The Fuzzy Comprehensive Evaluation Method of Civil Servant in the Application of Evaluation

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Abstract—In this paper, fuzzy comprehensive evaluation method is applied to the assessment of the Civil servant, first of all divided into four kinds based on attributes in each kind was divided into four minor sorts, has implemented the single factor judgment first in each kind, then synthesized has implemented the second-level judgment, finally gave this model Matlab to realize. Through this kind of fuzzy comprehensive evaluation method good consideration various factors synthesis influence,the role which played to the Civil servant has carried on the science appraisal.

Keywords-Civil Servant ; Assessment System ; Fuzzy Comprehensive Evaluation Method ; Matlab Realize

1. Introduction

Civil servants in public administration plays an important role in an orderly and efficient society must have a number of outstanding civil servants play an active role, that civil service will directly affect the quality of the entire community. As citizens of the civil service itself is their words and deeds affect the citizens of the community, they can take the lead role is crucial, is to further develop and strengthen social work important to rely on force. How fair, impartial, scientific evaluation is extremely important to the civil service, the evaluation results good will increase the civil service initiative, both for their clear effort, but also strengthen the civil service training, management of a measure. Civil service examination is a complex system, need to consider many factors, factors that are there at different levels, weight distribution is difficult to detail that even the weight of a certain out, the share of each factor the weight is often very small. Application of fuzzy comprehen-sive evaluation method for assessment of civil servants can be better to consider the combined effects of various factors, fair, impartial, scientific evaluation of civil service. Commonly used evaluation model denoted by $M(\wedge,\vee)$, B calculated using $\max-\min$ synthesis operations, i.e. $B = A \circ R$, where $b_j = \underset{i=1}{\overset{n}{\vee}}(a_i \wedge r_{ij})(j = 1,2,\cdots,m)$. In this paper one of the factors to take into accounts the comb-ined effects, the choice of model type $M(\cdot,+)$-weighted average: denoted by $B = A \cdot R$ the element is calculated as:

$$b_j = \overset{n}{\underset{i=1}{\oplus}}(a_i \cdot r_{ij}) = \sum_{i=1}^{n} a_i r_{ij},(j = 1,2,\cdots,m)$$

It is the use of real number multiplication increases, that instead of using ordinary multiplication of real numbers $\wedge$ in model $M(\wedge,\vee)$, $+$ instead of $\vee$ in model $M(\wedge,\vee)$.

2. Fuzzy comprehensive evaluation model and solution

According to the study's purpose, you need to select the appropriate assessment indicators, the establishment of a can from a different perspective, reflecting different aspects of the evaluation index system of evaluation objects. Fuzzy comprehensive evaluation requires the use of the indicator system consisting of multiple index select the evaluation should follow the principles of purpose, objectivity, comprehensiveness, sensitivity and mutual independence, the comparability and operable. In the fuzzy comprehensive evaluation, the importance of weighing the value of different projects is called the weight, or weight; in the evaluation, the need for the purpose of the evaluation of each target within the meaning given to the appropriate weight. This system is a multi-level evaluation projects, and requires each one level, the same level of the sum of the weights of items are equal to Civil service examination taken in many ways, but no matter what methods are a

lot of factors involved, to be fair, impartial and scientific assessment of the civil service, but also to give full play to initiative of all citizens, asked each citizen to the civil service examination.

This model uses two fuzzy comprehensive evaluations, the first set U of comprehensive evaluation to determine the civil service.

Factor set $U = \{U_1, U_2, U_3, U_4\} = \{$moral character; ability to work; expression; other$\}$

(1) For low-level judge, respectively, on the moral character, working ability, skills, comprehensive evaluation of learning ability.

Factor set $U_1 = \{$superior-subordinate relationship u_{11}, the relationship between colleagues u_{12}, discipline u_{13} sense of service $u_{14}\}$; factor set $U_2 = \{$work performance u_{21}, coordination u_{22}, management ability u_{23}, organizational skills $u_{24}\}$; factor set $U_3 = \{$clear thinking u_{31}, quick thinking u_{32}, clear concise u_{33}, concise statement shall $u_{34}\}$; factor set $U_4 = \{$innovation u_{41}, awards u_{42}, attendance u_{43}, practice capacity $u_{44}\}$.

Evaluation grade set $V = \{$excellent v_1, good v_2, moderate v_3, and poor $v_4\}$

Each of the evaluation factors to determine the levels of these four specific evaluations can be used to represent A, B, C, D corresponding level, and provides a collection of V for each civil servant can only be selected one rating.

(2) Group in the civil service of every citizen of a superior-subordinate relationship factors to score, if a civil servant, "superior-subordinate relationship u_{11}" aspects of the evaluation results as excellent, good, moderate, poor accounting for $15\%, 50\%, 15\%, 20\%$, we obtain evaluation of the first row of the result matrix U_1, which $R_{11} = \{0.15, 0.5, 0.15, 0.2\}$; Similarly, civil servants can get the relationship between colleagues, discipline, sense of service and other aspects of evaluation results:
$$R_{12} = \{0.2, 0.4, 0.2, 0.2\}, R_{13} = \{0.1, 0.6, 0.1, 0.2\}$$
$$R_{14} = \{0.3, 0.3, 0.1, 0.3\}.$$

Evaluation of single elements have U_1 matrix
$$R_1 = \begin{pmatrix} 0.15 & 0.5 & 0.15 & 0.2 \\ 0.2 & 0.4 & 0.2 & 0.2 \\ 0.1 & 0.6 & 0.1 & 0.2 \\ 0.3 & 0.3 & 0.1 & 0.3 \end{pmatrix},$$

Please weight distribution $A_1 = (0.3, 0.4, 0.1, 0.2)$ of the relevant expert, using the model $M(\cdot, +)$, evaluation results $B_1 = A_1 \cdot R_1$

(3) Have the civil servants in the "ability to work U_2" single element in the evaluation matrix for the
$$R_1 = \begin{pmatrix} 0.15 & 0.35 & 0.3 & 0.2 \\ 0.15 & 0.3 & 0.2 & 0.35 \\ 0.2 & 0.4 & 0.3 & 0.1 \\ 0.2 & 0.3 & 0.35 & 0.15 \end{pmatrix}$$

Please weight distribution $A_2 = (0.3, 0.3, 0.1, 0.3)$ of the relevant expert, using the model $M(\cdot, +)$, evaluation results $B_2 = A_2 \cdot R_2$.

(4) Have the civil service in the "ability to express U_3" single element in the evaluation matrix for the
$$R_3 = \begin{pmatrix} 0.2 & 0.45 & 0.3 & 0.05 \\ 0.2 & 0.25 & 0.2 & 0.35 \\ 0.2 & 0.5 & 0.2 & 0.1 \\ 0.3 & 0.35 & 0.2 & 0.15 \end{pmatrix},$$

Please Weight distribution $A_3 = (0.3, 0.2, 0.4, 0.1)$ of the relevant expert, using the model $M(\cdot, +)$, evaluation results $B_3 = A_3 \cdot R_3$.

(5) The civil servants had "other U_4" single element in the evaluation matrix for

$$R_4 = \begin{pmatrix} 0.2 & 0.4 & 0.2 & 0.2 \\ 0.2 & 0.5 & 0.2 & 0.1 \\ 0.18 & 0.32 & 0.3 & 0.2 \\ 0.35 & 0.3 & 0.2 & 0.15 \end{pmatrix}$$

Please Weight distribution $A_4 = (0.3, 0.35, 0.2, 0.15)$ of the relevant expert, using the model $M(\cdot, +)$, evaluation results $B_4 = A_4 \cdot R_4$.

Finally, according to the above results for the second evaluation of the model, this level of the factor set $U = \{U_1, U_2, U_3, U_4\}$ = {moral character; ability to work; expression, other}, set of evaluation grades is still V = {excellent v_1, good v_2, moderate v_3, bad v_4}, have the $R = (B_1, B_2, B_3, B_4)^T$. Level evaluation matrix for the weight of the expert, please $A = (0.2, 0.35, 0.3, 0.15)$, with the model $M(\cdot, +)$, evaluation results $B = A \cdot R$.

3. Fuzzy Comprehensive Evaluation Model of the Matlab implementation

```
Clear all
Close all
V=[1,2,3,4];
R1= [0.15 0.5 0.15 0.2; 0.2 0.4 0.2 0.2; 0.1 0.6 0.1 0.2; 0.3 0.3 0.1 0.3];
A1= [0.3 0.4 0.1 0.2];
R1 (:,:, 2)=[0.15 0.35 0.3 0.2;0.15 0.3 0.2 0.35;0.2 0.4 0.3 0.1;0.2 0.3 0.35 0.15];
A1 (:,:,2)=[0.3 0.3 0.1 0.3];
R1 (:,:, 3)=[0.3 0.45 0.3 0.05;0.2 0.25 0.2 0.35;0.2 0.5 0.2 0.1;0.3 0.35 0.2 0.15];
A1 (:,:,3)=[0.3 0.2 0.4 0.1];
R1(:,:,4)=[0.2 0.4 0.2 0.2;0.2 0.5 0.2 0.1;0.18 0.32 0.3 0.2;0.35 0.3 0.2 0.15];
A1 (:,:,4)=[0.3 0.35 0.2 0.15];
A= [0.2 0.35 0.3 0.15]
R=ones (4,4);
for k=1:4
R (k,:)=A1(:,:,k)*R1(:,:,k)
end
B=A*R
b=B (1);k=1;
for i=2:4
if b<B(i)
b=B (i);k=i
end
end
result = V(k)
The result is
B = 0.2033    0.3863    0.2327    0.1866
result   = 2
```

The civil service test results as "good", indicating that the share of the work of competent civil servants.

Commentary: The fuzzy comprehensive evaluation, the weight is very important, it directly affects the results of assessment, the weight of the selection, assessment results may vary, so the examination is necessary to select the appropriate weight.

Conclusion: This is the second judge in the use, can also be used according to the actual situation in a similar way to three judges, four judges, and even more levels of evaluation, or evaluation for the class is divided into more, and then sub-category more subcategories, at this time is very tedious manual calculation, you need a lot of time, a lot of manpower, some errors will occur, resulting evaluation is not reasonable, fair, and science. using Matlab to solve the evaluation system to better assessment many indicators, classification and more problems, as long as the Matlab program enter the appropriate data, the results can be obtained. Using Matlab computing can save a lot of time, and can reduce the errors of human calculation. Matlab fuzzy comprehensive evaluation and a combination of Methods for assessment of cadres, to make assessment a

more just, reasonable, scientific and effective, and can also be applied to other areas related to civil service examination.

4. Acknowledgment

5. References

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