Study on the Public's Evaluation of Higher Education Financing Performance

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Keywords: higher education financing; performance evaluation system; public opinion analysis.

Abstract: The evaluation of higher education financing performance (HEFP) is often limited to the government's financial department, education authorities and research institutions, and currently the public understanding of college financing is only partial. Therefore, the public's evaluation of HEFP has become the focus of attention. It is necessary to conduct research on this field in order to fully gather social recognition and lay an important foundation for the construction of HEFP evaluation system. This research established a system for the public's evaluation of HEFP, and made an analysis of correlations between the key factors of HEFP. The research findings show that investment in facilities and policy environment had significant influence on HEFP evaluation. The research provides reference and suggestions for improving China's higher education financing evaluation system and higher education financing fund management mechanism.

1. Introduction

With the development of social economy, the scale of higher education in China has surpassed that of Europe and the United States, ranking first in the world and reaching the standard level of popularization of higher education. The development and innovation of China's higher education financing system has made great contributions to the "popularization" of China's higher education. However, higher education, as a kind of quasi-public goods, has its diversified financing enterprises and sources.

Scholars outside china have a higher degree of research scope / coverage on HEFP. For example Butin (2010) maintained that democracy and community participation are important aspects of connecting universities and communities, so he proposed "conceptual service learning", and predicted the future development of higher education[1]. Abdullah (2006) conducted a research on the quality of higher education services and proposed an improved five-factor structure of HEDPERP, which provides a better scale for measuring higher education services[2]. Tamburr (2008) pointed out that, colleges and universities, in terms of their financing channels, increasingly rely on donations to meet their growing expenditures[3]. However, under the impact of the economic crisis, the university's donation income is declining, forcing colleges and universities to adjust their corresponding financing operating strategies.

In terms of studying financing of colleges and universities, scholars in China started a little later than their counterparts in other countries. For examples, Wang, He, and Xie (2014) proposed that the problem of insufficient financing in higher education can be solved only by establishing a diversified investment entity through the cooperation between the government, the market, the society and so on[4]. Liao (2014) selected representative first-tier cities in China, established an evaluation index system, and adopted the fuzzy comprehensive evaluation method to evaluate the quality of community-based residential care services in these cities[5]. He then proposed that the quality of community home care services in Chinese first-tier cities should be improved. Liao and Xiang (2017) used structural equations to analyze the key factors of community education services (including administrative services, supporting facilities, curriculum teaching, personnel quality, service guarantee and humanistic care), and proposed that the community education services should be

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enriched, the level of administrative services should be raised, and the entire community education service system should be improved, so that the quality of the entire community can be enhanced[6].

At present, improving the quality and efficiency of higher education financing has become an important part of China's efforts to promote the construction of community public service systems. It is worth noting that foreign studies focus on the evaluation of the relatively mature higher education financing system, while the existing researches in China lack the evaluation of HEFP, and their methods are established based on evaluation dimensions and methods set up in foreign countries. There are few evaluations in the perception category, and they do not apply so well to some of the new features of China's rapidly developing HEFP. It is highly necessary to identify scientific methods, conduct investigation and analysis in consideration of the characteristics of HEFP, and to re-establish the dimensions for the evaluation of HEFP in China. Thus, this paper attempts to establish a new evaluation index system and conduct a related empirical research to observe the public's views and feelings about HEFP, and to provide reference for the scientific evaluation of HEFP that has certain common characteristics.

2. Research design for an analysis of the social impact HEFP

2.1 Data collection

This research used a scale and a questionnaire for data collection, and analyzed the factors of HEFP. The scale consists of two parts. The first part includes the following information: university name, gender, full/part-time staff, position or title, retired/not retired, satisfied/unsatisfied with the public's evaluation of HEFP, and statistical information about their willingness to participate in the evaluation of HEFP in the surveyed Chinese regions. The second part is for the measurement of HEFP evaluation containing 35 question items. The conventional 5-point Likert scale was used. Each question item has five choices, from "1 very insufficient / very unreasonable" to "5 Very sufficient / very unreasonable" (see the "Variable Definitions" section in Table 1).

Table 1 Variables Measurement and Factor Classification for Influencing Factors of HEFP

I : Variable definition and corresponding items	II : Factor classification analysis		
	Factor	Factor load	Commonality
	Investment in teachers (I)		
Are there sufficient full-time teachers?	Q1	0.591	0.664
Are there sufficient faculty and staff above the associate senior level?	Q2	0.574	0.613
Are there sufficient teaching assistants?	Q3	0.602	0.629
Are there sufficient logistics support personnel?	Q4	0.759	0.698
Is the proportion of full-time teachers in the school faculty and staff reasonable?	Q5	0.704	0.612
Is the ratio of teachers and students in the school reasonable?	Q6	0.573	0.587
	Research expenditures (IV)		
Is the basic research funding sufficient?	Q7	0.650	0.577
Is the applied research funding sufficient?	Q8	0.733	0.633
Is the experimental funds guaranteed/sufficient?	Q9	0.593	0.605
Are teachers and students satisfied with the research labor costs?	Q10	0.575	0.584
Is there sufficient funding for academic exchanges?	Q11	0.554	0.577
Are teachers satisfied with the management of school research funds?	Q12	0.565	0.554
	Personnel expenditures (V)		
Are the teacher's salary and welfare satisfactory?	Q13	0.813	0.708
Is there sufficient office funding?	Q14	0.725	0.668
Are students satisfied with student life services?	Q15	0.683	0.693
Are students satisfied with the award, loan, and bursary?	Q16	0.593	0.640
Are students satisfied with the clubs/societies and entertainment activities?	Q17	0.589	0.695
	Investment in facilities (III)		
Is the area of teaching sites adequate?	Q18	0.661	0.646

Satisfied with utilization of teaching facilities?	Q19	0.651	0.503
Are the administrative office area and equipment sufficient?	Q20	0.593	0.569
Are the laboratory area and equipment sufficient?	Q21	0.575	0.613
Satisfied with the use of sports facilities and recreational facilities?	Q22	0.554	0.612
Is the number of practice bases inside and outside the school sufficient?	Q23	0.565	0.563
	Policy environment (II)		
Is the government's policy on education financing is favorable?	Q24	0.694	0.689
Has the education financing policy been implemented?	Q25	0.602	0.562
Do the relevant government departments cooperate with the implementation of the policy?	Q26	0.701	0.642
Is the propaganda of education financing concept in place?	Q27	0.611	0.659
Is the education financing process streamlined?	Q28	0.597	0.604
	HEFP (VI)		
Is there unimpeded access to government funding?	Q29	0.726	0.703
Is the source of non-government financing easily accessible?	Q30	0.729	0.685
Is the financing structure reasonable?	Q31	0.651	0.610
Are the funds for personnel guaranteed?	Q32	0.697	0.742
Is the research funding sufficient?	Q33	0.609	0.643
Are students satisfied with basic services?	Q34	0.607	0.688
Does the college-enterprise have a positive effect on college economy?	Q35	0.695	0.534

We found that in the existing literature, there were few researches related to the public evaluation of HEFP, and even the basic education and compulsory education financing performance in China. Therefore, we selected one central city from each region in China, namely, east, south, west, north and middle. Specifically, those cities include: Shanghai in East China, Guangzhou in South China, Beijing in North China, Chengdu in Western China, and Wuhan in Central China. Those cities have many research institutes, China's first batch of graduate schools, as well as abundant teachers and students who could facilitate our survey and interviews. We entrusted the local university teachers and students with the random distribution of the questionnaire to the following subjects in those cities surveyed: education administration departments, financial departments, and administrative agencies and university teachers. A total of 616 questionnaires were randomly distributed, and 524 questionnaires were collected, with a recovery rate of 85.06%; 34 invalid questionnaires were eliminated, so 490 valid questionnaires were recovered, with an effective recovery rate was 93.5%.

2.2 Sample analysis

Descriptive statistics were produced from the collected sample data (see Table 2). We found that among the 490 valid questionnaires, the number of males was 254, accounting for 51.9%; the number of females was 236, accounting for 48.1%.

In terms of retirement, 380 employees (employees) were active employees, accounting for 77.6%, and 110 faculty members (staff) were retired, accounting for 22.4%.

In terms of professions in colleges and universities, there were 178 full-time teachers, accounting for 36.3%; 21 administrative personnel members in colleges and universities, accounting for 4.3%; 184 non-university administrative staff members, accounting for 37.6%; 124 personnel members in university logistics, accounting for 25.3 %.

In terms of the position or title, 79 teaching assistants (or deputy chiefs), accounting for 16.2 %; 137 lecturers (or assistant researchers, chiefs), accounting for 27.9%; associate professors (or associate researchers, Deputy Director Level) of 256 people, accounting for 52.3%; 8 high-level professors (or high-level researchers, deputy director and above), accounting for 1.6%.

Judging from the above sample characteristics, it can be seen that the respondents had several salient features: first, the number of active employees was the largest among all respondents; second, the number of interviewed members of full-time teachers and non-college administrators was large; third, there was high percentage of interviewees who were associate professors (or associate research fellows and deputy directors). Therefore, it could reflect the extent to which respondents understood the financing field of colleges and universities to some degree.

Table 2 Basic Statistics of the Sample

Feature item	Sample description	Frequency	Percentage (%)
Gender	Male	254	51.9
	Female	236	48.1
Retired	Active employee (staff)	380	77.60
	Retired faculty (staff)	110	23.40
College employee	Full-time teacher	178	36.3
	University administrator	21	4.3
	Non-university administrator	184	37.6
	Personnel in university logistics	124	25.3
Position or title	Teaching assistant (or deputy chief)	79	16.2
	Lecturer (or assistant researcher, section chief)	137	27.9
	Associate Professor (or Associate Researcher, Deputy Director)	256	52.3
	High-level professor (or high-level researcher, deputy bureau level and above)	8	1.6

2.3 Hypothesis testing

In consideration of the actual situation in China and the research questions, we revised the five-dimensional evaluation model - SERVQUAL. To be specific, because the limited funds of higher education were still an important factor affecting the evaluation of China's HEFP, we incorporated factors such as “research expenditures” into the evaluation model. Thus we formulated a six-dimension evaluation model in line with the current research on HEFP. The six dimensions include: investment in teachers (I), research expenditures (IV), and personnel expenditures (V), investment in facilities (III), policy environment (II), HEFP (VI).

Therefore, the following hypotheses were made:

H1: There is a direct positive correlation between “research expenditures” and “HEFP”; the former has a positive effect on the latter.

H2: “Investment in teachers” has a positive impact on “HEFP.”

H3: There is a direct positive correlation between “investment in facilities” and the quality of “HEFP”; the former has a positive effect on the latter.

H4: There is a direct positive correlation between “investment in teachers” and residents' evaluation of HEFP quality; the former has a positive effect on the latter.

H5: There is a direct positive correlation between “policy environment” of the higher education financing and HEFP; the former has a positive effect on the latter.

H6: The measurement variables of the above-mentioned HEFP have a positive impact on HEFP

2.4 Analysis methods and test procedures

This study used Structural Equation Modeling (SEM) to analyze the influencing factors and correlations of HEFP evaluation:

The first step was to identify the influencing factors that affected the evaluation of HEFP. Then we conducted exploratory factor analysis (EFA) on the questionnaire as a whole to verify the reliability and validity of the questionnaire. At the same time, we classified the variables involved in the questionnaire into factors, in order to verify whether the six dimensions affecting HEFP are reasonable, then to construct a measurement model, and make hypotheses for testing.

The second step was to use confirmatory factor analysis (CFA) to conduct the model fitness analysis on the measurement model, and evaluate the validity of the measurement model, analyze the model’s convergence validity, discriminant validity and theoretical validity, and identify the effectiveness of the internal structure of the measurement model.

The third step was to compare and evaluate the service evaluation indicators of HEFP. Similar to the method of fuzzy comprehensive evaluation, we considered that our survey items (variables), that is, different evaluation indicators, often have different dimensions and dimensional units, so the interactions of the dimensions within the evaluation indicators can affect the final results of the data

analysis. As a result, in order to eliminate the dimensional influence between indicators, normalization of data (standardization processing) was required to resolve the comparability between data indicators. We normalized the raw data through the data Z-score, then put the indicators in the model into the same order of magnitude, which is suitable for finding the relationship between each potential variable and HEFP. At the same time, we verified the validity of each coefficient through the T- test coefficient, and made an overall comparative evaluation of HEFP.

3. Empirical analysis results

Table 3 Structure Validity of HEFP Evaluation

Variables	Standardized load	T value	Variable names	Load	T value
Service quality	0.754	13.141	Investment in teachers (I)		
			Q1	0.722	
			Q2	0.696	16.876
			Q3	0.64	15.515
			Q4	0.849	20.547
			Q5	0.795	19.290
			Q6	0.75	18.202
	0.824	14.221	Research expenditures (IV)		
			Q7	0.768	
			Q8	0.733	18.521
			Q9	0.657	16.422
			Q10	0.748	18.932
			Q11	0.619	15.34
			Q12	0.603	14.957
	0.890	13.400	Personnel expenditures (V)		
			Q13	0.655	
			Q14	0.702	15.575
			Q15	0.797	17.274
			Q16	0.84	17.974
			Q17	0.745	16.364
	0.929	14.721	Investment in facilities (III)		
			Q18	0.726	
			Q19	0.768	18.966
			Q20	0.785	19.394
			Q21	0.696	17.142
			Q22	0.747	18.423
			Q23	0.599	14.685
	0.892	13.656	Policy environment (II)		
			Q24	0.683	
			Q25	0.69	15.489
			Q26	0.693	15.546
			Q27	0.69	15.483
			Q28	0.599	13.632
	1		HEFP (VI)		
			Q29	0.615	
			Q30	0.675	14.523
			Q31	0.698	14.909
			Q32	0.756	15.801
			Q33	0.659	14.251
			Q34	0.659	14.265
			Q35	0.656	14.207

According to the above research methods and steps, the maximum likelihood method and the lisel8.7 software package were used to estimate the fitting parameters of the constructed model, and the fitting results were tested. Before testing the structural equation model, the confirmatory factor analysis (CFA) was performed on the whole set of measured variables, and it was found that the obtained measurement model had a high degree of data fitting. That is, the standard chi-square free ratio of the HEFP evaluation model = 2.806, less than 3; p = 0.000, less than 0.001; CFI = 0.869, but close to 0.90; the mean square of the progressive residual and the square root RMSEA = 0.077, less

than 0.08. Based on the data analysis results, it is shown that the large-sample-sized model and the data were a good fit. The load and T values for each level of indicators are shown in the table below (see Table 3).

The above table verified the correlation between each measured variable and the internal and external latent variables, and also verified the external dependent variables (investment in teachers; research expenditures; personnel expenditures; investment in facilities; policy environment) and internal variable (HEFP); the relationship between HEFP and HEFP was 1, which was only the tabular expression of structural equations; after the confirmatory factor analysis of structural equations was conducted, it is found that there was also a positive correlation between each measured variable and each potential variable; there was a positive correlation between the internal HEFP and the above potential external factors, thus verifying the correctness of the above assumptions.

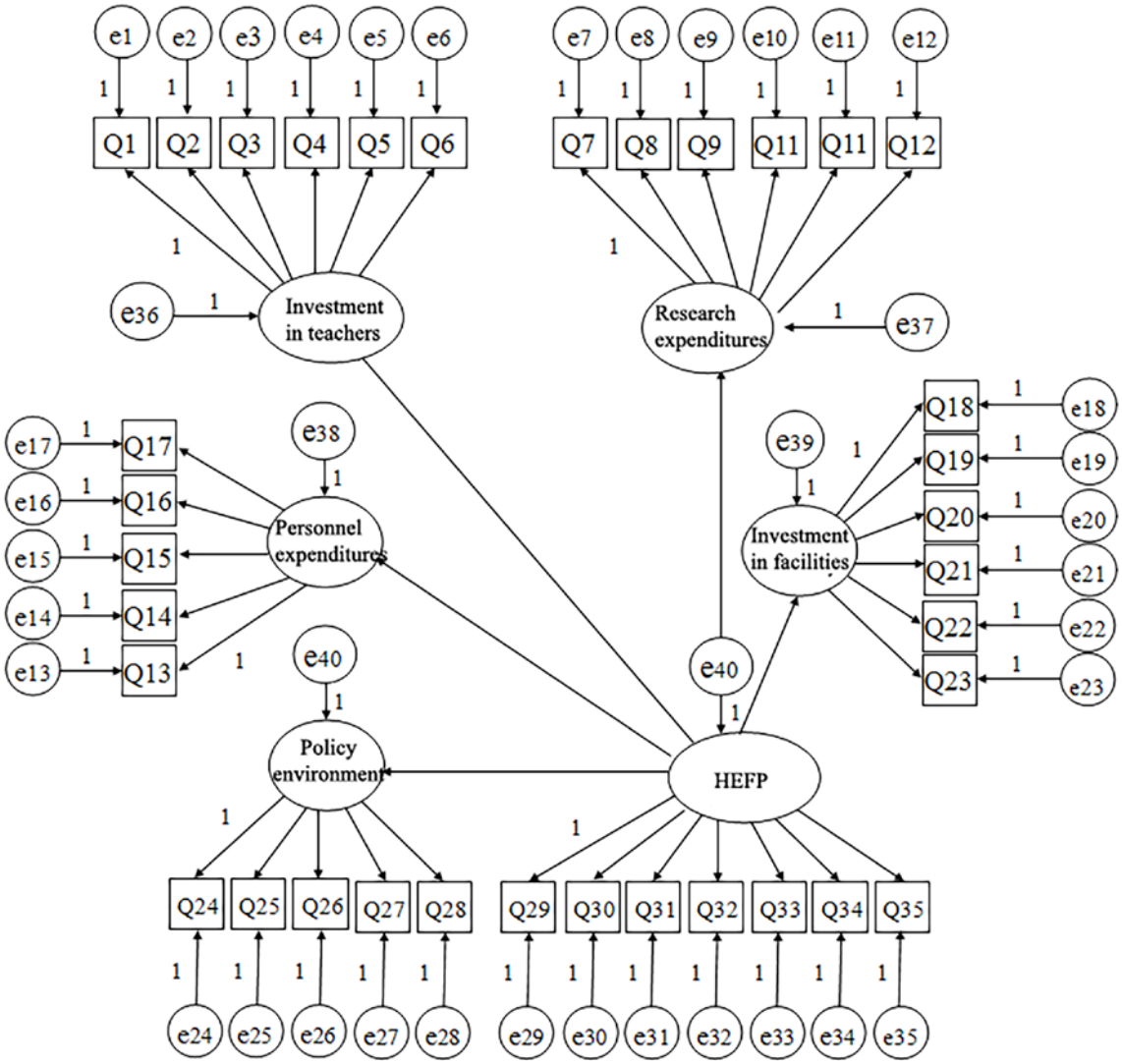

Figure 1 Relationship between measured variables and latent variables

Based on the above analysis, we further derived the relationship between each measured variable and the latent variable (see Figure 1), namely the composition of the supporting system of HEFP. It includes: five external dependent variables used as secondary indicators (investment in teachers, research expenditures, personnel expenditures, investment in facilities, and policy environment); the measurement variables of each secondary indicator were used as the three-level indicators (Q1-Q28) to examine the contribution of the secondary indicator. Based on this, we no longer considered the measurement variables of HEFP. When the data was normalized, the comprehensive evaluation results of the three-level indicators were obtained (see Table 4):

Table 4 Evaluation Index of HEFP Evaluation

Variable	Standardized load	Evaluation coefficient	Variable name	Load	Coefficient
Service quality	Investment in teachers (I)				
	0.754	0.176	Q1	0.722	0.162
			Q2	0.696	0.156
			Q3	0.64	0.144
			Q4	0.849	0.191
			Q5	0.795	0.179
			Q6	0.75	0.168
	Research expenditures (IV)				
	0.824	0.192	Q7	0.768	0.186
			Q8	0.733	0.178
			Q9	0.657	0.159
			Q10	0.748	0.181
			Q11	0.619	0.150
			Q12	0.603	0.146
	Personnel expenditures (V)				
	0.890	0.207	Q13	0.655	0.175
			Q14	0.702	0.188
			Q15	0.797	0.213
			Q16	0.84	0.225
			Q17	0.745	0.199
	Investment in facilities (III)				
	0.929	0.217	Q18	0.726	0.121
			Q19	0.768	0.128
			Q20	0.785	0.131
			Q21	0.696	0.116
			Q22	0.747	0.125
			Q23	0.599	0.100
	Policy environment (II)				
	0.892	0.208	Q24	0.683	0.203
			Q25	0.69	0.205
			Q26	0.693	0.206
			Q27	0.69	0.205
			Q28	0.609	0.181

The model results in Table 4 show that in the first-level indicator system of HEFP evaluation, “investment in facilities” and “policy environment” had the greatest impact on the evaluation of HEFP, and the evaluation coefficients were 0.217 and 0.208 respectively. The index of “investment in teachers” had the least impact on the evaluation of HEFP, and its evaluation coefficient was only 0.176. The reason is that in the eyes of the public, investment in teachers of colleges and universities seemed to be not much directly related to the financing of colleges and universities. It, however, may have been a potential factor indirectly affecting the evaluation of HEFP.

Based on the analysis of the model evaluation indicators, we compared HEFP in different regions, with the coefficient line drawn at 0.165, that is, the coefficient of the secondary evaluation indices (Q7-Q28) being greater than or less than 0.165. It can be seen that the “investment in teachers” and “policy environment” provided by HEFP were relatively good. But the coefficients of the secondary evaluation indicators of "research expenditures" and "investment in facilities" lower than 0.165, were in the largest number. Specifically, among the second-level indicators of “research expenditures”, the coefficients of “Q9, regarding outdoor greening environment”, “Q11, regarding sufficient academic exchange funds”, and “Q12, regarding teachers’ satisfaction with research funding management” were 0.159, 0.150 and 0.146 respectively. Judging from the weight of indicators, respondents’ primary requirements for HEFP were focused on “investment in teachers”, “investment in facilities” and “policy environment”, followed by infrastructure requirements.

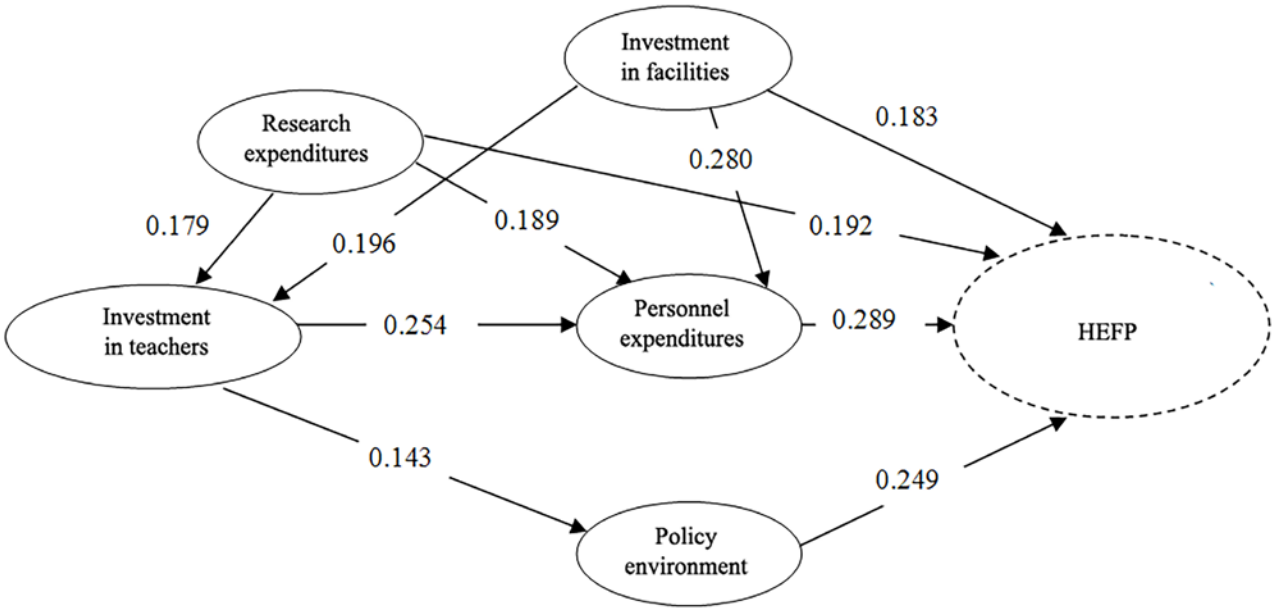

Figure 2 Relationship between structural equation variables and correlation coefficient

Further, we provided The Relationship of Higher Education Financing Structure (coefficient table omitted) to reflect the interactions between HEFP and the following factors: “investment in facilities”, “research expenditures”, “investment in teachers”, “personnel expenditures” and “policy environment” (see Figure 2).

As can be seen from Figure 2, in terms of direct impact, “personnel expenditures” and “policy environment” had the greatest impact on HEFP, with impact coefficients of 0.289 and 0.249 respectively. The impact of “investment in facilities” and “research expenditures” on “HEFP” were ranked second to the above-mentioned, with the correlation coefficients of 0.183 and 0.192 respectively.

“Personnel expenditures” in the field of higher education played a partial intermediary role between “investment in teachers” and “HEFP”. “Policy environment” had a partial mediating effect between “investment in teachers” and “HEFP”, with the corresponding coefficients being 0.143 and 0.249 respectively, indicating that the current number and structure of higher education teachers influenced HEFP through the policy environment.

4. Conclusions and recommendations

This paper established a new evaluation system – HEFP, through a questionnaire survey of five super-large cities where there are a high concentration of universities. The structural equation model was used to analyze the six key factors of HEFP. The variables designed in this paper can be used to support and evaluate HEFP rating system. Based on that, the samples were normalized and HEFP was evaluated. The results show that “investment in facilities” and “policy environment” had the greatest impact on the evaluation of HEFP; the indicator “investment in teachers” had the least impact on the evaluation of HEFP. In addition, the secondary evaluation indicators were used to compare HEFP in China’s different regions, and it was found that “investment in teachers” and “policy environment” provided by HEFP were relatively good, but the overall secondary evaluation indicators of “research expenditures” and “investment in facilities” were not high. Respondents reported that requirements for HEFP were focused on “investment in teachers,” “investment in facilities” and “policy environment.” Based on our investigation, the conclusions of this paper are as follows:

First, we should improve the funds usage mechanism of higher education financing, and channel funds mainly to teaching and capital construction.

The use of funds for higher education must first ensure the integrity and adequacy of the teaching faculty, which is the foundation of higher education, and also the financial guarantee for the faculty to train a new generation of successors of the socialist cause. Second, currently the education finance

system in China is funded according to the principle of “budgeted fee per student”. Therefore, in addition to the government funding of undertakings, the financing of colleges and universities should give priority to the basic facility construction through other channels, so that the teachers and students can have a fair and good learning environment.

Second, we should control the use of market-oriented higher education financing funds.

The main channels for financing higher education are loans from the financial sector and donations from the society. These loans are often collateralized by educational land and a small number of “Educational Admission Permits”. In addition, the fund usage is limited. Therefore, while controlling the debt ratio of colleges and universities, financial lending institutions should control loans in the field of colleges and universities, clarify the usage of funds, ensure the safety of credit funds, safeguard the legitimate rights and interests of teachers and students in higher education, and promote educational equity.

Third, third-party HEFP evaluation mechanism should be introduced. That is, third-party evaluation agencies that are independent of government and universities, should be introduced to participate in HEFP evaluation, play its professional evaluation role, make and publicize the assessment results reports. The third party can supervise the evaluation of HEFP, which is conducive to the improvement of HEFP, ensuring the healthy development of higher education.

Acknowledgements

This work was supported by Research on the Financing Performance Evaluation of Higher Education in Sichuan Province project (16SB0037).

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