

The Fuzzy Judgement on the Service Quality of the University Department Reference Room

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Abstract: A measure representation of the university department reference room service quality is given in this paper by using the fuzzy comprehensive judgement model. This model can be widely used in the scientific management.

Keywords: daily circulation reading, second reference, good-bad degree value.

1. Introduction

The university reference room is such a special information organization as handles the scholarism, technology and service as a whole. It is of benefit to us according to the specialized subjects set up and the research topics. The service quality has direct influences on teaching and research work. Therefore, how to evaluate the service quality reasonably is an important thing which may improve the active role of management. The concept of service quality is a fuzzy concept which has been believed as an unmeasurable concept. We try to measure it with the fuzzy judgement method and give the good-bad service degree value. By comparing the values we can see the differences among the managers and the reference rooms concerned. This method can improve the subjective judgement in some way, and obtain an objective value.

2. Fuzzy mathematical model determining the good-bad degree value of service quality

2.1 Establishing the index element set: This means suggesting the content and standard of the good-bad service quality. We make use of the following elements as the determining index.

2.1.1 Everyday circulation reading information: This concerns whether the service is active, whether the provided material is correct, whether the borrowing quantity is large, and whether the attendance rate of the manager is high.

2.1.2 The collection and arrangement information: This concerns whether the collection and the classification of the cards of the contents and newspapers are complete, whether the distribution of books and magazines is on time and correct, whether the quantity of copies and circulation materials is large.

2.1.3 The second reference information: This concerns whether the special reference arrangement and the card making are complete and correct.

2.1.4 The circulation information: This concerns whether the following items of service are in time: i.e. the report on the circulation information about the scientific research, publishing and scientific activity, and the distribution of the teaching materials, reference books, newspapers, and magazines exchanging.

2.1.5 The other information: This concerns whether the arrangement of the used newspapers, magazines is in time and whether the reference room is kept clean.

2.2 For every single element, suggest the compare set, that is, good, middle, and bad. This is denoted as follows: $C = \{\text{good, middle, bad}\}$

2.3 Establishing the table of the frequency number distribution of compare classes.

The table of the frequency number distribution of compare classes is a fuzzy matrix R . In order to obtain the fuzzy matrix R reasonably, the invited experts responsible for the judgement must have right thought. They are to make a sign " \surd " in the following table and then collect the tables to make a calculation of the numbers.

(Table 1) Table of service quality evaluation

items	Everyday circulation reading			collection and arrangement of materials			second reference			report on information			others		
	good	middle	bad	good	middle	bad	good	middle	bad	good	middle	bad	good	middle	bad
comments															
reference rooms															

(Table 2) Table of frequency number distribution

items	frequency		good		middle		bad	
	number	%	number	%	number	%	number	%
Everyday circulation reading								
collection of materials								
second reference								
report on information								
others								

2.4 Fill in the frequency table with evaluation results, then establish the single element fuzzy judgement matrix R.

2.5 Establishing the weight number set A

In the fuzzy judgement, taking the weight is very important. It can influence the result directly. The weight numbers ought to be obtained from the practice and the weight number which can reflect the main object of reference room service ought to be big enough. For example, the weight of such major items as everyday circulation reading, collection and arrangement of materials, second reference etc. ought to be bigger than the others.

2.6 Making the product of A and R by using the calculating method of fuzzy matrix (taking min or max), we obtain $A \circ R$, and then obtain the unified matrix B (see reference (1)).

2.7 The value of calculating $B \times \bar{C}$ is the good-bad degree value of service quality. Here matrix \bar{C} is the turned matrix of C.

3. The example for application

The reference room of a certain mathematics department contains twenty thousand books, eighty-seven types of magazine, twelve types of newspaper, and there are fifty-four teachers working in the department. The result can be obtained by the 10-expert judgement group as the following:

(Table 3) Table of service quality evaluation of the Mathematics Department reference room

items comments experts	everyday circulation reading			collection and arrangement of materials			second reference			report on information			others		
	good	mid- dle	bad	good	mid- dle	bad	good	mid- dle	bad	good	mid- dle	bad	good	mid- dle	bad
No.1	✓				✓		✓				✓			✓	
No.2	✓			✓			✓			✓					✓
No.3		✓		✓				✓		✓			✓		
No.4	✓			✓				✓			✓			✓	
No.5	✓				✓		✓			✓				✓	
No.6	✓			✓			✓			✓				✓	
No.7	✓			✓			✓			✓				✓	
No.8	✓			✓				✓			✓			✓	
No.9		✓			✓			✓		✓			✓		
No.10	✓			✓				✓			✓			✓	

The result of the table above is as follows:

Everyday circulation reading (0.8,0.2, 0)

Collected and arranged materials (0.7,0.3,0)

Second reference (0.5,0.5,0)

Information report (0.6,0.4,0)

Others (0.2,0.7,0.1)

Taking single element, we obtain the judgement matrix below:

$$R = \begin{bmatrix} 0.8 & 0.2 & 0 \\ 0.7 & 0.3 & 0 \\ 0.5 & 0.5 & 0 \\ 0.6 & 0.4 & 0 \\ 0.2 & 0.7 & 0.1 \end{bmatrix}$$

According to the amount of work and the experts' compare, the

weight numbers are as follows:

Everyday circulation reading 0.28
 Collected and arranged materials 0.25
 Second reference 0.17
 Information report 0.2
 Others 0.1

That is

$$A=(0.28, 0.25, 0.17, 0.2, 0.1)$$

Calculating product matrix

$$A \circ R=(0.28, 0.25, 0.17, 0.2, 0.1) \circ \begin{bmatrix} 0.8 & 0.2 & 0 \\ 0.7 & 0.3 & 0 \\ 0.5 & 0.5 & 0 \\ 0.6 & 0.4 & 0 \\ 0.2 & 0.7 & 0.1 \end{bmatrix}$$

$$=(0.28, 0.25, 0.1)$$

Making $A \circ R$ unified

$$B=(0.44, 0.40, 0.16)$$

The matrix B represents that there are 44% experts believing that the service quality is good, 40% experts believing middle, and 16% experts believing bad. In order to get a value, that is, the good-bad degree value of service quality, we take a number in $(0,1)$. The higher the service quality, the larger the number is, and vice versa. The value "1" means absolutely good, and "0" indicates absolutely bad.

The comment class set is $C=(0.8, 0.5, 0.2)$, then

$$B \times \bar{C}=(0.44, 0.4, 0.16) \times \begin{bmatrix} 0.8 \\ 0.5 \\ 0.2 \end{bmatrix} =0.584$$

(In which \bar{C} is the turned matrix of C). This result is the good-bad value of service quality. This value means the service quality is a little above middle.

4. Some notes:

4.1 The good-bad value of service quality is the measure representation of the service quality. It is more concrete and convincing than the qualitative comment.

4.2 This model is simple and workable. It has wide applications

and can be used in different units and different trades.

4.3 This model has practical value for scientific management. It has been programmed as the software that can be used easily.

References

- (1) Wang Peizhuang, *Fuzzy Set Theory and Its Application*, Shanghai Science and Technology Publishing Company, 1983.
- (2) He Songzhen, "Department Reference Room Measure Management", *The Work of Information and Material*, 1990(3).