The Performance Evaluation of University Scientific Research Project Management Based on the FAHP

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ABSTRACT: Along with the advance of scientific powers strategic of our country, all types and levels funding limit and quantity of college scientific research project have also increased constantly. It is very important to have complete, accurate and fair evaluations for university scientific research project management performance. Fuzzy analytic hierarchy process (FAHP) as a qualitative, a quantitative and comprehensive evaluation method can be able to evaluate the university scientific research project management performance effectively.

Categories and Subject Descriptors:
I.5 [Pattern Recognition]: I.5.1 [Fuzzy Models]: K.6.1 [Project and People Management}

General Terms: Project Management, Research Management

Keywords: College Research, Fuzzy Analytic Hierarchy Process (FAHP), Fuzzy Judgment Matrix, Management Performance Evaluation

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1. Introduction

The university research project management and performance evaluation is still in just the start stage, and the performance evaluation has some problems. Due to scientific research project evaluation is belong to the subjective evaluation, so there is no exact quantitative indexes of science and technology project quality. It is difficult to reflect the quality level completely and really, and this lead to inaccurate and incomplete information when evaluating the science and technology project [1].

Scientific research project management performance evaluation is to point to use scientific and standardization methods to have a comprehensive evaluation for performance management, personnel performance, results performance of scientific research project and the goal realization degree following certain principles, procedures and standards and organized by research management department and provide scientific basis for scientific research project decision-making, management and implementation of the future through the timely and effective information feedback at the same time [2-4].

At presently, there are a variety of university management performance evaluation methods, mainly including balance performance index method, the benchmark of analysis, layer analytical method, and fuzzy comprehensive analysis [5-6]. AHP method was put forward in the 1970s by famous operations research scholars Satty of university of Pittsburgh and it is a multi-objective decision analysis method combined with qualitative and quantitative analysis [7-8]. The difference between fuzzy analytic hierarchy process (FAHP) and analytic hierarchy process (AHP) is that the former simplifies complex degree of relative importance about judgment target and extends AHP method to fuzzy environment and realizes convenient and fast conversion from qualitative to quantitative about the decision with the aid of fuzzy judgment matrix combining the fuzzy mathematics and the analytic hierarchy process (AHP). It forms fuzzy consistent judgment matrix directly by the fuzzy judgment matrix and solves judgment uniformity problem [9-10].

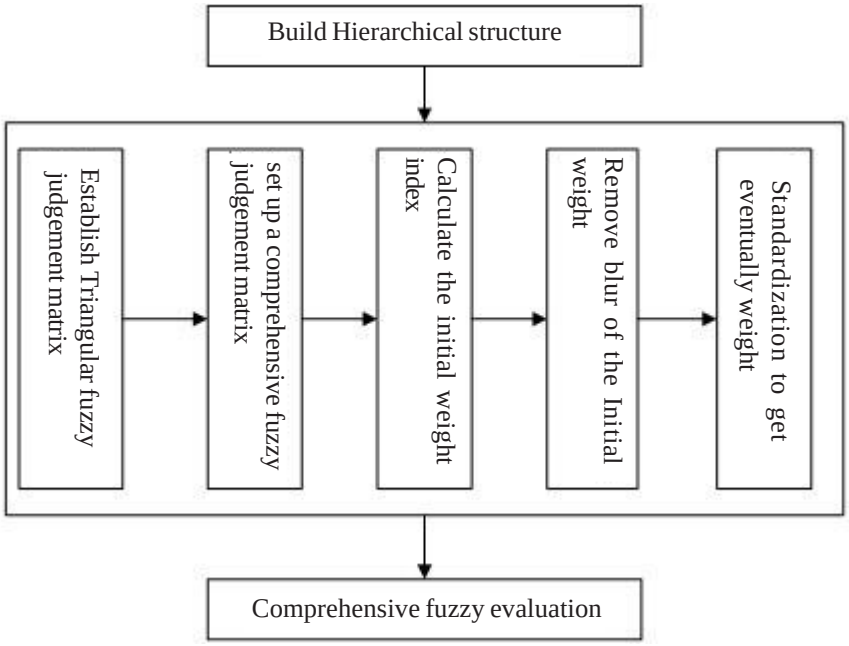

Figure 1. Fuzzy analytic hierarchy process flow diagram of the performance evaluation of scientific research project

This paper consider that scientific research fund performance evaluation system should be able to reflect the whole process of the establishment to examination and approval of the research fund, and evaluate research efficiency through the specific data. Because of varies sex of selection about quantitative analysis indicators of the process and results of scientific research activities and funds performance evaluation. This paper mainly uses fuzzy analytic hierarchy process to constitute a proper evaluation index system to make an objective, fair and accurate comprehensive evaluation for a certain period of university project efficiency and performance.

2. The mathematical model of fuzzy analytic hierarchy process

The basic idea of fuzzy analytic hierarchy process in general is first to research the decision making problems for hierarchical structure analysis, and then establish affect system index according to the structure of target strata, criterion layer and layer factors. Next, it builds triangular fuzzy matrix through expert scoring for comparison between two elements according to 1 ~ 9 digital scale method and establish fuzzy comprehensive judgment matrix to get the initial weight. It ensures the corresponding indexes weights of the factors of different levels after removing blur and standardization finally. The performance evaluation of scientific research project management using fuzzy analytic hierarchy process is shown in figure 1.

2.1 establish performance evaluation levels structure model

Fuzzy analytic hierarchy process (AHP) is derived by analytic hierarchy process (AHP), and it determines the index of the research object according to target strata, criterion layer, and layer factor in the analytic hierarchy process. There is only one element in the target layer which is the purpose of this question as the highest level structure. Rule layer is some main element which is important for target layer. They are measures and principles, policies, etc for achieving the goal. Factors layer is the specific index factor attached to the corresponding standards layer.

The performance evaluation of scientific research project is a complex system of multi-level and many factors and many stages, and there are many factors reflecting the level and affecting the change. In this paper, the performance evaluation of scientific research project is mainly according to the use and safeguard status of scientific research outlays to evaluate the quality of the project management. According to the funds investment of scientific research, production, and the output and project external overall condition and the security situation of the facilities, combining previous long-term studies, it takes the university scientific research project management performance evaluation for the purpose (O), and integrates relevant index about the scientific research project investment, production and output and project guarantee. It gradually forms the university scientific research project management performance effectiveness evaluation index system by Preliminary screening, adding and perfecting about these indexes. University scientific research project management performance evaluation is the target layer. And rule layer (S) includes project guarantee (S_1), the fund budget (S_2), process management (S_3) and project performance (S_4). There are 12 factor evaluation indexes including research team quality (S_{11}), research performance (S_{12}),scientific research conditions ensure (S_{13}), project management status (S_{14}), the fund budget audit (S_{21}), budget approval (S_{22}), budget

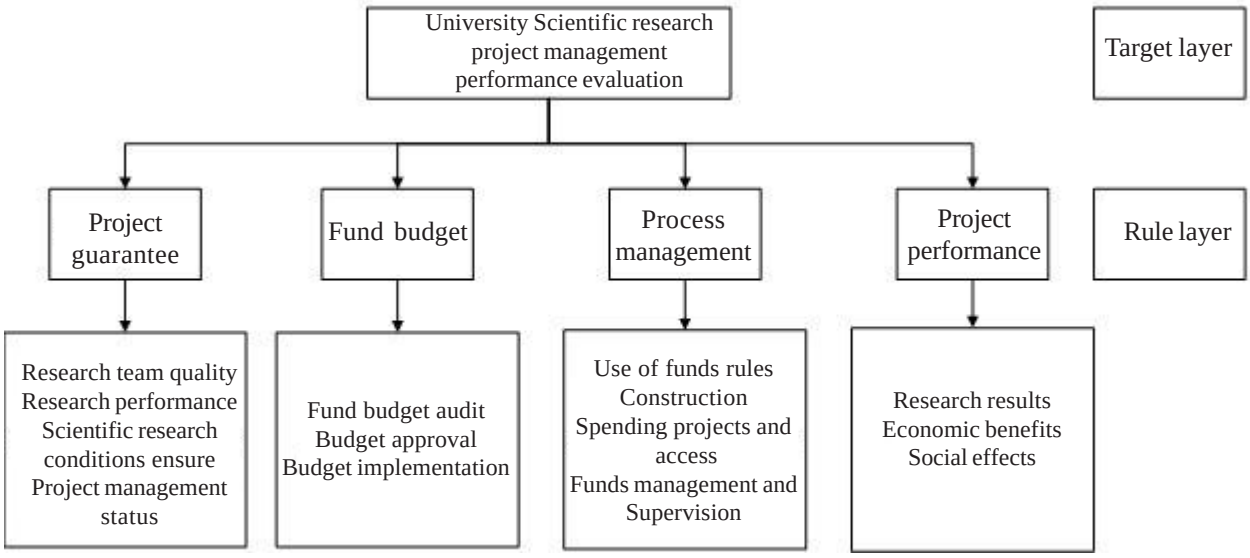

Figure 2. Hierarchical structure of scientific research project management performance evaluation

Rule layer	One class index	Evaluation content
Project guarantee	Research team quality	The academic level of the whole team, excellent young proportion, master degree or above proportion
	Scientific research conditions	Technology application development laboratory level, equipment construction
	Research performance	The main research results
	Project management status	Project management team condition, the construction of university management department

Table 1. The evaluation index and evaluation content of the project guarantee

Rule layer	One class index	Evaluation content
Funds budget	He fund budget audit	Budget material quality, budget rationality
	Budget approval	Approved Progress, declare prepare
	Budget implementation	Compliance of Project implementation and budget, Funds planning implementation process

Table 2. The evaluation index and evaluation content of the funds budget

budget implementation (S_{23}), use of funds rules construction (S_{31}), spending projects and access (S_{32}), funds management and supervision (S_{33}), the research results (S_{41}), economic benefits (S_{42}) and social effects (S_{43}). As shown in figure 2.

2.1.1 Projects supportability index

The establishment of projects supportability index is because of the prospective, exploratory, risk and cannot foresight of scientific research activities. Evaluating the quality of the team and project can guarantee the smooth progress of scientific research project, such as construction equipment, technology application development laboratory level, including the quality of talents which will affects the project, and the specific content is as shown in table 1.

2.1.2 Funds budget sex index

About the fund budget index, research fund budget is throughout the whole in the spending process, and budget examination and approval lays the foundation of the research project and provides a range for the use of the implementation process of scientific research project. The implementation of the budget plan can supervises the reasonable amount of funds use effectively and provides strong guarantee for planning implementation of the research funding. Specific content is as shown in table 2.

2.1.3 Process managerial index

The distribution of the quantity of the research fund is controlled by the budget, and the next step is the supervision and administration in the process of using

Rule layer	One class index	Evaluation content
Process management	Use of funds rules construction	Constitution execution dynamics, Use of funds statute
	Spending projects and access	Spending powers and economic responsibility, spending projects and amount management
	Funds management and supervision	The periodic goal completion rate, expenditure executive progress

Table 3. The evaluation index and evaluation content of the process management

Rule layer	One class index	Evaluation content
Project performance	The research results	Patent number, number and level of papers
	Economic benefits	Achievement transfer income, the scientific research technical gains
	Social effects	Actual use efficiency of the results, talent cultivation quantity

Table 4. The evaluation index and evaluation content of the project performance

Setting up complete process management mechanism has effective monitoring for preventing the appearance of the abuse and divert in the use of funds and explicit the economic responsibility and makes accountability mechanism establishment and implementation play to utility. Specific content is as shown in table 3.

2.1.4 Project profitability index

When we pay attention to the process of the scientific research outlays management, we should pay attention to the effect at the same time. The use of funds for research in the universities is to create more benefits for the school and countries. From the resource allocation part to think, it is that to use fewer resources as possible to create maximization research influence. Specific content is as shown in table 4.

2.2 The determination of index weight

In the hierarchical analysis of a general problem, two and two comparison judgment matrix usually did not consider the fuzzy of the judgment and only considered the man's judgment of the two possible extreme: use membership 1 to choice one index and at the same time again use membership 1 to negative other scale value. In the fuzzy hierarchical analysis it used group decision to tectonic triangular fuzzy judgment matrix to confirm the weight of each variable in each layer variable by the judging of the expert assessment. Using triangular fuzzy evaluation method, we first need to determine the scale methods of the triangular fuzzy number, for example, using 1 ~ 9 scale method (table 5). Experts use triangular fuzzy number to mark the relationship between two variables when specific

Scale	Implication
1	Compared, the same important
3	Compared, the former slightly important than the latter
5	Compared, the former obvious important than the latter
7	Compared, the former intensity important than the latter
9	Compared, the former extremely important than the latter
2, 4, 6, 8	Middle value of the above adjacent judgment
countdown	If the importance ratio of element *i* and element *j* is *a*. *j*, then the importance ratio of element *j* and element *i* is *a*.*j* =1 / *a*.*j*

Table 5. 1 ~ 9 scale method

rating. The triangle fuzzy number M was expressed as $(1, M, u)$, of which $X = M$, and X belongs entirely to M, and outside of the 1 and u completely do not belong to the fuzzy number M. So firstly it need expert to mark the median m, and it showed the basic relations between two variables. Then it marks 1 and u, which means the possible highest and lowest score. After structuring the triangular fuzzy judgment matrix of rule layer and factors layer, it gets the fuzzy matrix through the integration to get the initial weights, and then get the weight finally by removing blur.

2.3 The comprehensive evaluation of the scientific research project management performance

The fuzzy comprehensive evaluation method mainly use the fuzzy set theory, the fuzzy transform principle and maximum membership degree of the fuzzy mathematics and consider various factors related with the evaluation object to make reasonable comprehensive evaluation [11-12]. It has established evaluation levels structure and index weight of the university scientific research project management performance by fuzzy analytic hierarchy process (FAHP) in above. Next it construct scientific

research project management performance evaluation model with fuzzy comprehensive evaluation method.

3. Case Analyses

3.1 Project Situation

This article selects A project as evaluation objects, and this project research industry cluster manufacturing services platform of the lace industry in Zhejiang province in order to improve scientific research and practical ability of the project team members. After the completion of the subject, it reflects research achievements with science and technology paper form and plans to publish 1 ~ 2 articles related to the project research contents in core journals or in a meeting and participate in the 1 ~ 2 times academic conferences, etc.

3.2 Build the triangular fuzzy matrix

Firstly, it use fuzzy analytic hierarchy process to select and division the index of the whole system according to the target strata, criterion layer and layer factors when evaluating the project management performance. It has established four rule layers including the project security, budget, process management, project benefits combined with the mentioned, and the factors layer in project guarantee divided into one class index: research team quality, scientific research conditions guarantee, the scientific research achievement, the project management condition, research team quality. In order to determine the specific weight of each index, it hires experts to carries on the comparison of all the variables in rule layer and layer factors to get the triangular fuzzy judgment matrix. It takes the triangular fuzzy judgment matrix of the rule layer and the index factors layer in the project guarantee, reference table 6 and table 7.

	S_1	S_2	S_3	S_4
S_1	(1,1,1) (1, 1,1)	(1, 2, 3) (0.2, 0.25, 0.33)	(1, 2, 3) (0.2, 0.25, 0.33)	(3,5,7) (0.25, 0.33, 0.5)
S_2	(0.33, 0.5, 1) (3, 4, 5)	(1, 1, 1) (1, 1, 1)	(3, 4, 6) (1, 2, 3)	(1, 2, 3) (0.13, 0.14, 0.17)
S_3	(0.33, 0.5, 1) (3, 4, 5)	(0.17, 0.25, 0.33) (0.33, 0.5,1)	(1, 1, 1) (1, 1, 1)	(0.5, 1, 1.5) (0.14, 0.17, 0.25)
S_4	(0.143, 0.2, 0.33) (2, 3, 4)	(0.33, 0.5, 1) (6, 7, 8)	(0.67, 1, 2) (4, 6, 7)	(1, 1, 1) (1, 1, 1)

Table 6. Triangular fuzzy judgment matrix of the rule layer

	S_{11}	S_{12}	S_{13}	S_{14}
S_{11}	(1,1,1) (1, 1,1)	(2, 3, 4) (0.25, 0.33, 0.5)	(3, 4, 6) (1, 1.5, 2)	(2,4,5) (0.5, 0.67, 1)
S_{12}	(0.25, 0.335, 0.5) (2, 3, 4)	(1, 1, 1) (1, 1, 1)	(0.5, 0.67, 1) (1, 1.5, 2)	(1, 2, 3) (1, 2, 3)
S_{13}	(0.17, 0.25, 0.33) (3, 4, 5)	(1, 1.5, 2) (0.5, 0.67,1)	(1, 1, 1) (1, 1, 1)	(0.5, 1, 1.5) (0.5, 0.67, 1)
S_{14}	(0.2, 0.25, 0.5) (2, 3, 4)	(0.33, 0.5, 1) (0.33, 0.5, 1)	(0.67, 1, 2) (1, 1.5, 2)	(1, 1, 1) (1, 1, 1)

Table 7. Triangular fuzzy judgment matrix of $S_{11}, S_{12}, S_{13}, S_{14}$

	S_1	S_2	S_3	S_4
S_1	1.00 1.00 1.00	0.60 1.13 1.67	0.6 1.13 1.67	1.63 2.67 3.75
S_2	1.67 2.25 3.00	1.00 1.00 1.00	2.00 3.00 4.50	0.57 1.07 1.58
S_3	1.67 2.25 3.00	0.25 0.38 0.67	1.00 1.00 1.00	0.32 0.58 0.88
S_4	1.07 1.60 2.17	3.17 3.75 4.5	2.33 3.50 4.50	1.00 1.00 1.00

Table 8. Comprehensive fuzzy judgment matrix of the rule layer

With multiple experts participate in scoring and so the comprehensive fuzzy triangle number is:

$$a_{ij} = \frac{a_{ij}^1 + a_{ij}^2 + Aa_{ij}^m}{m}$$

	S_{11}			S_{12}			S_{13}			S_{14}		
S_{11}	1.00	1.00	1.00	1.13	1.67	2.25	2.00	2.75	4.00	1.25	2.33	3.00
S_{12}	1.13	1.67	2.25	1.00	1.00	1.00	0.75	1.08	1.50	1.00	2.00	3.00
S_{13}	0.33	0.47	0.67	0.75	1.08	1.50	1.00	1.00	1.00	0.50	0.83	1.25
S_{14}	0.60	0.88	1.25	0.33	0.50	1.00	0.83	1.25	2.00	1.00	1.00	1.00

Table 9. Comprehensive fuzzy judgment matrix of $S_{11}, S_{12}, S_{13}, S_{14}$

Among them, the m is the total number of experts a_{ij}^{m}, means the triangular fuzzy number of the m. It gets table 8 and table 9 when taking comprehensive fuzzy triangle count from triangle judgment matrix of table 6 and table 7.

3.3 Calculate index synthesis weights

When it gets the fuzzy judgment matrix of the rule layer and the index of the S_1, it needs to calculate the initial weight index, calculated as below:

$$D_i^k = \sum_{j=1}^{n} a_{ij}^k \div \left(\sum_{i=1}^{n} \sum_{j=1}^{n} a_{ij}^k \right), i = 1, 2.....n$$

The D_i^k means the comprehensive fuzzy value of i in K and the initial weight calculation are as follows:

$$\sum_{i=1}^{4} \sum_{j=1}^{4} a_{ij} = (1.00\ 1.00\ 1.00) + (0.60\ 1.13\ 1.67) + ... + (1.00\ 1.00\ 1.00) = (19.86\ 27.30\ 35.875)$$

$$\sum_{j=1}^{4} a_{ij} = (1.00\ 1.00\ 1.00) + (0.60\ 1.13\ 1.67) + ... + (1.63\ 2.67\ 3.75) = (3.83\ 5.93\ 8.09)$$

$$D_{s_1} = (3.83\ 5.93\ 8.09) \div (19.86\ 27.30\ 35.875) = (0.107\ 0.178\ 0.407)$$

$$D_{s_2} = (0.146\ 0.268\ 0.508)\ D_{s_3} = (0.09\ 0.154\ 0.279)$$

$$D_{s_4} = (0.211\ 0.361\ 0.613)$$

Similarly, it gets the initial weight of S_{11}, S_{12}, S_{13}, S_{14}

$$D_{s_{11}} = (0.194\ 0.339\ 0.702)\ \ D_{s_{12}} = (0.14\ 0.28\ 0.531)$$

$$D_{s_{13}} = (0.093\ 0.165\ 0.303)\ \ D_{s_{14}} = (0.10\ 0.177\ 0.36)$$

After calculating the initial weight of the above indexes, it needs to remove blur and calculate the finally the weight of the index. The comparison principle of the fuzzy number is:

Definition 1: $M_1\ (l_1,\ m_1,\ u_1)$ and $M_2\ (l_1,\ m_2,\ u_2)$ is the triangular fuzzy number. The possibility of $M_1 \geq M_2$ is defined by triangular fuzzy function as

$$v(M_1 \geq M_2) = \sup_{x \geq y} \left[min\left(u_{M_1}(x), u_{M_2}(y)\right) \right]$$

$$v(M_1 \geq M_2) = u(d) = \begin{cases} 1 & m_1 \geq m_2 \\ \dfrac{l_2 - u_1}{(m_1 - u_1) - (m_2 - l_2)} & m_1 \leq m_2, u_1 \geq l_2 \\ 0 & otherwise \end{cases}$$

Definition 2: The possibility that one fuzzy number greater than other K fuzzy number is defined as:

$$v(M \geq M_1, M_2 ... M_K) = min\ V(M \geq M_I), i = 1, 2...k$$

So remove blur of S_1, S_2, S_3, S_4, S_{11}, S_{12}, S_{13}, S_{14} as:

$$v(S_1 \geq S_2) = 0.739\ \ v(S_1 \geq S_3) = 1\ \ v(S_1 \geq S_4) = 0.514$$

$$v(S_2 \geq S_1) = 1\ \ v(S_2 \geq S_3) = 1\ \ v(S_2 \geq S_4) = 0.762$$

$$v(S_3 \geq S_1) = 0.888\ \ v(S_3 \geq S_2) = 0.539\ \ v(S_3 \geq S_4) = 0.762$$

$$v(S_4 \geq S_1) = 1\ \ v(S_4 \geq S_2) = 1\ \ v(S_4 \geq S_3) = 1$$

$$v(S_{11} \geq S_{12}) = 1\ \ v(S_{11} \geq S_{13}) = 1\ \ v(S_{11} \geq S_{14}) = 1$$

$$v(S_{12} \geq S_{11}) = 0.851\ v(S_{12} \geq S_{13}) = 0.584\ v(S_{11} \geq S_{14}) = 0.943$$

$$v(S_{13} \geq S_{11}) = 0.382\ \ v(S_{14} \geq S_{12}) = 0.679\ \ v(S_{14} \geq S_{13}) = 1$$

It gets the minimum value through comparing digital of each line as

$$(0.514\ \ 0.762\ \ 0.247\ \ 1)\ (1.00\ \ 0.851\ \ 0.382\ \ 0.504)$$

With the standardization of the above weight values, it gets the final weight of each index.

Standardization point to make $(a\ \ b\ \ c\ \ d)$ to

$$\left(\frac{a}{a+b+c+d}\ \frac{b}{a+b+c+d}\ \frac{c}{a+b+c+d}\ \frac{d}{a+b+c+d} \right)$$

The final weight of the index:

$$(w_{s_1}\ \ w_{s_2}\ \ w_{s_3}\ \ w_{s_4}) = (0.204\ \ \ 0.302\ \ \ 0.098\ \ \ 0.396)$$

$$(w_{s_{11}}\ \ w_{s_{12}}\ \ w_{s_{13}}\ \ w_{s_{14}}) = (0.365\ \ \ 0.311\ \ \ 0.14\ \ \ 0.184)$$

It gets the level index system of the performance evaluation of scientific research project management comprehensively as table 10.

3.3 Comprehensive evaluations

After determining the index weight, it scores to index factors according to comment set by experts. Suppose the evaluation of each factor in factor set has 4 levels, including well, good, medium and bad. The comment set: V = {well , good v_2, medium v_3, bad v_4}, u_1 = {Research

Target layer	Rule layer	Weight	Factor layer	weight
The performance evaluation of scientific research project management	Project guarantee	0.20	Research team quality	0.37
			Research performance	0.31
			Scientific research conditions ensure	0.14
			Project management status	0.18
	Fund budget	0.30	Fund budget audit	0.45
			Budget approval	0.25
			Budget implementation	0.30
	Process management	0.10	Funds rules construction	0.30
			Spending projects and access	0.30
			Funds management and supervision	0.40
	Project performance	0.40	Research results	0.46
			Economic benefits	0.26
			Social effects	0.28

Table 10. Hierarchy evaluation index system of the University scientific research project management performance

Evaluation index	Expert 1	Expert 2	Expert 3	Expert 4	average
Well	0.15	0.28	0.19	0.23	0.2125
Good	0.57	0.55	0.59	0.47	0.545
Medium	0.23	0.15	0.19	0.22	0.1975
Bad	0.05	0.02	0.03	0.08	0.045

Table 11. Evaluation of research team quality indexes

team quality, Scientific research conditions ensure, Research performance, Project management status} = $\{R_1', R_2', R_3', R_4'\}$. Experts scored one class index through the evaluation of the second index, then it random extract four score sheets to carry on the analysis from the form by visiting survey or telephone consultation the relevant experts. Among them, the evaluation of research team quality indexes is showed as the following table 11:

From the table, it get that for the performance of research team quality, the expert evaluation 20% think well, 55% think good, 20% think general, 5% think that bad. There is one line matrix R_1' to show the evaluation results:

$$R_1' = (0.2, 0.55, 0.2, 0.55)$$

Similarly, assume that experts evaluate scientific research conditions guarantee, the scientific research achievement and the project management situation, then the evaluation results constitute the fuzzy relation matrix of project guarantee index valuation results:

$$\text{guarantee index } R_1 = \begin{Bmatrix} 0.2 & 0.55 & 0.2 & 0.55 \\ 0.1 & 0.8 & 0.1 & 0 \\ 0.2 & 0.7 & 0.1 & 0 \\ 0.1 & 0.8 & 0.1 & 0 \end{Bmatrix}$$

Reference table 10, and multiply by so it get the fuzzy subset:

$$B_1 = A_1 \times R_1$$

$$= (0.37 \;\; 0.31 \;\; 0.14 \;\; 0.18) \times \begin{bmatrix} 0.2 & 0.55 & 0.2 & 0.55 \\ 0.1 & 0.8 & 0.1 & 0 \\ 0.2 & 0.7 & 0.1 & 0 \\ 0.1 & 0.8 & 0.1 & 0 \end{bmatrix}$$

$$= (0.151 \;\; 0.6935 \;\; 0.137 \;\; 0.0185)$$

From the comprehensive evaluation results, it know that experts on the evaluation results about 15% is good, 69% think good and 14% think that moderate, 2% think the poor about the project guarantee index of the project. In the same way, it takes other indicators of scientific research project performance management as scientific research budgets, research fund internal control and research fund output to evaluate according to the above method, and through the fuzzy computation it get comprehensive evaluation results for $B_2 = (0.2, 0.7, 0.1, 0.02)$ $B_3 = (0.1, 0.7, 0.16, 0.04)$ $B_4 = (0.1, 0.8, 0.1, 0)$. By the "*project guarantee, research fund budget, research fund internal control, research fund output* " evaluation result for the line consists of the fuzzy relation matrix is for

$$R = \begin{bmatrix} 0.15 & 0.69 & 0.14 & 0.02 \\ 0.2 & 0.68 & 0.1 & 0.02 \\ 0.1 & 0.7 & 0.16 & 0.04 \\ 0.1 & 0.64 & 0.21 & 0.05 \end{bmatrix}$$

Then it makes weight distribution coefficient vector A and the fuzzy relation matrix R for multiplication, and The comprehensive fuzzy evaluation set B is defined as shown below.

$$B = A \times R$$

$$= (0.2 \quad 0.3 \quad 0.1 \quad 0.4) \times \begin{bmatrix} 0.15 & 0.69 & 0.14 & 0.02 \\ 0.2 & 0.68 & 0.1 & 0.02 \\ 0.1 & 0.7 & 0.16 & 0.04 \\ 0.1 & 0.64 & 0.21 & 0.05 \end{bmatrix}$$

$$= (0.14 \quad 0.668 \quad 0.158 \quad 0.034)$$

According to the maximum subjection principle in fuzzy math, and the maximum subjection principle is close to the good, so this research project performance management situation is good.

4. Conclusions

It is very important for the management of scientific research projects to establish a performance evaluation model which can evaluate the projects effective and reasonable. This paper is based on the actual demand of the scientific research project management performance, and put forward the fuzzy hierarchy performance method which combined Analytic hierarchy process and fuzzy evaluation method. We transform the complex problem about scientific research project management into several factors, though the qualitative and quantitative analysis. Then, we invite experts to score the related factors, and construct the fuzzy triangular matrix to get the ultimate weight through to blur and standardization, so that it can makes the actual system situation and the experts' professional knowledge or experience quantitative. This method can reflect the influence of indexes objectivity, avoiding the randomness of subjective evaluation. In addition, it is easy to judge the benefits of the various projects from the score in the form of evaluation, and this will helps us to evaluate the project performance effective.

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Author Biographies

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