

Research on Performance Evaluation of Special Funds for Higher Education: A Case Study of Special Financial Fund for “Chong Bu Qiang” Development Plan

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Abstract: Special fund for education is the special financial fund allocated by governments to educational institutions in the form of appropriation. In order to ensure the supply of education resources, support financially the development of education and deepen the reform of education system, it has been an urgent issue for local governments to increase their special financial funds step by step, study the index system of performance evaluation on special funds for education and scientifically evaluate the performance of special funds for education. This paper aimed to strengthen the development plan of higher education institutions by taking Guangdong government’s special financial fund for the development plan of “Chong Bu Qiang, i.e. constructing first-class, making up for shortcomings, and enhancing characteristics”. The plan was reinforced with reference to the connotation of “constructing first-class, making up for shortcomings, and enhancing characteristics” in colleges and universities. The scientific selection of performance evaluation indexes of special funds for education and the progressive assignment of values were carried out using the Delphi method and analytic hierarchy process. Additionally, a measurement index system for the performance of the special financial funds for “constructing first-class, making up for shortcomings, and enhancing characteristics” was constructed. The purpose of all these efforts was to provide empirical reference for the performance evaluation research on special financial funds and strategic suggestions for the accurate and effective performance evaluation of special financial funds for higher education.

1. Introduction

Special fund for education is an important part of government expenditure on public finance and a policy instrument used by governments for public finance to help special education tasks or fund education projects. The performance level of the special education funds directly affects the effectiveness of fiscal policy instruments and restricts the realization of the education tasks planned by governments. Therefore, with scientific selection of indexes to construct measurement indexes and an objective performance evaluation on the special funds for education, it can ensure optimal

allocation of governments' special funds for education and urge subsidized colleges and universities to improve their efficiency and effectiveness of the special financial funds. Now At present, the governments at all levels are increasing their special funds for education, the subsidized colleges and universities have a relatively large control power to allocate funds and a relatively high efficiency in fund using, while some hidden dangers exist in fund supervision and management[1]. The performance evaluation of special financial funds is usually carried out by colleges and universities themselves, that is, colleges and universities make comparison and gap analysis based on the performance targets they have realized and the performance targets set by financial departments for special education fund [2]. In addition, self-evaluation indexes for the performance of special education fund have not yet come to a unified definition and the system has not been sound, lacking a relatively complete evaluation system and evaluation index system for the performance management of colleges and universities [3]. On this basis, taking Guangdong Province's special financial funds for the plan of "constructing first-class, making up for shortcomings, and enhancing characteristics" as an example, this paper constructs a measurement index system for multi-subject evaluation of the performance of special funds for higher education and improves the tools and methods for the performance evaluation of the special education fund, so as to improve the efficiency and effectiveness of colleges and universities in managing and using governments' special financial funds.

2. Theoretical Framework of Performance Evaluation of Special Funds for Education

It is widely believed in domestic academic circles that special fund for education is the special financial fund allocated by governments to educational institutions in the form of appropriation and is mainly used to safeguard the supply of education resources, support financially the development of education and deepen the reform of education system. The performance of the special fund for education consists of three parts: education fund using process, using results and education fund supervision. Fund using results are the core of performance evaluation of the special education fund [4]. The performance evaluation of the special education fund may be made with quantitative index system and the results of the funds, such as input-output, resource allocation, project implementation and target realization, can be directly reflected in the form of data [5]. Some scholars also question the quantitative evaluation method of the performance of special fund for education. The special fund for education is mostly for the planning and development of specific educational undertakings, and the operation cycle is generally long. The use of quantitative indicators to evaluate special funds for education in a short period of time may lack the horizontal comparison with similar financial funds [6]. Based on "New Public Management Theory" and "Stakeholder Theory", this paper attempts to create a performance evaluation measure for the special fund for higher education, and make a quantitative index evaluation for the special fund for "constructing first-class, making up for shortcomings, and enhancing characteristics".

2.1. New Public Management Theory

In accordance with new public management theory, there is a relationship of entrustment and fiduciary responsibility between the government and the user of public resources. The ownership of public resources belongs to the government, and the management right belongs to the user of public resources. Resource user must be responsible to the resource owner, namely the government, in allocating and controlling resources [7]. The view "agency by agreement" in the new public management theory decides that the colleges and universities using special funds shall scientifically manage, allocate and use the fund by referring to the performance targets set by functional government departments for the special fund for education, and shall actively cooperate with the

government or a third party in audit supervision and performance assessment, in order to strengthen the efficiency of the use of funds, improve the effectiveness of the use of funds [8]. Therefore, the indexes of performance evaluation of the special financial fund for “constructing first-class, making up for shortcomings, and enhancing characteristics” shall be selected and screened based on the performance targets specified by the government in the enhancing program for the plan of “constructing first-class, making up for shortcomings, and enhancing characteristics”, so as to ensure that the performance evaluation of the special fund for “constructing first-class, making up for shortcomings, and enhancing characteristics” is consistent with the intention of the government to use public financial resources to stimulate the solid development of colleges and universities.

2.2. Stakeholder Theory

“Stakeholder theory” holds that the groups and individuals that influence the realization of targets in enterprise management process are the stakeholders and advocates classified treatment and joint governance of the stakeholders, so as to ensure the realization of management target [9]. The stakeholders in the management of special education fund mainly include government finance departments, administrative departments of colleges and universities, fund administrators, teachers, students and other social interests. As a result, in the performance evaluation of the special education fund, the stakeholders shall be included in the performance evaluation system and the performance evaluation shall be dominated by the government and jointly managed by the stakeholders. For this purpose, in addition to government departments and university departments, the subject of the performance evaluation of the special funds for “constructing first-class, making up for shortcomings, and enhancing characteristics” shall include three subjects, teachers, students and social institutions. The performance evaluation index shall not only focus on the interests of the government and the colleges and universities, but also conform to the interests of teachers, students and social institutions.

3. Index System for Performance Evaluation of Special Financial Fund for “Constructing First-class, Making Up for Shortcomings, and Enhancing Characteristics”

3.1. Index Screening

In July 2021, the Guangdong Provincial Government promulgated *Implementation Scheme of Higher Education Improvement Plan for “Constructing First-class, Making Up for Shortcomings, and Enhancing Characteristics” (2021-2025)* (referred to as “CME” Plan), and formulated three plans for connotative development of higher education in Guangdong Province, namely, the construction plan of high-level universities for “constructing first-class”, the plan of revitalizing colleges and universities in East, West and North Guangdong for “making up for shortcomings”, and the plan of characteristic university enhancing for “enhancing characteristics”. By 2021, 36 colleges and universities in Guangdong Province had received the special financial fund for “constructing first-class, making up for shortcomings, and enhancing characteristics”. Firstly, by referring to the performance targets established by Guangdong finance department for the improvement plan of “constructing first-class, making up for shortcomings, and enhancing characteristics”, the experts of government performance evaluation center were invited to select the performance evaluation indexes of the management and application of the funds for “constructing first-class, making up for shortcomings, and enhancing characteristics” in 37 colleges and universities, with Delphi method. In index selection, the experts referred to the 3E principles of performance audit, “economy, efficiency and effectiveness”, namely, economic index measured cost input and quality output, efficiency index evaluated the optimal allocation of resources and effectiveness index evaluated the realization degree of the preset targets [10]. After the experts selected indexes, the stakeholders involved in the special

funds for “constructing first-class, making up for shortcomings, and enhancing characteristics” were included into the evaluation index, to ensure that the preset performance evaluation indexes were consistent with the expected target of the government for setting up a special financial fund for education and the performance evaluation target were the same as the interests of educational institutions and social institutions. After selecting the performance indexes, the performance evaluation index system of the special fund for “constructing first-class, making up for shortcomings, and enhancing characteristics” was subdivided into target layer, criterion layer and index layer with analytic hierarchy process: the target layer consists of the economic target and effectiveness target of the performance evaluation of the special fund for “constructing first-class, making up for shortcomings, and enhancing characteristics”; the criterion layer consists of four dimensions: financial benefit, academic benefit, social benefit and school satisfaction. See Table 1 for each index at the criterion layer.

3.2. Index Assignment

In this paper, the analytic hierarchy process (AHP) is used to make matrix weighting and sorting analysis on each dimension and index of “target layer (level-1 index) - criterion layer (level-2 index) - index layer (level-3 index)” in the performance evaluation of the special education funds for “constructing first-class, making up for shortcomings, and enhancing characteristics”, specifically in three steps: (1) Setting pairwise judgment matrix of indexes; (2) index weighting and ranking; (3) consistency check.

3.2.1. Setting Pairwise Judgment Matrix of Indexes

Issue performance evaluation indexes of the special funds for “constructing first-class, making up for shortcomings, and enhancing characteristics” to experts of performance evaluation and higher education research with Delphi method in the form of questionnaire survey, invite the experts to judge the importance of any two indicators at the three layers with 1-9 scaling method, and thus obtain the comparison matrix of the indexes at the three layers. Importance scaling description of each matrix on a scale of 1-9 is as shown in Table 2.

3.2.2. Index Weighting and Ranking

After setting importance judgment matrix of indexes, get the largest characteristic root CI (λ_{max}) of each matrix with Matlab software and thus make weight calculation of evaluation indexes at criterion layer and index layer, tabular (Table 3 and Table 4) descriptions are as in Tables.

3.2.3. Consistency Check

Calculate the largest characteristic root CI (λ_{max}) of each matrix with Matlab software, get the weight of each index relative to the upper layer, and then make a consistency check, if it fails, readjust and rebuild the matrix. When the index (CR) of the consistency check is less than 0.1, the matrix passes the check and each index weight in the matrix is established [11]. The formula for calculating the consistency check indexes is $CR=CI/RI$, CI is the largest characteristic root (λ_{max}) and RI can be obtained by looking up CI value in the table. Matlab-based consistency check shows that all index matrices in the performance evaluation of the special fund for “constructing first-class, making up for shortcomings, and enhancing characteristics” pass the check, and the calculation results are detailed in Table 5.

Table 1: Performance indexes of target layer, criterion layer and index layer

Target layer	Criterion layer	Index layer (construction plan of high-level universities)
Economic target	Financial benefit	Fund availability rate: Amount of the special education funds available for the selected universities for “constructing first-class, making up for shortcomings, and enhancing characteristics” in 2021-2022/Budget for the special education fund for “constructing first-class, making up for shortcomings, and enhancing characteristics”*100% Fund utilization rate: Expenditures of the selected universities for “constructing first-class, making up for shortcomings, and enhancing characteristics” in 2021-2022/The special education fund available for “constructing first-class, making up for shortcomings, and enhancing characteristics”*100%
Effect target	Academic benefit	Number of the universities selected in the “Double First-Class” Initiative Number of national scientific research awards Number of national first-class undergraduate programs Number of national first-class courses
	Social benefit	Number of employed graduates with bachelor, master and doctoral degrees/Number of graduates with bachelor, master and doctoral degree*100% Ranking of the schools selected at home and abroad Number of professional certifications obtained from domestic or international authoritative organizations
	School satisfaction	Teacher satisfaction: Teachers’ satisfaction with teaching and research management Student satisfaction: Students’ satisfaction with teaching quality Social satisfaction: Employers’ satisfaction with graduates
Target layer	Criterion layer	Index layer (plan of revitalizing colleges and universities in East, West and North Guangdong)
Economic target	Financial benefit	Fund availability rate: Amount of the special education funds available for the selected universities for “constructing first-class, making up for shortcomings, and enhancing characteristics” in 2021-2022/Budget for the special education fund for “constructing first-class, making up for shortcomings, and enhancing characteristics”*100% Fund utilization rate: Expenditures of the selected universities for “constructing first-class, making up for shortcomings, and enhancing characteristics” in 2021-2022/The special education fund available for “constructing first-class, making up for shortcomings, and enhancing characteristics”*100%
Effect target	Academic benefit	Number of universities for granting master degree Number of first-class undergraduate schools above provincial level Number of first-class courses above provincial level Number of provincial and ministerial research platforms
	Social benefit	Number of employed graduates with a bachelor and master degree/Number of graduates with a bachelor and master degree*100% Domestic ranking of universities Number of domestic professional certifications obtained
	School satisfaction	Teacher satisfaction: Teachers’ satisfaction with teaching and research management Student satisfaction: Students’ satisfaction with teaching quality Social satisfaction: Employers’ satisfaction with graduates
Target layer	Criterion layer	Index layer (characteristic university enhancing)
Economic target	Financial benefit	Fund availability rate: Amount of the special education funds available for the selected universities for “constructing first-class, making up for shortcomings, and enhancing characteristics” in 2021-2022/Budget for the special education fund for “constructing first-class, making up for shortcomings, and enhancing characteristics”*100% Fund utilization rate: Expenditures of the selected universities for “constructing first-class, making up for shortcomings, and enhancing characteristics” in 2021-2022/The special education fund available for “constructing first-class, making up for shortcomings, and enhancing characteristics”*100%
Effect target	Academic benefit	Number of universities for granting doctoral degree Number of scientific research and innovation platforms above provincial and ministerial level Number of first-class undergraduate programs above provincial level Number of first-class courses above provincial level
	Social benefit	Number of employed graduates with bachelor, master and doctoral degree/Number of graduates with bachelor, master and doctoral degree*100% Ranking of the schools selected at home and abroad Number of professional certifications obtained from domestic or international authoritative organizations
	School satisfaction	Teacher satisfaction: Teachers’ satisfaction with teaching and research management Student satisfaction: Students’ satisfaction with teaching quality Social satisfaction: Employers’ satisfaction with graduates

Table 2: Importance scale of pairwise indexes (1-9)

Scale quantization	Scale meaning
1	The two indicators are of equal importance.
3	One index is slightly more important than the other.
5	One index is more important than the other.
7	One index is significantly more important than the other.
9	One index is mightily more important than the other.
2, 4, 6, 8	Importance mid-value of pairwise indexes

Table 3: Judgment matrix at criterion layer

Indexes at criterion layer	Financial benefit	Academic benefit	Social benefit	Social satisfaction	Weight	The largest characteristic root
Financial benefit	1	1/2	1/3	1/5	0.1855	0.0014
Academic benefit	2	1	1/4	3	0.5664	
Social benefit	4	3	1	1/3	0.0972	
Social satisfaction	2	1/3	5	1	0.2854	

Table 4: Judgment matrix at index layer

(Construction plan of high-level universities *)

Financial benefit index	①	②	Weight	The largest characteristic root		
Fund availability rate	1	1	0.0500	No check for a second-order matrix		
Fund utilization rate	1	1	0.0500			
Academic benefit index	③	④	⑤	⑥	Weight	The largest characteristic root
Number of the universities selected in the “Double First-Class” Initiative	1	1/2	1/3	2	0.1542	0.0273
Number of national scientific research awards	3	1	2	3	0.4323	
Number of national first-class undergraduate programs	2	3	1	2	0.1762	
Number of national first-class courses	1	1/2	1/3	1	0.2376	
Social benefit index	⑦	⑧	⑨	Weight	The largest characteristic root	
Number of employed graduates with bachelor, master and doctoral degrees/Number of graduates with bachelor, master and doctoral degree*100%	1	1/2	2	0.2576	0.0036	
Ranking of the schools selected at home and abroad	1/3	1	3	0.5736		
Number of professional certifications obtained from domestic or international authoritative organizations	2	1/3	1	0.1875		
School satisfaction index	⑩	⑪	⑫	Weight	The largest characteristic root	
Teach satisfaction	1	1/2	1/2	0.4475	0.0046	
Student satisfaction	1/3	1	2	0.2674		
Social satisfaction	2	1/3	1	0.1516		

*A calculation is made for the judgment matrix of the index layer of the performance evaluation of the special fund for “constructing first-class, making up for shortcomings, and enhancing characteristics” based on the performance index of the “construction plan of high-level universities”, “plan of revitalizing colleges and universities in East, West and North Guangdong” and “characteristic university enhancing” are of the same dimension and similar standard as those of the criterion layer of the performance of “construction plan of high-level universities”.

Table 5: Consistency check

Criterion-layer matrix	
CI: The largest characteristic root (λ_{max})	CR=CI/RI
(Performance of the special fund) 0.0014	0.0015<1
Index-layer matrix	
CI: The largest characteristic root (λ_{max})	CR=CI/RI
(Academic benefit) 0.0273	0.0303<1
(Social benefit) 0.0036	0.0079<1
(School satisfaction) 0.0046	0.0063<1

4. Research Conclusion

An analysis of the judgment matrix of the criterion layer of the performance evaluation of the special fund for “constructing first-class, making up for shortcomings, and enhancing characteristics” reveals the following: The index weight of “academic benefit” at the criterion layer is 0.5664, which is the highest, suggesting that academic results of 37 universities supported by the special financial fund for “constructing first-class, making up for shortcomings, and enhancing characteristics” are the most important criterion in the performance evaluation. The weights of “number of national scientific research awards” and “number of national first-class courses” rank higher at 0.4343 and 0.2376, respectively, thus emphasizing the academic benefit of the universities funded is a key index in the evaluation of academic performance. In the criterion layer, the index weight of “school satisfaction” is 0.2854, which ranks second, indicating that in the evaluation of management and application of the fund for “constructing first-class, making up for shortcomings, and enhancing characteristics,” more attention shall be paid to the rights and interests of university teachers, students, and graduate employers and the satisfaction of the stakeholders involved in special fund programs. The index weight of “teacher satisfaction” in the dimension of “school satisfaction” is 0.4475, which is the highest of the three indexes. This shows that “teacher satisfaction” is a key index in the performance evaluation of the special fund for “constructing first-class, making up for shortcomings, and enhancing characteristics” and an important content in the performance evaluation of the special fund for education. In the dimension of “social benefit,” the highest weight in three indexes is “Ranking of the schools selected at home and abroad,” indicating that the competitiveness ranking of the universities funded is generally a concern in the performance evaluation of the special fund for education. Additionally, the index weights of “fund availability rate” and “fund utilization rate” are both higher than 0.5. This shows that the performance of the special fund for education greatly depends on whether the special financial fund is allocated timely or not and whether the special fund is efficiently applied by the higher education institutions.

In this paper, quantitative indexes for the performance evaluation were screened and selected from three dimensions, “target layer, criterion layer and index layer”, and a performance evaluation measure was thus established for the special fund for “constructing first-class, making up for shortcomings, and enhancing characteristics”, discussing the methods and paths of quantitative evaluation of the performance of special funds for higher education. The research results show, compared with the self-evaluation of financial fund management and application made by colleges and universities themselves, the performance evaluation measure built for the special education fund based on Delphi qualitative analysis and quantitative analysis by analytic hierarchy process, and the three subjects, teachers, students and society, is much more comprehensive, objective and scientific and can effectively present the core contents and key indexes of the performance evaluation of the special fund for education and help the colleges and universities funded to specify the key links in the process of the management and allocation of the special fund for education, so as to help the

colleges and universities funded improve their benefits and efficiency in the application of the special fund for education.

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