Evaluation of Financial Expenditure Performance of Higher Vocational Education—Taking Sichuan Province as an Example

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Abstract. In purposing of exploring the financial expenditure performance lever of higher vocational institutions in Sichuan Province in 2021 and providing them with relevant proposals on financial expenditure utilization rate, the article applies factor analysis to select 12 categories of relevant indicators and takes 32 higher vocational institutions in the province as the research object, using the advanced data processing software SPSS to obtain the combined performance score of each college and ranks them. The study found that there is substantial difference in the performance levels of financial expenditures among the 32 institutions. The main affecting factors were the education funding situation and school running condition.

Keywords: Higher Vocational Education · Factor Analysis Method · Financial Expenditures · Performance Evaluation

1 Introduction

Performance evaluation of higher vocational education financial expenses is a vital aspect of fiscal expense efficiency evaluation, which plays a unique role in using fiscal expenses to generate effective output and avoid problems such as cost wastage and structural deficiency. Therefore, adopting a reasonable method to comment the performance of higher vocational institutions' fiscal expenditures can contribute to the improvement of the efficiency of fiscal expenditures utilization and the quality of universities' output. In the early stage of research, domestic scholars established the performance evaluation system of university financial expenditures from different perspectives at the qualitative level [1–3]. With the depth of research, many scholars began to search for suitable methods for the evaluation of financial performance of universities. In the existing studies, balanced scorecard method [4, 5], hierarchical analysis [6], DEA [7] and factor analysis [8, 9] are widely used. Guoyu Zhang and Bin Yu believe that among the established quantitative methods, factor analysis is more appropriate for university performance evaluation [10].

Thus, this paper takes 32 higher education institutions in Sichuan Province as an example and adopts factor analysis to conduct an empirical study on financial expenditure

performance, gaining the result through specialized information processing techniques and provides targeted opinions.

2 Empirical Analysis

2.1 Indicator Selection and Data Sources

According to the existing index system and the availability of data, the author selected the following 12 types of indicators: student-teacher ratio (X1), the proportion of teachers with "double-teacher" quality to full-time teachers (X2), ratio of teachers with senior titles to full-time faculty(X3), the average financial allocation per student (X4), current students (X5), the employment rate (X6), satisfaction of employers (X7), satisfaction of alma mater (X8), average value of teaching and research equipment and equipment per student (X9), average income from education business per student (X10), number of conversion of patent achievements (X11), and self-employment ratio (X12).

All the data in this paper come from the Column of Annual Report on Quality of Higher Vocational Education, collected through online data collection and some index data are directly calculated by computer.

2.2 The Process of Empirical Analysis

The tabular data in this paper were calculated through computer data processing techniques. Before conducting the empirical analysis, the raw data were screened using data screening technology to remove unreasonable data. The KMO measure and Bartlett's sphericity test were used to determine whether the data were suitable for factor analysis, and the results showed that the KMO value was 0.688 (>0.6) with a significance level of 0.000, indicating suitability for factor analysis. The results are shown in Table 1.

Applying data processing software to extract the common factors using principal component analysis, there were four factors with eigenvalues greater than 1, and the cumulative variance contribution rate reached 68.855%, showing that these four factors could adequately explain the information expressed by the original data, so it was more appropriate to extract four common factors. The data are shown in the following Table 2.

The factor loading matrix was rotated using the maximum variance method and the results are shown in Table3. F1 has higher loadings in X4, X10, X9, X2, concentrating on education funding and school conditions. F2 has higher loadings in X5, X1, X8, X6, reflecting the teaching scale and student output quality. F3 has higher loadings in X11,

Table 1. KMO and Bartlett's sphericity test

Kaiser-Meyer-Olkin metric for sampling adequacy		0.688
Bartlett's test	Approximate cardinality	125.423
	Degree of freedom	66
	Significance Level	.000

Table 2. Total variance explained

Ingredients	Initial Eigenvalue			Sum of squares of extracted loads			Sum of squared rotary loads		
	Total	Percent variance	Total%	Total	Percent variance	Total%	Total	Percent variance	Total%
1	4.019	33.493	33.493	4.019	33.493	33.493	2.322	19.354	19.345
2	1.754	14.617	48.109	1.754	14.617	48.109	2.227	18.556	37.910
3	1.401	11.677	59.786	1.401	11.677	59.786	1.895	15.792	53.702
4	1.088	9.069	68.855	1.088	9.069	68.855	1.818	15.145	68.855
5	.860	7.166	76.021						
6	.675	5.627	81.648						
7	.614	5.118	86.765						
8	.476	3.967	90.732						
9	.425	3.540	94.272						
10	.305	2.541	96.813						
11	.230	1.917	98.730						
12	.152	1.270	100.000						

Table 3. Component matrix after rotation

	Ingredients			
	1	2	3	4
X4	.813	−.079	−.246	−.031
X10	.699	.225	.195	.070
X9	.616	.017	.167	.539
X2	.610	.358	.418	.276
X5	.245	.840	.075	.076
X1	−.322	.765	−.325	.001
X8	.208	.642	.439	.071
X6	.194	.544	.228	.484
X11	.069	−0.67	.752	−262
X7	−.028	.159	.688	.302
X12	−.020	.073	−.178	.827
X3	.413	.088	.408	.598

Table 4. Component score coefficient matrix

	Ingredients			
	1	2	3	4
X1	−.159	.443	−.221	−.031
X2	.208	.085	.116	−.009
X3	.039	−.099	.149	.308
X4	.514	−.045	−.280	−.168
X5	.080	.414	−.072	−.131
X6	−.050	.184	.036	.211
X7	−.199	−.024	.409	.160
X8	.007	.280	.182	−.117
X9	.210	−.112	−.028	.247
X10	.344	.064	−.016	−.143
X11	−.027	−.065	.485	−.236
X12	−.159	−.073	−.163	.600

X7, which focus on the social contribution. F4 has higher loadings in X12, X3, focusing on the entrepreneurship level and teacher level.

The data in the following table were obtained by using relevant information processing technology and statistical models for the four common factors were derived: $X1 = -0.159*F1 + 0.443*F2 – 0.221*F3 – 0.031*F4$; $X2 = 0.208*F1 + 0.085*F2 + 0.116*F3 – 0.009*F4$; $X3 = 0.039*F1 – 0.099*F2 + 0.149*F3 + 0.308*F4$; $X4 = 0.514*F1 – 0.045*F2 – 0.280*F3 – 0.168*F4$……and so on. And the specific coefficients are shown in Table 4.

The factor scores were calculated by SPSS, and the overall scores of each institution were calculated by weighting and summing the factor scores.

$$Factor\ weights = \frac{Factor\ variance\ contribution\ rate}{Cumulative\ variance\ contribution\ rate} * 100\% \tag{1}$$

According to Table 1, the weights of the four factors are 48.64%, 21.23%, 16.96% and 13.17%, so the combined score of educational expenditure performance of each institution can be derived.

$$F = F1 * 48.64\% + F2 * 21.23\% + F3 * 16.96\% + F4 * 13.17\% \tag{2}$$

The results of the calculation were used to rank the overall scores of the institutions, and the results of the data processing are shown in Table 5.

Table 5. Overall factor scores and rankings of 32 institutions

School Abbreviation	F	Rank	School Abbreviation	F	Rank
Chengdu Airlines	0.7818	4	Sichuan Transportation	1.0524	2
Chengdu Textile	1.0961	1	Sichuan Sports	−0.3150	22
Chengdu Industry and Trade	0.0181	15	Sichuan Culture Industry	−0.4389	25
Chengdu Agriculture Technology	−0.0872	16	Sichuan Science and Technology	−0.2239	21
Chengdu Vocational	0.4476	8	Sichuan Health Rehabilitation	−0.1755	20
Chuanbei Early Childhood Teacher Training	−0.4850	26	Yibin Career	0.4039	9
Sichuan Industry and Commerce	0.3235	10	Tianfu New Area Information	−1.3798	32
Sichuan International Labeling	−0.5484	28	Sichuan Occupation	0.5636	7
Sichuan Aerospace	−0.1453	19	Sichuan Changjiang	−0.5347	27
Neijiang Vocational	−0.1098	17	Ya'an Careers	0.1277	12
Sichuan City	0.1637	11	Sichuan Arts	−0.5607	29
Sichuan Engineering	0.9162	3	Guang'an Careers	−0.1317	18
Sichuan Huaxin Modern	−0.6570	30	Luzhou Careers	0.6618	5
Sichuan Chemical	0.0264	14	Meishan Careers	−0.3260	23
Sichuan Railway	−0.4258	24	Mianyang Careers	0.1046	13
Sichuan Construction	0.6079	6	Sichuan Tianyi	−0.7505	31

3   Conclusions and Recommendations

The results of the empirical analysis lead to the following conclusions: institutions with high overall scores are mostly ranked at the top in F1 and F2, while schools with lower overall scores are mainly ranked lower in F1 and F2; 26 institutions have negative scores for two or more factors, indicating that most institutions have the problem of uneven internal development. In the four public factors, the highest contribution of F1 to the financial expense performance is 33.493%, which suggests that the main factors affecting the financial expenditure performance are the investment in education and operating conditions. Besides, 15 of the 32 higher education institutions have positive combined scores and 17 institutions have negative overall scores, and the difference between the highest and lowest scores is as much as twice. And there is great discrepancy in financial expenditure performance among different universities.

Based on the above findings, the following advice is made: different schools have distinct development status and the focus on how to enhance the level of fiscal spending performance also varies. F1 ranked low ought to increase financial investment; F2 ranked low should pay more attention to improve the quality of student output; F3 ranked low needs to strengthen the communication between schools and society; more efforts should be made to improve students' entrepreneurial awareness and teachers' level if F4 ranked low. In addition, institutions have to constantly explore the reasonable allocation of education funds and spend the money on the "cutting edge". Attention should be paid to the renewal of various teaching facilities and the improvement of soft resources and improve the conditions of operation and stimulate the development potential of institutions. Meanwhile, the lower-performing universities can learn from the management methods of higher-performing institutions to narrow the performance gap.

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