2. Internal management process level. This level primarily evaluates the expected outputs produced by the university-run projects. At the level of internal business process, three second-level core indicators are set up, which are quantitative indicators, quality indicators and timeliness indicators. In order to reflect the characteristics of the "double first-class" construction of university B, some third-level indicators are established under the second-level core indicators, as shown in Table 3.
Table 3
The core indicators of the decomposition of the financial output indicators of the "double first-class" construction of University B at the second (third) level

<table>
<thead>
<tr>
<th>First-level Indicators</th>
<th>Second-level Indicators</th>
<th>Third-level indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Indicators</td>
<td>Quantitative Indicators</td>
<td>Number of first-class majors and courses at or above university level</td>
</tr>
<tr>
<td>Quantitative Indicators</td>
<td>Number of high-level talents introduced</td>
<td></td>
</tr>
<tr>
<td>Quality Indicators</td>
<td>Formation of high-level teaching achievements and teams</td>
<td></td>
</tr>
<tr>
<td>Economic Indicators</td>
<td>Number of academic activities and conferences supported</td>
<td></td>
</tr>
<tr>
<td>Quality Indicators</td>
<td>Number of students involved in promoting excellent culture</td>
<td></td>
</tr>
<tr>
<td>Education Indicators</td>
<td>Number of students studying overseas</td>
<td></td>
</tr>
<tr>
<td>Representative papers</td>
<td>Representative papers published in important journals</td>
<td></td>
</tr>
<tr>
<td>New major landmark</td>
<td>Timely completion rate of projects</td>
<td></td>
</tr>
<tr>
<td>awards in science and</td>
<td></td>
<td></td>
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<tr>
<td>technology</td>
<td></td>
<td></td>
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</tbody>
</table>

3. Learning and growth level. Learning and growth are crucial factors for universities to improve their comprehensive competitiveness and sustain their internal high-quality development. This level mainly reflects the expected effects formed continuously in the current year and several years after the implementation of the project. The second-level core indicators considered at this level mainly include economic benefit indicators, social benefit indicators and ecological benefit indicators. Similarly, some third-level indicators are set under the second-level core indicators to reflect the characteristics of the "double first-class" construction of university B, as shown in Table 4.
Table 4  
Decomposition of second-level (third-level) core indicators of financial efficiency indicators of "double first-class" construction of university B

<table>
<thead>
<tr>
<th>First-level Indicators</th>
<th>Second-level Indicators</th>
<th>Third-level Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefit Indicators</td>
<td>Economic Benefit Indicators</td>
<td>Guide and encourage the community to invest more funds</td>
</tr>
<tr>
<td>Social Benefit Indicators</td>
<td>Promote the popularization of science and undertake social public service functions</td>
<td></td>
</tr>
<tr>
<td>Social Benefit Indicators</td>
<td>Expand the openness of school education to the outside world and enhance the global influence of the school</td>
<td></td>
</tr>
<tr>
<td>Social Benefit Indicators</td>
<td>Number of scientific and technological achievements transformed</td>
<td></td>
</tr>
<tr>
<td>Ecological Benefit Indicators</td>
<td>Promote the green ecological concept in the co-construction unit and surrounding communities</td>
<td></td>
</tr>
</tbody>
</table>

4. Customer-level indicators. Students, teachers and society are the service targets or beneficiaries of project implementation. The degree of their satisfaction with the output and effect of the project is a direct feedback to measure whether the university is fulfilling its responsibilities. Three core second-level indicators can be set at this level, which are student satisfaction, faculty satisfaction, and community satisfaction.

(4) Setting of indicator values and indicator assignment scores

After setting the core indicators for "double first-class" construction funds, the scientific setting of indicator values can refer to the plan standards, industry standards, standards approved by the higher authorities or historical data, etc. The ways of taking values include direct proof method, statistical method, situation description method, questionnaire survey method and trend judgment method. The performance indicators can be assigned according to the actual situation of the project by direct assignment of points, according to the completion ratio of points and the evaluation level of points, satisfaction points, etc.

After the above evaluation indicator system is constructed, the performance evaluation results of the overall project can be obtained by integrating the actual implementation of the "double first-class" construction funding indicators.

V. Summary

In this study, two performance indicator construction methods, namely balanced scorecard and key performance indicator method, are deeply embedded in the indicator setting specification of the
guidelines. In addition, a multi-level indicator structure is adopted to build non-overlapping first-level indicators and decompose them into several second-level indicators reflecting the concept of key indicator evaluation. The objective is to build a performance evaluation system framework that meets the characteristics of "double first-class" construction projects of universities. Finally, the scienticity and operability of the indicator design scheme are verified by taking the specific preparation process of "double first-class" construction fund performance indicator of university B as an example. This study is expected to contribute to the further improvement of the quality and efficiency of the budget performance management of "double first-class" construction projects in universities.

Declaration

Competing interests: The authors declare no competing interests.

References