

Study on Satisfaction of Customer with Inns Based on Fuzzy Mathematics for Comprehensive Evaluation

Taking Puzhehei Scenic Spot Inns in Wenshan County, Yunnan Province as an Example

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Abstract¹—This paper takes the inns of Puzhehei Scenic Area, Wenshan County, Yunnan Province as the research object. Through the customer evaluation data provided by Qunar.com, the satisfaction of customer is studied. The fuzzy mathematics method for comprehensive evaluation is adopted in the research process. The evaluation results show that customers have a high overall satisfaction with the service quality of Puzhehei Scenic Spot Inns. But in the qualitative evaluation of customer network, the author found some problems about the hotel. In order to further improve the service quality of the hotel, this paper proposes improvement suggestions from three aspects: improving hotel facilities and equipment, strengthening staff training and improving catering level.

Keywords—Puzhehei; Inn; Perceived satisfaction; AHP; Fuzzy evaluation comprehensive method

I. INTRODUCTION

Puzhehei Scenic Area is affiliated to Qiubei County of Yunnan Province. It is located in the northwest of Wenshan Zhuang and Miao Autonomous Prefecture in Yunnan Province. Since the end of 2014, the third place of the first season in *Where Are We Going, Dad* was filmed in Puzhehei, the small village was completely displayed in front of the national audience. Its beautiful scenery, simple folk customs and unique ethnic customs are desirable. In January 2017, with the hit of the TV series *Once Upon a Time*, the shooting place of the “Qingqiu” was popular with more tourists, so there were a large number of inns in the Puzhehei scenic area. The competition between them has also become increasingly fierce. How to provide better service to improve customer satisfaction has become the key for the inns to gain a favorable position in the competition. Therefore, this paper intends to study the satisfaction of customer of Puzhehei scenic spot in order to provide some references for the improvement of the inn's competitiveness[1].

II. DATA SELECTION

With the increasing integration of network technology and hotel industry, customers' comprehensive evaluation of living experience on the Internet has been increasing. In addition to getting information or advice from traditional channels, many

customers will pay more attention to the comments of other customers on online review websites and community platforms before booking accommodation[2]. They trust online customers even more than experts and merchants. Therefore, the credibility and reference significance of online review data can meet the needs of this study[3].

At present, there are many websites for hotel evaluation in China, but mainly focus on Ctrip.com, Qunar.com and eLong.com. Among them, the hotel evaluation information of Qunar.com is more authoritative and comprehensive, which can guarantee the integrity of the sample. Therefore, this study selects the customer evaluation data of Qunar.com as the source of information. The starting time is August to October 2017. The customer evaluation data of Qunar.com is divided into two parts: quantitative evaluation and qualitative evaluation. The quantitative evaluation uses grade 1, grade 2, grade 3, grade 4, grade 5, the five grades to evaluate the catering, inn service, facilities and equipment, inn sanitation, and location environment. From the evaluation results, the service quality is increasing from grade 1 to grade 5. In this paper, grade 1 means very poor, grade 2 means poor, grade 3 means average, grade 4 means good, and grade 5 means excellent. Qualitative evaluation mainly refers to the specific comments given by the customer to the hotel. It is mainly expressed by text description, which can reflect the details of the hotel service quality.[4]

There are 519 inns around Puzhehei Scenic Area. In this study, 30 inns with more than 100 customer reviews were selected as research objects, and a total of 6102 customer reviews were collected.

III. RESEARCH PROCESS

A. Evaluation elements, comment collections, and weights of each element

In the evaluation of the service quality of the surrounding inns in Puzhehei Scenic Area, this paper intends to adopt AHP-single level fuzzy comprehensive evaluation method. It is based on the evaluation indicators provided by Qunar.com, combined with customer network reviews, evaluation elements select five evaluation indicators: catering, inn service, facilities and equipment, inn sanitation, and location and environment. The collection of evaluation elements is:

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$$Y = \{Y1, Y2, Y3, Y4, Y5\} \quad (1)$$

In (1), U represents a collection of all the evaluation indicators, of which U1 stands for catering, U2 stands for inn service, U3 stands for facility and equipment, U4 stands for inn sanitation, U5 location environment. When evaluating each element, the evaluation criteria are divided into five grades of "excellent", "good", "average", "poor" and "very poor" according to the needs of the evaluation. In (2), the collection of reviews is:

$$V = \{\text{excellent, good, average, poor and very poor}\} \quad (2)$$

TABLE I. WEIGHT COEFFICIENT OF EVALUATION ELEMENTS

	U1	U2	U3	U4	U5	Weight coefficient (W)
U1	1	1/7	1/3	1/5	1/3	0.051
U2	7	1	2	2	2	0.370
U3	3	1/2	1	1/2	2	0.181
U4	5	1/2	2	1	2	0.262
U5	3	1/2	1/2	1/2	1	0.136
$\lambda_{\max} = 5.107$ CI = 0.026 CR = 0.024						

In fuzzy comprehensive evaluation, the calculation of weight is an important content that directly affects the evaluation results[5]. It is mainly to measure the relative importance of each factor and determine its weight coefficient. At present, the methods for determining the weight of indicators mainly include subjective valuation method and objective valuation method[6].

In Table I, CR = 0.024 < 0.1, it judges the matrix to be consistent through the consistency check.

It obtains the weights of the above four indicators through the analytic hierarchy process. Based on this, a single-level fuzzy evaluation method was used to evaluate 30 hotels.

First of all, for i evaluation factors U_i ($i = 1, 2, 3, 4, 5$), the membership degree of each evaluation grade is obtained to form an evaluation decision matrix $R_{ij} = [r_{i1}, r_{i2}, r_{i3}, r_{i4}, r_{i5}]$. In (3), the evaluation decision matrix of the four evaluation factors is:

$$\begin{bmatrix} R1 \\ R2 \\ R3 \\ R4 \\ R5 \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} & r_{13} & r_{14} & r_{15} \\ r_{21} & r_{22} & r_{23} & r_{24} & r_{25} \\ r_{31} & r_{32} & r_{33} & r_{34} & r_{35} \\ r_{41} & r_{42} & r_{43} & r_{44} & r_{45} \\ r_{51} & r_{52} & r_{53} & r_{54} & r_{55} \end{bmatrix} \quad (3)$$

Let the weight distribution of each evaluation factor be $A = (a_1, a_2, a_3, a_4, a_5)$. In (4) the comprehensive evaluation result is:

$$B = AR \quad (4)$$

According to the collection of reviews, the results of the comprehensive evaluation are judged according to the principle of membership degree, and the evaluation result of the customer's satisfaction with the hotel is obtained.

TABLE II. NETWORK EVALUATION RESULTS OF CUSTOMERS ON THE HOTEL AROUND PUZHEHEI SCENIC SPOT

Evaluation factor	Weights	Evaluation results				
		excellent	good	average	poor	very poor
catering	0.051	0.278	0.289	0.412	0.018	0.003
inn service	0.370	0.943	0.041	0.01	0.004	0.002
facilities and equipment	0.181	0.096	0.124	0.225	0.453	0.102
Innsanitation	0.262	0.165	0.142	0.288	0.369	0.036
Location and environment	0.136	0.483	0.269	0.132	0.1	0.016

According to Table II, the matrix is calculated by excel. In (5) the fuzzy comprehensive evaluation result is:

$$B = AR = (0.489, 0.126, 0.159, 0.195, 0.031) \quad (5)$$

The calculation results show that the overall service quality of the inns around Puzhehei is satisfactory to customers. However, in the specific evaluation factors, in addition to the satisfaction evaluation of "inn service" and "location and environment" is "excellent", the evaluation of "catering" is "average", the evaluation of "facility and equipment" and "inn sanitation" is "poor".

IV. CONCLUSIONS AND SUGGESTIONS

A. Conclusions

The software service score of the inns is the highest among all indicators, indicating that the service level of the inns in Puzhehei scenic area has been recognized by a large number of customers. The innkeepers are warm to the guests, their service is very attentive. They can provide customers with useful travel strategies, provide personalized shuttle services, etc.

It can be seen from the analysis of the overall evaluation data that the customers are satisfied with the location of the inns. Inns are closer to the scenic spot, the overall environment is better, and the transportation is more convenient. In addition, many inns have open-air balconies and exclusive small courtyards, providing customers with a better place to relax.

Scores are lower on hardware facilities. Most of the customers reflected that the inns have small rooms and beds, old bathroom facilities, damp rooms, poor sound insulation, poor air conditioning, weak WIFI signals and unstable hot water supply.

In terms of dining, many inns offer catering services. The taste of the dishes reflected by the customers is quite delicious. However, the variety of dishes offered by every inn is relatively simple, such as spicy crayfish, lotus leaf fried egg, lotus fish, etc.

The score of the inn sanitation is low. There were stains on the sheets, the toilet in the bathroom was dirty, and the room was smelly.

B. Suggestions

1) *Improving the facilities of the inns:* In terms of accommodation hardware facilities and equipment of inns, it is necessary to strengthen the overall planning of the inn area, improve the supporting public service facilities and equipment, strengthen the maintenance and management of the facilities and equipment of the inns, and ensure the quality of the service facilities and equipment[7]. For the problems of old bathroom facilities, poor sound insulation and humidity reflected by customers of inns, take measures to carry out active transformation within the scope of affordable operating costs. For example, replace the damaged toilet lid or old facilities in the bathroom, add some noise insulation boards in the poorly soundproof room to improve the sound insulation effect of the room and increase the moisture protection measures. At the same time, the inn can be designed like home or with national characteristics. For example, place the local decorations in the guest rooms, provide the cribs for families with children and open the self-service kitchen to make inns more comfortable and humane.

2) *Strengthen staff training and pay attention to service details:* Staffs with good professional training and perfect service skills can improve the service efficiency and hygiene of the inns[8]. Therefore, the operator of the inns should ask a special person to train the staff regularly. Meanwhile, the operator of the inns should inspect and supervise every clean room and communicate with customers in time, and then

evaluate whether the service of the inns needs to be improved, so as to make the service details more perfect.

3) *Improving catering quality and optimizing catering services:* In customer reviews, most of customers are satisfied with the food. However, they reflected that the variety is relatively single and not rich enough. In view of these problems, the inn should further enrich the catering varieties, and develop a series of dishes using lotus leaves, lotus flowers, lotus root based on the theme of local lotus and constantly innovate and make distinctive dishes.

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