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Construction and Simulated Experiment of Comprehensive Evaluation Model for Information Policy Scheme

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Abstract. The scientific evaluation of information policy plan is the basis of the implementation of information policy. This paper proposes the comprehensive evaluation indicates system of the information policy scheme, constructs the evaluation model by using fuzzy comprehensive evaluation method, and has confirmed the model's feasibility and practicability by simulated experiment.

1. Introduction

China's information policy research began in the late 1970s, due to the important position and indispensable role of information policy in the national information construction[1], the problem of studying the information policy making plan is becoming more and more prominent. How to evaluate the information policy scheme and make rational and effective use of it to guide the implementation of information policy has become an important subject of quantitative and scientific research on information policy[2].

2. Evaluation of information policy scheme and fuzzy comprehensive evaluation

The Information policy scheme is the basic premise of all information policy implementation, and also an important guarantee for the scientific operation of information policy. The quality of the scheme is not simply evaluated by a single factor, but by a variety of factors[3], which requires a comprehensive evaluation method, and the evaluation results are often very good, generally good, bad with fuzzy color evaluation[4], Because of the above reasons, this paper uses the fuzzy comprehensive evaluation method to predict the information policy scheme[5]. It not only solves the complex problem of multi-factor influence, but also meets the fuzziness requirement of comment.

3. Constructing Fuzzy Comprehensive Evaluation Model of Information Policy Scheme

3.1 Determination of the comprehensive evaluation index system (factor set) and evaluation set of information policy programmes

The author puts forward an index system which is composed of basic indexes according to the principle of constructing the evaluation index system of information policy scheme[6]. The factor set is U={u1, u2, u3...u10}, and the commentary is V={v1, v2, v3, v4, v5}. For different factors and the value of information, the 5 level commentary focused on different meanings[7]. The specific meaning of the comment set corresponding to different factors is shown in Table 1.

Table 1. comprehensive evaluation indicators of information policy options (factors) and corresponding Reviews

Factor set U	Comment set V
Clarity of objectives u1	[Very clear, clear, relatively clear, fair, ambiguous]
Innovativeness u2	[Very novel, novel, relatively novel, fair, old]
Timeliness u3	[Very strong, strong, relatively strong, fair, weak]
Scientific u4	[Very strong, strong, relatively strong, fair, weak]
Normative u5	[Very standardized, standardized, relatively standardized, fair, non-standardized]
Integrity u6	[Very complete, complete, relatively complete, fair, incomplete]
Authoritative u7	[Very authoritative, authoritative, relatively authoritative, fair,unauthoritative]
Degree of cognition u8	[The best, better, good, fair, bad]
Degree of interest regulation u9	[The best, better, good, fair, bad]
Degree of enforceabilityu10	[Very authoritative, authoritative, relatively authoritative, fair, unauthoritative]

3.2 determination of the factor weighting coefficient Wi for judging information policy schemes

In each basic evaluation index, the degree of reflection and influence of each index on the information policy scheme is different, that is, the weight is different, so it is necessary to distribute the weight of each index[8]. Practice has proved that AHP is especially suitable for dealing with complex problems which are difficult to complete quantitative analysis. Therefore, this paper intends to use AHP analytic hierarchy process to determine the weights of each index.

3.2.1Comparative judgement and determination of comparative order of importance of factors

The psychological experiments show that most people have the ability to distinguish between the same attributes of different things in the range of 1-9. Therefore, the 1-9 scale method proposed by American Professor SAATY is used to reflect the judgment ability of most people[9]. According to the scale method, this paper compares the indexes of each layer, constructs a judgment matrix, and assigns the value according to the scale of 1-9.

3.2.2 Establishes judgement matrix and determines relative weight.

According to the rules of the scale law, experts determine the size of the evaluation factors U1 ~ U10 of the model to play a role in the evaluation of the target, two comparisons, get the judgment matrix. Assuming that the relative weight of the evaluation factor u1-u1 0 of the model is Wi (i=1,2,3...,10), the relative weight Wi, the consistency index CI, the maximum characteristic root and the random consistency ratio CR of each factor can be calculated by MATLAB 7.0 simulation software.

Table 2 the judgement matrix and relative weight table of factor set U

U	u1	u2	u3	u4	u5	u6	u7	u8	u9	u10	Wi
u1	1	2	3	2	5	3	2	3	2	3	0.194
u2	1/2	1	3	2	3	3	2	3	2	2	0.157
u3	1/3	1/3	1	1/3	3	1/2	1/3	1/3	1/4	1/5	0.037
u4	1/2	1/2	3	1	3	2	2	2	2	3	0.136
u5	1/5	1/3	1/3	1/3	1	1/3	1/5	1/3	1/4	1/5	0.026
u6	1/3	1/3	2	1/2	3	1	1/4	1/4	1/5	1/6	0.042
u7	1/2	1/2	3	1/2	5	4	1	2	3	2	0.128
u8	1/3	1/3	3	1/2	3	4	1/2	1	2	1/2	0.082
u9	1/2	1/2	4	1/2	4	5	1/3	1/2	1	1/2	0.084
u10	1/3	1/2	5	1/3	5	6	1/2	2	2	1	0.114

$\lambda_{\max} =$ 11.103, CI=0.123 RI=1.49 CR=0.082<0.1, Meeting the requirement of consistency

3.3 Determination of Fuzzy Comprehensive Evaluation matrix for information policy schemes.

Each factor in the factor set U is evaluated, and the fuzzy mapping f from U to V is obtained, from which the fuzzy relation Ri ∈ F (Ui × V),i=1,2. The members of the expert group evaluate the factors of the information policy scheme according to the evaluation set, and construct the evaluation vector and fuzzy matrix of each factor from the evaluation results. For example, the evaluation vector of the first factor of the set U is (ri1, ri2, ri3, ri4,ri5) (i=1,2,⋯10)The fuzzy evaluation matrix of the corresponding set of factors U is as follows:

$$\underset{\sim}{R} = \begin{vmatrix} r11 & r12 & \cdots & r15 \\ r21 & r22 & \cdots & r25 \\ \vdots & \vdots & \vdots & \vdots \\ ri1 & ri2 & \cdots & ri5 \end{vmatrix}$$

Among r_{ij} = experts rated as J level / the total number of experts (i=1,2... 10, j=1,2,... 5), which can be interpreted as the subordinate factor of the I level of comment J.

3.4 The result of Fuzzy Comprehensive Evaluation of calculating information policy scheme

The evaluation vector of information policy plan is V=W • R= (v_{c1} , v_{c2} ⋯ v_{c5}), v_{ci} (i=1,2,⋯,5)membership degree of the information policy scheme to the I level comment. The final comment level is (the best, better, good, fair, bad). According to the principle of maximum subordinate degree, the comment on the evaluated information policy is $v_{c\max}=\max v_{ci}$ (1⩽i⩽5).

4. Model simulation experiment

Now 10 experts evaluate a certain information policy scheme according to the model set up in this paper. Firstly, the evaluation level of each influencing factor is determined, Secondly, the fuzzy evaluation matrix of the factor set U of the scheme is determined as follows:

$$\underset{\sim}{R} = \begin{vmatrix} 0.1 & 0.9 & 0.1 & 0 & 0 \\ 0 & 0.3 & 0.8 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ 0.1 & 0.3 & 0.4 & 0 & 0 \end{vmatrix}$$

Finally, the evaluation vector of the information policy scheme is V = W • R = (0.1, 0.195, 0.157, 0.037, 0.026) and normalized V=(0.18, 0.40, 0.29, 0.08, 0.05). The results showed that 18% thought the scheme was the best, 40% thought it was better, 29% thought it was good, 8% thought it was fair, and 5% thought it was bad. According to the principle of maximum membership $v_{c\max}$=0.4 can be finally determined. That is, the information policy scheme is a good and can be implemented.

5. Summary

In this paper, the scheme of information policy is discussed and a fuzzy comprehensive evaluation model of information policy is established to solve the problem of whether the scheme of information policy is reasonable and effective, so as to ensure the correct implementation of information policy and achieve the desired results.

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