Research on Quality Evaluation of Rural Hotel Based on Factor-Cluster Analysis
A Case Study of 116 Star-rated Rural Hotels in Chengdu

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ABSTRACT

This paper studies the field survey data to extracts the accommodation condition factor, safety responsibility factor, market reputation factor and service quality factor by factor-cluster analysis. We calculate scores and rankings of a single factor and comprehensive factor of rated star rural hotels by districts and all single star rural hotels in Chengdu. We cluster star rural hotels into three categories: comprehensive, general and differential. And then we analyze the correlation between the rating and quality of rural hotels. Finally, we put forward corresponding suggestions for improving the quality of star-rated rural hotels.

Keywords: Star-rated rural hotels, Quality evaluation, Factor analysis, Cluster analysis, Chengdu.

1. INTRODUCTION

With the rapid development of China's economy and the increase of residents' income, urban residents will be eager to get close to nature to ease their body and mind [1]. It is this growing demand that promotes the rise of rural tourism. In more than ten years of developing rural tourism, Chengdu has formed a trend of the rural tourism industry with farmhouse resort, rural hotels, tourism characteristic villages, and tourism ancient towns as the main products, which has effectively promoted the growth of total tourism income and the income of tourism practitioners year by year. The development of rural tourism in Chengdu has also led to the rise and development of rural hotels in Chengdu.

The rural hotel is a kind of leisure travel place between the farmhouse resort and the city business hotel. As one of the main reception facilities for the development of rural tourism, rural hotels gradually develop with the rapid development of rural tourism. However, in the development process of rural hotels, there are many problems such as imperfect infrastructure, imperfect supporting service systems, limited management levels, and backward marketing methods [2]. At the same time, the academic circle lacks a corresponding quality evaluation system for rural hotels

to evaluate them. Therefore, we use factor-cluster analysis to process field survey data and construct a index evaluation system to evaluate the quality of star-rated rural hotels in Chengdu.

2. SURVEY METHODS AND DATA COLLECTION

2.1. Survey Methods

The survey adopted the field survey method, based on the Classification and Evaluation of Tourism Service Quality of Farmhouse Resort (Rural Hotels) in Sichuan Province [3] and Detailed Rules for the Evaluation of Tourism Service Quality of Farmhouses in Sichuan Province (Rural Hotels) to design a questionnaire. And we conducted a one-month and a half unannounced field survey as a consumer in Chengdu.

2.2. Data Collection

The investigation was conducted in two ways: unannounced visits and expert visits. The unannounced visit team conducted unannounced visits as consumers or on the grounds of ordering meals such as family wedding banquets and school training to investigated the internal landscape, safety facilities, catering, accommodation,

and other reception facilities of rural hotels. The expert investigation team conducts investigations through investigations, interviews, and surveys, and organizes various primary data to form a survey score sheet. According to the survey, there are 116 star-rated rural hotels in Chengdu, of which 7 are closed and 3 are closed. The effective sample size of this survey is 106. The specific distribution is shown in Figure 1.
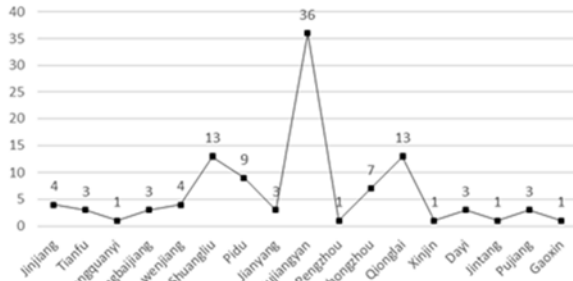

Figure 1 Number of rural hotels in each district in Chengdu.

3. ANALYSIS METHOD AND INDEX SYSTEM CONSTRUCTION

3.1. Analysis Method

We performed factor analysis on the data of Chengdu star-rated rural hotels by SPSS25.0: the first step is to standardize the data obtained from the survey; the second step is to perform factor-cluster analysis on the standardized data; the third step is to score and rank the rural hotels in each district and the individual factors and comprehensive factors of individual rural hotels based on The results of factor analysis and cluster analysis, and to analyze the relationship between star rating of rural hotels and actual hotel quality; the fourth step is to get draw conclusions and recommendations.

3.2. Index Selection

Because the evaluation index of this survey scoring table is too scattered and the index level is not unified, this study used the Delphi method to inquire 10 tourism experts to form an index system. Environmental landscape mainly includes the environment and landscape. The other factors are shown in Table 1.

Table 1. Quality evaluation index system of rural hotels in Chengdu

One class	Two class
Environmental landscape	Environment
	Landscape
Lodging facilities	Reception capacity
	Hardware facilities in the room
	Sanitary facilities
	Furniture and bedclothes
Accommodation facilities	Kitchen
	Restaurant
	Toilet
Service quality	Service standardization
	Attitude of employees
Security management	Operation safety
	Preventive measure
Management performance	Market popularity
	Social responsibility

4. EMPIRICAL ANALYSIS BASED ON FACTOR ANALYSIS

4.1. Reliability and Validity Analysis

First, we tested the reliability of the indicators. The result shows that Cronbach's alpha coefficient is 0.867, which is greater than 0.8, so the reliability test is qualified. Since some indexes are lower than 0.4 in the load of the rotating component matrix, we removed four indexes including the surrounding environment, toilets, operating safety, and preventive measures to construct a new evaluation index system. And the details are shown in Table 2. The KMO value of the new evaluation index system is 0.624, and the significance level of Bartlett's sphere test is less than 0.05. The analysis results shows that the data is suitable for factor analysis.

Table 2. Revised quality evaluation index system of rural hotels in Chengdu

One class	Two class
Environmental landscape	Landscape
Lodging facilities	Reception capacity
	Hardware facilities in the room
	Sanitary facilities
	Furniture and bedclothes
Accommodation facilities	Kitchen
	Restaurant
Service quality	Service standardization
	Attitude of employees
Management performance	Market popularity
	Social responsibility

4.2. Feature Vectors

We extracted principal components and correlation matrix analysis by principal component analysis to obtain indicators such as initial eigenvalues and cumulative variance contribution rate. According to Kaiser's point of view [4], factors with a characteristic value greater than

1 should be extracted, and there are 4 factors extracted in this sample with a cumulative contribution rate of 62.920%. The initial eigenvalues of the 4 factors are respectively 2.557, 1.878,1.456, and 1.028. It shows that 4 principal components are needed to reflect the situation of star-rated rural hotels in Chengdu.

4.3. Common Factors

In the factor analysis, the orthogonal rotation method standardized by Kaiser is used. The rotation converges after 8 iterations to obtain the rotation component matrix. The results show that the first factor has a higher load on furniture and bedclothes, hardware facilities in the room, reception capacity, and bathroom facilities; the second factor has a higher load on social responsibility, restaurants, and kitchens; the third factor has a higher load on market visibility, service standardization, and landscape environment. The fourth factor is mainly reflected in the attitude of employees.

Through the extraction of the above four common factors, the correlation between common factor variables is small. And there is no problem with information redundancy. Therefore, combining professional knowledge to name each factor as follows:

Factor 1: Accommodation condition factor. This factor mainly includes four indicators: furniture and bedding, hardware facilities in the room, reception capacity, and sanitary facilities. It mainly reflects reception capacity of rural hotels, the safety, comfort, and completeness of guest rooms and bedding.

Factor 2: Safety responsibility factor. This factor mainly includes three indicators: social responsibility, restaurant, and kitchen, which mainly reflects indicators related to safety responsibility such as restaurant kitchen.

Factor 3: Market reputation factor. This factor mainly includes three indicators: landscape, service standardization, and market popularity, which mainly reflects the quality of market awareness brought by the rural hotel landscape environment and standardized services.

Factor 4: Service quality factor. This factor mainly includes the indicator of the attitude of employees. The attitude of employees can reflect the service quality management level of the rural hotel to a certain extent.

4.4. Factor Score Calculating

We use Regression to obtain the factor score coefficient matrix (Table 3).

Table 3. Component score coefficient matrix

Component Score Coefficient Matrix				
	Component			
	1	2	3	4
Landscape	-0.027	-0.119	0.378	0.355
Hardware facilities in room	0.363	0.054	-0.110	0.005
Furniture and bedclothes	0.395	0.047	-0.079	0.106
Service standardization	-0.024	0.071	0.366	-0.234
Market popularity	0.008	-0.038	0.449	-0.045
Social responsibility	0.122	0.502	-0.251	-0.011
Kitchen	0.014	0.385	0.153	0.161
Restaurant	-0.185	0.402	0.070	-0.022
Reception capacity	0.285	-0.029	0.076	0.110
Attitude of employees	0.101	0.108	-0.142	0.775
Sanitary facilities	0.186	-0.159	0.189	-0.099

The scores of factors 1, 2, 3, and 4 are respectively expressed by F1, F2, F3, and F4. The calculation model of four factors are as follows:

F1= -0.270Landscape + 0.363Hardware facilities in the room + 0.369Furniture and bedclothes - 0.240Service standardization + 0.008Market popularity + 0.122Social responsibility + 0.014Kitchen - 0.185Restaurant + 0.285Reception capacity + 0.101Attitude of employees + 0.186Sanitary facilities;

F2= -0.119Landscape + 0.054Hardware facilities in the room + 0.047Furniture and bedclothes + 0.071Service standardization - 0.038Market popularity + 0.502Social responsibility + 0.385Kitchen + 0.402Restaurant - 0.029Reception capacity + 0.108Attitude of employees - 0.159Sanitary facilities;

F3= 0.378Landscape - 0.110Hardware facilities in the room - 0.079Furniture and bedclothes + 0.366Service standardization + 0.449Market popularity - 0.251Social responsibility +0.153 Kitchen +0.070 Restaurant + 0.076Reception capacity -0.142 Attitude of employees +0.189 Sanitary facilities;

F4= 0.355Landscape + 0.005Hardware facilities in the room + 0.106Furniture and bedclothes - 0.234Service standardization - 0.045Market popularity - 0.011Social responsibility + 0.161Kitchen - 0.022Restaurant + 0.110Reception capacity + 0.775Attitude of employees - 0.099Sanitary facilities.

The weight of each factor is determined by the contribution rate of each factor to calculate the comprehensive evaluation score of each enterprise. F is used to represent the score of the comprehensive factor. And the calculation formula is as follows.

F=(20.946F1+15.416F2+15.035F3+11.522F4)/62.920.

5. RESULT ANALYSIS

5.1. Scores of Star-rated Rural Hotels by Districts

We calculated the scores and ranks of the individual factors and the comprehensive factors of the star-level rural hotels in each district are obtained by the factor score coefficient matrix and the factor contribution rate (Table 4).

Table 4. Scores and ranks of factors in districts

District	Amt. of hotels	F1	Rank	F2	Rank	F3	Rank	F4	Rank	F	Rank
Pengzhou	1	5.8880	1	4.7360	6	4.8190	4	4.8290	12	5.1563	1
Longquanyi	1	4.5840	14	5.6250	1	5.2480	1	5.4400	3	5.1544	2
Jintang	1	4.9290	10	5.0570	4	4.8690	2	5.7590	1	5.0979	3
Tianfu	3	5.7845	2	4.7118	7	4.0892	11	5.4938	2	5.0632	4
Qingbaijiang	3	5.1632	7	4.6307	8	4.8589	3	5.2128	6	4.9690	5
Jianyang	3	4.8540	13	4.9825	5	4.4024	8	5.4302	4	4.8830	6
Chongzhou	7	5.0008	9	5.0628	3	3.8906	12	5.3989	5	4.8235	7
Pidu	9	5.4707	3	3.8506	13	4.4628	7	5.0906	8	4.7632	8
Wenjiang	4	5.0123	8	4.0970	11	4.1513	10	5.0533	10	4.5897	9
Xinjin	1	5.1966	6	3.9743	12	3.7886	14	5.0903	9	4.5411	10
Gaoxin	1	4.5297	15	5.1440	2	4.2737	9	3.6473	17	4.4574	11
Pujiang	3	4.9146	12	3.6548	14	3.6616	16	5.1185	7	4.3438	12
Dayi	3	4.9168	11	2.9871	16	4.5174	6	4.0129	15	4.1830	13
Qionglai	13	5.3152	4	2.2108	17	3.8687	13	4.9643	11	4.1446	14
Shuangliu	13	5.2029	5	3.2674	15	3.6702	15	3.6942	16	4.0861	15
Dujiangyan	36	4.1497	16	4.3011	9	3.0179	17	4.8105	13	4.0373	16
Jingjing	4	2.4813	17	4.1886	10	4.6373	5	4.7929	14	3.8380	17

According to Table 4, the top 3 of districts on comprehensive factor scores are Pengzhou, Longquanyi and, Jintang. Besides, Pengzhou, the district with the highest score, scored 5.1563; Jinjiang, the district with the lowest score, scored 3.8380.

The higher the score of accommodation management factor, the better the accommodation facilities of star-rated rural hotels in a district. The top 3 of districts on this factor scores are Pengzhou, Tianfu, and Qingbaijiang. The higher the score of the safety responsibility management factor, the higher the safety of the restaurant kitchen of its star-rated rural hotel, and the more it can do its best in social responsibility. The three districts with the highest scores are Longquanyi, Jintang, and Chongzhou. The higher the market reputation management factor, the higher the market reputation management factor score. The top 3 of districts on this factor scores are Longquanyi, Jintang, and Qingbaijiang. The higher the service quality management factor score, the better its star-rated rural hotel services. The three districts with the highest scores are Jintang, Longquanyi and Tianfu.

5.2. Cluster Analysis

Based on factor analysis, K-means clustering analysis is performed. When the clustering category is 3, the clustering effect is the best. The clustering results are shown in Figure 2.

Category I, the comprehensive rural hotel. All evaluation factors of this category has high scores. There are 46 hotels in Chengdu, accounting for 43.4%. The top three districts in terms of the number of category I rural hotels are Dujiangyan, Pidu, and Chongzhou.

Category II, the general rural hotel. This type of rural hotel scored very high on a single factor, but average scores on other factors. The service quality management factor scores high, the accommodation condition management condition factor, and the safety responsibility management factor score high, but the market reputation management factor scores are average. There are 42 hotels in Chengdu, accounting for 39.6% of the total. The top three districts in the number of rural hotels of category II are Dujiangyan, Shuangliu, and Qionglai.

Category III, the differential Rural Hotel. One evaluation factor of this category has a low score, but other factors have high scores. The accommodation conditions management condition factor and the service quality management factor score high, the market reputation management factor is high, but the safety responsibility management factor score is very low. There are 18 hotess in Chengdu, accounting for 16.9% of the total. The top three districts in terms of the number of

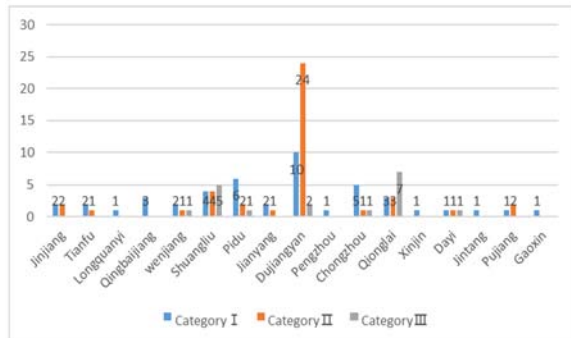rural hotels of category II are Qionglai, Shuangliu, and Dujiangyan.

Figure 2 Cluster results of Star-rated rural hotel in Chengdu.

5.3. Scores of Star-rated Rural Hotels by Single Star Rural Hotels

According to the factor scoring coefficient matrix and the factor contribution rate, we got the scores, ranks, and category of individual factors and comprehensive factor of each star-level rural hotel in Chengdu are obtained. According to calculations, among the 106 star-rated rural hotels in Chengdu, Cui****Zhuang in Dujiangyan City has the highest comprehensive factor score, with a score of 5.4899, which is a comprehensive rural hotel. Du****Zhuang in Dujiangyan has the lowest score, with a score of only 2.7463, is a differential rural hotel.

5.4. Analysis of the Relationship between Star and Quality

In the field of consumer behavior, the star of products is significantly related to consumers' purchase intentions [4]. Therefore, we verified whether the star rating of rural hotels in Chengdu is reasonable to study the correlation between the star rating and the quality of rural hotels. Pearson analysis was carried out on the quality comprehensive factor score data of 106 rural hotels in Chengdu and their star ratings to analyze the relationship between star-rated rural hotel ratings and quality. The results shows that the Pearson correlation coefficient is 0.631, which is a strong correlation. That means the current rating of 106 rural hotels in Chengdu is relatively reasonable, and consumers can choose consumers according to their star ratings.

6. CONCLUSION

In the development of rural hotels, there are significant quality differences in various districts. Therefore, a systematic evaluation study of rural hotels in a district can help the government fully get the development of local rural hotels, so this study has high practical significance., This paper, based on a field survey of star-rated rural hotels in Chengdu, evaluated their quality by factor-cluster analysis. The results show

that star-rated rural hotels in different districts of Chengdu have large differences in scores and rankings of various factors. Pengzhou, which ranked the highest in comprehensive factor score, scored 5.1563; Pengzhou, which got the highest score on accommodation management factor, scored 5.8880; Longquanyi, which got the highest score on safety responsibility management factor, scored 5.6250; Longquanyi, got the highest score on market reputation management factor, scored 5.2480; Jintang, which got the highest service quality management factor score, scored 5.7590. Besides, cluster analysis was performed on the scores of each factor of 106 rural hotels, and the star-rated rural hotels in Chengdu were clustered into comprehensive, general, and differential types. We evaluated the 106 specific rural hotels to obtain the scores and rankings of various factors of each hotel. Finally, we found that there is a strong correlation between star rating and quality of star rural hotels.

The relevant departments of districts in Chengdu can promote the improvement of specific factors of rural hotels according to our evaluation results. Meanwhile, they can raid and rectify individual star-rated rural hotel with a low score in their own district. The individual rural hotel can also choose the corresponding promotion measures according to its own scores of factors.

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