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An Assessment Model for Evaluating Asymmetric Effects of Attribute-Level Performance on Satisfaction

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Abstract: The effects of attribute performance on satisfaction have been widely addressed in the discussion on satisfaction. In traditional view, customer satisfaction should be enhanced by improving product or service attribute performance. However, as theoretical and empirical studies have shown, the linkage between attribute performance and overall satisfaction is asymmetric and nonlinear, which means that it is not a definite relationship between high performance of attribute and satisfaction. Regarding the research on delivering asymmetric effects, the Kano model was utilized extensively in the previous studies. But this method suffers from lacking a validity testing and failing to take account of the degree of attribute's importance. To get a more effective access to measuring the asymmetric and nonlinear effects of attributes on customer satisfaction, this study presents an integrated approach which can express asymmetric effects through evaluating the significance of different attributes to satisfaction based on response surface analysis and importance grid analysis methods. In this paper, an empirical study on rural tourists' satisfaction was undertaken using this integrated method. Furthermore, compared with the regression with a dummy variable method, this proposed approach shows more responsive to enhancing attribute performance and makes allowance for improving a certain target attribute in the customer satisfaction improvement process.

Keywords: attribute performance; customer satisfaction; asymmetric effect; Kano model; response surface method

1. Introduction

Customer satisfaction plays a critical role in survival and future of service organization. Practitioners and academics have devoted increasing efforts on the measurement and improvement of customer satisfaction since the early 1970s [1–7]. The concept of satisfaction is derived from the Latin root satis, meaning "enough". Because of this, it was defined mainly from the perspective of expectation fulfillment or customer experience in previous studies [8,9]. According to Oliver and Fen, satisfaction can "provide a pleasurable level of consumption-related fulfilment including levels of under- or overfulfillment" and can be characterized as positive "attitudes of the customers' resulting from comparing a product's or service supplier's perceived performance in relation to their expectations" [8,10]. Although these definitions were accepted and widely used, measurement of satisfaction is difficult when it was thought as a subjective evaluation and an attitudinal response to customer's judgement [9].

Despite problems with the measurement of satisfaction, various measurement method and model have been explored and implemented in previous studies. In these approaches, identification of the determinants of satisfaction was regarded as essential, because it can affect resources allocation on different service attributes for satisfaction improvement [11,12]. To confirm the critical factors,

multi-attributes approach to measuring satisfaction was employed in previous research [5,13–16]. Using this approach, a list of key product or service attributes are generated first and rated by customers according to its performance or customers' experiences. Then, multiple-regression models are used to acquire the effect of attribute performance on customer satisfaction. It was identified that attribute level of satisfaction measurement can provide more constructive feedback for satisfaction improvement [17], and the management strategy is expected to be developed based on the importance and performance values of attributes for the limits of resources.

Traditional multi-attributes approach using regression models seems to be plausible and acceptable, however, there are still considerable disagreements on it. The implicit assumption of this approach is that the relationship between attribute-level performance and satisfaction is linear and symmetric, which means that as the attribute performance increases or decreases, overall satisfaction will change with it. Yet, more recent evidences have suggested that an asymmetric relationship exists between attribute performance and customer satisfaction [16,18–20]. These studies indicated that product or service quality is a multi-dimensional construct and the attributes do not have equal impact on customer satisfaction [21]. Depending on the importance of attributes, overall satisfaction will be affected by the level of attribute performance [22]. To address the non-linear relationship between attribute performance and overall customer satisfaction, Kano et al. (1984) conducted the study on the categorization of product or service attribute (quality elements) according to their impacts on satisfaction or dissatisfaction. This approach is consistent with the marketing literature which proposed that an asymmetric relationship exists between attribute performance and overall customer satisfaction.

According to the Kano model, attributes can be classified mainly as four categories: must-be factor, one-dimensional factor, attractive factor, and indifferent factor. Concerning the types of attributes, Kano provided the survey method to investigate and categorize them. However, this method was not widely applied for its limitations, such as only presenting the classifying results of attribute and being not easily understood and implemented [23,24]. For these reasons, other analysis methods have been provided in recent years, such as dummy-variables regression and partial regression methods. Nevertheless, different techniques brought diverse results owning to the limitations of these methods. Consequently, it is necessary for a greater number of studies to compare the results of different techniques [16].

The purpose of this study is to develop a new method for analyzing the asymmetric satisfaction response to attribute level performance. In line with Danaher [25], we use the response surface method to derive the nonlinear relationship between attribute performance and overall customer satisfaction. As an indirect approach, attribute importance derived from this method can reflect customer's real attitudes, and the effects of attribute performance on overall satisfaction can also be judged more accurately. The other feature of response surface method is the interaction effects of attributes that can be conducted, which were not involved in other techniques used in previous studies. To obtain the category of attributes, an importance grid analysis method is also employed. Based on these two methods, pivotal attributes and asymmetric impacts of attributes on satisfaction can be acquired. These results can help managers gain insight into developing targeted strategies to improve customer satisfaction and stimulate customers' purchase intentions.

The rest of this paper is organized as follows: Section 2 gives a brief overview of attribute performance and customer satisfaction, Kano's model, and importance grid analysis method. The proposed methodology is outlined in Section 3 with taking the rural tourism service in China as the study object. Then in Section 4, the response surface method combined with the importance grid analysis is presented. In this section, the multiple regression with dummy variable method is also employed for the comparison of the results. Finally, the discussion and conclusion are drawn in Section 5.

2. Theoretical Background

2.1. Attribute Performance and Customer Satisfaction

Product or service attributes usually include features, functions, benefits, and uses, which are the characteristics by which offerings are identified or differentiated [26]. Lancaster indicated that customers' preferences were not on the product itself but on its characteristics or attributes [27]. Therefore, customers are more likely to evaluate satisfaction at an attribute-level rather than product level [28]. Furthermore, researchers pointed out that satisfaction is a function of performance on products or attributes, and it can be increased through measuring and managing performance ratings on these drivers [11,13,29]. For these reasons, attribute-level approach is thought to be a better understanding of overall customer satisfaction [16]. Based on that, other researchers suggested that customer satisfaction should be evaluated on a multi-attribute scale [30].

Although the multi-attribute approach has implications for analyzing customer choice and decision making, several problems arise when measuring satisfaction. First, this approach fails to distinguish the customer's experience or evaluation on attributes of positive and negative performance [13]. In 2010, in Oliver's research, when product performance is worse than expect or standard, negative discrepancy exists. Conversely, positive discrepancy will exist when performance is better than standard. Other researchers also stated that positive or negative of attribute performance has different impact on overall customer satisfaction [13,31]. The other limitation of this approach is that it treats the relationship between attribute performance and overall satisfaction as symmetric and linear. Under the linear relationship assumption, attributes with high performance will lead to satisfaction, and low performance will cause dissatisfaction. Yet, many studies have shown that the symmetric relationship has not always held true [32,33]. Mittal, in 1998, demonstrated that positive and negative performance on an attribute has different impacts on overall satisfaction based on prospect theory. As shown in Figure 1, negative performance on attributes has a greater impact on overall satisfaction than does positive performance [13].

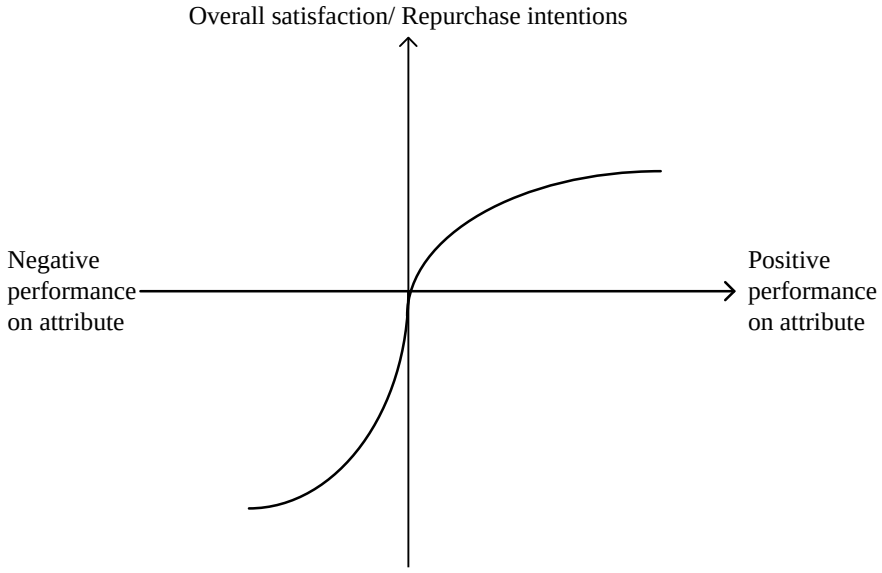

Figure 1. Asymmetric impact of attribute-level performance (Mittal, 1998).

Over the past decades, many studies have been carried out for investigating the asymmetric relationship between attribute performance and satisfaction. Since being proposed in 1984, the Kano model has been the most popularly implemented method in research on nonlinear relationship between attribute performance and satisfaction. This model was named "attractive quality creation" (AQC) by Kano, which means "creating a new product with a quality that cannot only be distinguished from the

qualities of the current products but also is attractive for customers" [34]. Based on a two-dimensional recognition, the physical sufficiency of the product or service is taken along the horizontal axis with "insufficient" and "sufficient" levels, and the customer's perception with "satisfied", "neutral" and "dissatisfied" levels is taken along the vertical axis (Figure 2). To enable the measurement to be understood more easily, other studies described the horizontal axis as "expectations" (not fulfilled to exceeded), and the vertical axis is expressed as "customer delight" (low to high).

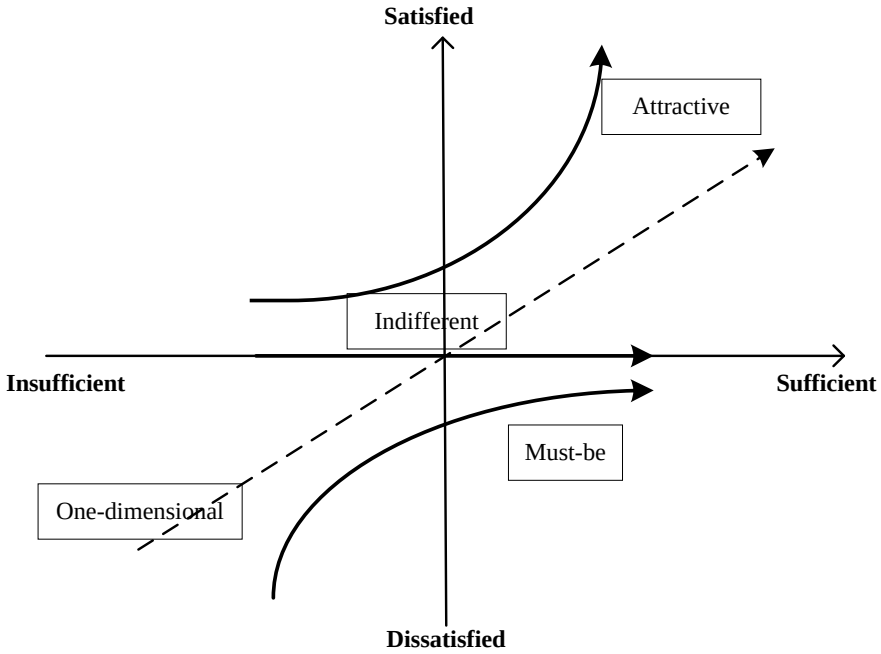

Figure 2. Evaluation patterns of quality (Kano, 1984).

Based on quality's evaluation patterns, four qualities can be acquired, including attractive quality, one-dimensional quality, must-be quality, and indifferent quality. The first three qualities are the most commonly used in the research, which are also described as three satisfaction factors including excitement factor, performance factor and basic factor. Kano model is thus referred to as three-factor theory. Basic factor (must-be quality) can respond to the basic needs for the product or service. This factor will cause dissatisfaction if not fulfilled, but do not bring customer delight if exceeded. On the contrary, excitement factor (attractive quality) can increase customer satisfaction if delivered but do not cause dissatisfaction if not fulfilled [35]. Performance factor (one-dimensional quality) will lead to satisfaction on the high-performance attributes, and dissatisfaction on the low performance.

Regarding development of research theme in the Kano model, Witell, in 2013, stated the emergence and development phases of it. Classification of attributes and combination of Kano methodology with other methods are the research themes dominate according to the research results [36]. In other studies, techniques or methods used in the Kano model were also the research focus [16,24,37,38]. For example, Mikulić, in 2011, compared four techniques with Kano method from the perspectives of validity and reliability [38]. The Kano model is reasonable with the assumption that product or service attributes have a varying impact on overall customer satisfaction depending on their current level of performance [37]. Although it has been empirically justified in several studies, the agreement was not established on assessment method of quality elements. For this reason, various modified or new approaches have emerged in recent years based on different research backgrounds and objectives.

2.2. Importance Grid Analysis

Vavra, in 1997, firstly proposed that importance grid can be used to identify the three satisfaction factors [39]. Alternative to the imaginary scheme given by Kano, importance grid is constructed

depending on whether the importance of attribute is derived explicitly or implicitly. Customer's self-stated importance is identified as explicit importance, which is the indicator of an attribute's dissatisfaction-generating potential. As an indicator of satisfaction-generating potential, implicit importance is obtained indirectly by applying other techniques such as regressing attribute-level performance against overall satisfaction [12,38,40].

The assumption of importance grid analysis is that explicit importance and implicit importance might differ on reflecting the attribute's importance–satisfaction relationship. Also, it is stated that the customer's self-stated importance cannot measure the relative importance of attribute adequately [41]. Importance grid analysis combines attribute importance weights derived explicitly and implicitly in a two-dimensional grid, and the attribute can be plotted according to the differences in importance weights (Figure 3).

In terms of importance grid analysis, basic attributes are the factors which have the strong negative impact on overall satisfaction in low-level performance, but do not have a significant positive impact for high-level performance. As the minimum requirements of product or service can thus be identified as high importance in directly derived evaluation of attributes, but low importance in indirectly derived evaluation. Different from the basic attributes, exciting attributes are identified as not much important in directly derived evaluation but high importance in indirectly derived evaluation for its positive relationship with overall satisfaction on the high performance of attribute. For the one-dimensional performance attributes, the corresponding changes can be shown between the performance of attribute and overall satisfaction. It means that the attributes with high explicit and implicit importance can be explained as high importance attributes, and contrary to it, low importance attributes show the little importance both in explicit and implicit ways.

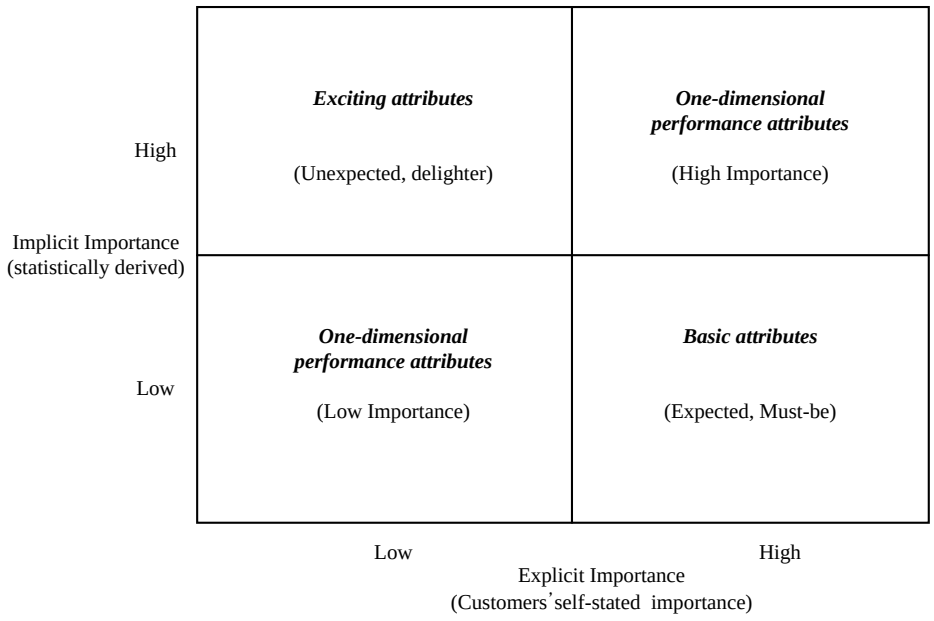

Figure 3. The importance grid (Vavra, 1997).

Based on the Kano model, we will use the response surface method and importance grid analysis to derive the relative importance of the attributes and classify the quality factors. In the process of response surface analysis, Box–Behnken design will be applied in profile design for reflecting consumer's real attitude on the attributes. Therefore, this integrated approach can express the nonlinear relationship between attribute performance and satisfaction. Furthermore, it can also avoid the shortcoming existed in the regression analysis which excludes the information associated with average (common) level of performance [24].

3. Methodology

3.1. Response Surface Method

Response surface method is a kind of statistical and mathematical technique, which has been extensively utilized in product developing, improving, and optimizing processes [42]. In recent years, this method was also employed in the research on attribute importance, customer satisfaction and job satisfaction [25,43–45].

In general, when a product, process, or system was concerned involving a response y that depends on the controllable input variables $\xi_1, \xi_2 ... \xi_k$, it was convenient to transform the natural variables to coded variables $x_1, x_2 ... x_k$ which are usually defined to be dimensions with mean zero and the same spread or standard deviation, which can be written as

$$\eta = f(x_1, x_2 ... x_k). \tag{1}$$

If the response is well modeled by a linear function of the independent variables, the first-order model can be employed. For the case of two variables, it can be described as

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon. \tag{2}$$

When the first-order model was not adequate, which means there was curvature in the system, a polynomial of higher degree will likely be requested, such as the second-order model

$$y = \beta_0 + \sum_{i=1}^{k} \beta_i x_i + \sum_{i=1}^{k} \beta_{ii} x_i^2 + \sum \sum_{i<j} \beta_{ij} x_i x_j + \epsilon. \tag{3}$$

For the case of three variables, the second-order model is

$$\begin{aligned} y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_{11} x_1^2 + \beta_{22} x_2^2 + \beta_{33} x_3^2 + \beta_{12} x_1 x_2 \\ + \beta_{13} x_1 x_3 + \beta_{23} x_2 x_3 + \epsilon. \end{aligned} \tag{4}$$

Response surface method is an effective approach for the performance optimization, and it could be thus applied to evaluate the performance of independent variable on response. To produce a maximum estimated response, one should find the path of steepest ascent in the first-order model. Similarly, in the second-order or higher-order model, the location of the stationary point is focused. For the case of three variables, the stationary point is the solution to

$$\frac{\partial y}{\partial x_1} = \frac{\partial y}{\partial x_2} = \frac{\partial y}{\partial x_3} = 0. \tag{5}$$

3.2. Regression with Dummy Variable

The dummy variable regression approach was adopted in previous studies for assessing non-linear, asymmetric impact of attribute performance on overall satisfaction [13,31,46]. Before conducting the analysis, attribute performance ratings are coded to form the dummy variables, such that "high performance" is coded (1, 0), "low performance" (0, 1), and "average performance" (0, 0). Then two regression coefficients for each variable can be obtained, which are used to measure the impacts when performance is low or high. Through comparing the negative and positive estimates, the category of the quality factors can be identified (Table 1).

Table 1. Classification of the Kano quality attributes (Lin, 2010).

Quality Factor	Regression Coefficients	
	Low Performance	**High Performance**
Basic factor	(−) Significant	Non-significant
Exciting factor	Non-significant	(+) Significant
Performance factor	(−) Significant	(+) Significant

Note: (+) = positive coefficient; (−) = negative coefficient.

Regression method have attracted the attentions of many researchers, and it is recognized by taking away some of the usefulness of the data to plot the nonlinear effect [24]. However, as others have highlighted [20,38], this approach is more practical as a means to identify how the attribute operates, and the conceptual validity as a Kano classification method was also questioned.

3.3. Questionnaire Design and Survey

This study conducted a survey of rural tourism satisfaction to demonstrate the application of the proposed approach. Previous studies on rural tourism attributes mainly concentrated on functional factors (i.e., reservation system, service quality) and technical factors (i.e., room size, price level, activities), access evaluation, lodgings availability and so on [47–51]. Based on these research and considering the characteristic of rural tourism product in China, this study initially selected six factors (transportation, price level, rural lodging, rural eating facilities, experience of rurality and rural tourism service quality) as the expectation and satisfaction factors. However, after consulting with tourism researchers and travel agency managers, we decided to delete three factors (transportation, rural lodging and rural eating facilities) from them. The reason to delete transportation is that transportation evaluation includes many aspects, such as time, price, comfortability. It will make the respondents feel difficult to evaluate. The reason to delete the other two factors is mainly because of the location of the survey region and the rural scenic spots. The rural scenic spots selected in this study are very close to the city. For a short journey, not every rural tourist has experiences of rural eating and lodging. Therefore, three factors were selected in this study including rural tourism price level, experience of rurality and rural tourism service quality (abbreviated in "price", "experience" and "service" in the data analysis).

Regarding measurement of attributes performance, we used three-point scale: "worse than expected", "about the same as expected", and "better than expected". The design of performance ratings was based two reason. First, according to Anderson, in 1972, and Swan, in 1976, the ratings of performance has the direct relation with the comparison result of customer's expectation [52,53]. It means that satisfaction is associated with performance that fulfills expectations. Second, the ratings will be easier to be understood by respondents. Because it will be abstract to evaluate performance without reference objects, using the expect ratings is a better choice than "low performance" to "high performance". Also, we can see this rating was implemented in other studies [25,31]. Levels and coding of attributes performance are shown in Table 2, "worse than expected" is coded "1", "about the same as expected" is coded "0", and "worse than expected" is coded "−1". This experiment design utilizes three factors each with three levels and will result $3^3 = 27$ treatments, which is too many for the respondents to evaluate. Different from previous research, this study applies Box–Behnken design (BBD) which is evaluated as a very effective design method to research the relationship among variables. According to BBD, the profile design used 12 runs (as shown in Table 3) with three coded levels and central point experiment for three times.

Table 2. Rural tourism product attributes and levels.

Selected Attributes	Levels	Coding
Tourism price level	Worse than expected	−1
	About the same as expected	0
	Better than expected	1
Experience of rurality	Worse than expected	−1
	About the same as expected	0
	Better than expected	1
Rurla service quality	Worse than expected	−1
	About the same as expected	0
	Better than expected	1

Table 3. Experimental matrix of Box–Behnken design (BBD).

Run	Coded Levels		
	X_1	X_2	X_3
1	−1	−1	0
2	−1	1	0
3	1	−1	0
4	1	1	0
5	−1	0	−1
6	−1	0	1
7	1	0	−1
8	1	0	1
9	0	−1	−1
10	0	−1	1
11	0	1	−1
12	0	1	1

For the case of three factors with three levels each, it needed 12 experimental runs and three central point experiments coded with (0, 0, 0). Therefore, we designed 15 questions according to the BBD method, and used five-point Likert scale, with 1 for "very dissatisfied" and 5 for "very satisfied" to evaluate the satisfaction of the combination of the three attributes with different levels. As to the central points experiment, we used different evaluation measurement questions for avoiding the confusion of respondents. Consequently, each respondent was asked to rank 15 alternatives. Referring to Danaher 1997 research, the questions designed in this survey are shown in Table 4.

We also designed the questions that ask customers to evaluate the importance and performance of attributes, and overall satisfaction directly. Regarding importance evaluation, we used five-point Likert scale of 1 (very unimportant), 2 (somewhat unimportant), 3 (neither unimportant nor important), 4 (somewhat important), and 5 (very important). Similar scale was also used in overall satisfaction evaluation, which used 1 (very dissatisfied), 2 (somewhat dissatisfied), 3 (neither dissatisfied nor satisfied), 4 (somewhat satisfied), and 5 (very satisfied). For the attribute performance evaluation, we used three scale of 1 (better than expected), 2 (about the same as expected) and 3 (better than expected). The results of these questions will be used in regression analysis with dummy variables as a comparison and validity test to the proposed approach.

Table 4. Question design in the survey.

1. If the price of the rural tourism product was lower than you expected, but not for the experience and service quality, how satisfied would you for the four products below?					
	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
(1) Rurality experience was worse than you expected, and service quality was about what you expected.	☐	☐	☐	☐	☐
(2) Rurality experience was better than you expected, and service quality was worse than you expected.	☐	☐	☐	☐	☐
(3) Rurality experience was about what you expected, and service quality was better than you expected.	☐	☐	☐	☐	☐
(4) Rurality experience was better than you expected, but the service quality was about what you expected.	☐	☐	☐	☐	☐

4. Research Results

4.1. Analysis of Basic Information

The survey was conducted online in a snowball sampling approach from 27 October to 11 November 2018. The residents in Dandong city who had already participated in rural tourism were selected. Because there are two famous rural scenic spots in Dandong city and many residents in Dandong have visited there. Regarding the evaluation on satisfaction of rural scenic spot in this questionnaire, we gave the options of "Dalishu rural scenic spot" (Dandong city), "Qingshangou rural scenic spot" (Dandong city) and "other rural scenic spot", which can make sure as many rural tourists can participate in this survey. A total of 282 online questionnaires were received. According to the pre-survey, 5–10 min is needed to read and complete all the questions. Therefore, the questionnaire completed in less than 5 min and more than 10 min were deleted, and the questionnaires with all the options had the same answers were also deleted. Finally, 171 valid and usable questionnaires were kept for analysis, and the demographic profiles of these respondents are summarized in Table 5.

4.2. Applying Response Surface Method to Analyze the Importance of Attribute

We used SAS procedure RSREG to fit the satisfaction response surface model. The attributes were coded so that "worth than expected" was −1, "about the same as expected" was 0 and "better than expected" was 1. The dependent variable was the satisfaction rating coded 1 through 5. There are 15 such observations per respondent according to the BBD method. The fitted models are given in Tables 6 and 7 for the rural tourism destination. Since the R^2 of 40.71% (adjusted-R^2= 40.50%) is higher than the linear, quadratic and cross-product model, the full response surface model is better. We also checked the multicollinearity of the three independent variables using SAS, the results were summarized in Table 8. It is shown that these variables are independent with respect to the linear model.

Table 5. Demographic of the sample (N = 171).

Demographic Variables	Frequency	%
Gender		
Male	53	30.994
Female	118	69.006
Age		
up to 35	90	52.632
36–44	28	16.374
over 46	53	30.994
Monthly income (USD)		
below 450	83	48.538
451–900	63	36.842
above 901	25	14.620
Occupation		
tourism-related occupation	43	25.146
tourism-unrelated occupation	73	42.690
student in tourism-related major	24	14.035
student in tourism-unrelated major	28	16.374
retirement	3	1.755

Table 6. Descriptive statistics for attributes.

Variables	Parameter Estimate	Standard Error	T-statistic	*p*-Value
Intercept	4.310	0.038	112.75	0.000
price	0.648	0.023	27.65	0.000
experience	0.336	0.023	14.36	0.000
service	0.251	0.023	10.74	0.000
$price^2$	−0.538	0.034	−15.59	0.000
$experience^2$	−0.327	0.034	−9.49	0.000
$service^2$	−0.646	0.034	−18.73	0.000
price∗experience	0.067	0.033	2.03	0.042
price∗service	0.199	0.033	6.00	0.000
experience∗service	0.167	0.033	5.03	0.000
R^2, %	40.71			
adj R^2, %	40.50			

Table 7. Model comparisons.

Source	DF	Sum of Square	Mean Square	R-Square	F-Value	p-Value
Linear	3	248.81	82.936	0.252	362.08	<0.0001
Quadratic	3	148.45	49.484	0.140	200.78	<0.0001
Cross-product	3	15.91	5.302	0.015	21.83	<0.001
Total model	9	413.17	45.907	0.407	194.90	<0.001

Table 8. Collinearity diagnostics.

Run	Eigenvalue	Condition Index	Variance Proportions			
			Intercept	x_1 (Price)	x_2 (Experience)	x_3 (Service)
1	1.00	1.00	1.00	0	0	0
2	1.00	1.00	0	1.00	0	0
3	1.00	1.00	0	0	1.00	0
4	1.00	1.00	0	0	0	1.00

Now we can have the function of price, experience, service and satisfaction as follow

$$\begin{aligned} Satisfaction = 4.31 + 0.65price + 0.34experience + 0.25service - 0.54price^2 \\ -0.33experience^2 - 0.65service^2 + 0.07price * experience + 0.20price * service \\ +0.17experience * service + \epsilon. \end{aligned} \quad (6)$$

The derivation of this directional derivative is given in Equation (5) where (x_1, x_2, x_3) = (price, experience, service), and the derivative of the satisfaction function is

$$\begin{aligned} \frac{\partial S}{\partial x_1} &= 0.65 - 1.08x_1 + 0.07x_2 + 0.20x_3 \\ \frac{\partial S}{\partial x_2} &= 0.34 + 0.07x_1 - 0.66x_2 + 0.17x_3 \\ \frac{\partial S}{\partial x_3} &= 0.25 + 0.20x_1 + 0.17x_2 - 1.30x_3. \end{aligned}$$

Through the functions, it can be indicated that satisfaction is maximized at (price, experience, service) = (0.718, 0.688, 0.394). Response surface plots and contour plots for the three attributes are displayed in Figure 4.

Finally, we computed the mean of ratings based on the actual rural tourism experience, which used three-point rating scale represent "worse than expected", "about the same as expected" and "better than expected". The mean of the three attributes are x_{actual} = (0.111, −0.199, −0.234). We put the values into the equation got in the last step, the value of performance then can be acquired, which are $S_{x_{actual}}$ = (0.464, 0.427, 0.537). The relative importance values of the three attributes are thus obtained. Although the values are very close, service quality can be seen as the most important factor, followed by price level, while experience of rurality is less important than the other attributes.

4.3. Creation of the Importance Grid

Using importance grid analysis method, classification of Kano's quality can be obtained. First, the attribute importance value derived directly can be acquired from questionnaires, and explicit importance value has been known in response surface analysis. The results are shown in Table 9.

Table 9. Mean of explicit and implicit importance ratings of each attribute.

Attributes	Mean of Explicit Importance	Mean of Implicit Importance
Price level	3.737	0.464
Experience of rurality	4.274	0.427
Tourism service quality	4.368	0.537

Then the grand means of explicit and implicit attribute importance values are used as the axis of the plot, and three attributes are plotted in the grid (Figure 5). It is shown that "experience of rurality", which constructs with high explicit and low implicit importance of attribute, forms the basic factor of overall customer satisfaction. "Price level" has low explicit and implicit importance and forms the unimportant one-dimensional factor. On the contrary, with the high explicit importance and high importance, "tourism service quality" forms the high important one-dimensional factor.

Due to "tourism service quality" is classified as the high important one-dimensional attribute, it is suggested that improvement of efforts and special attention should be given to help enhance the customer satisfaction. As the basic factor, "experience of rurality" is thus suggested that business managers should pay more attention to keeping the existing level and minimizing the cost of it.

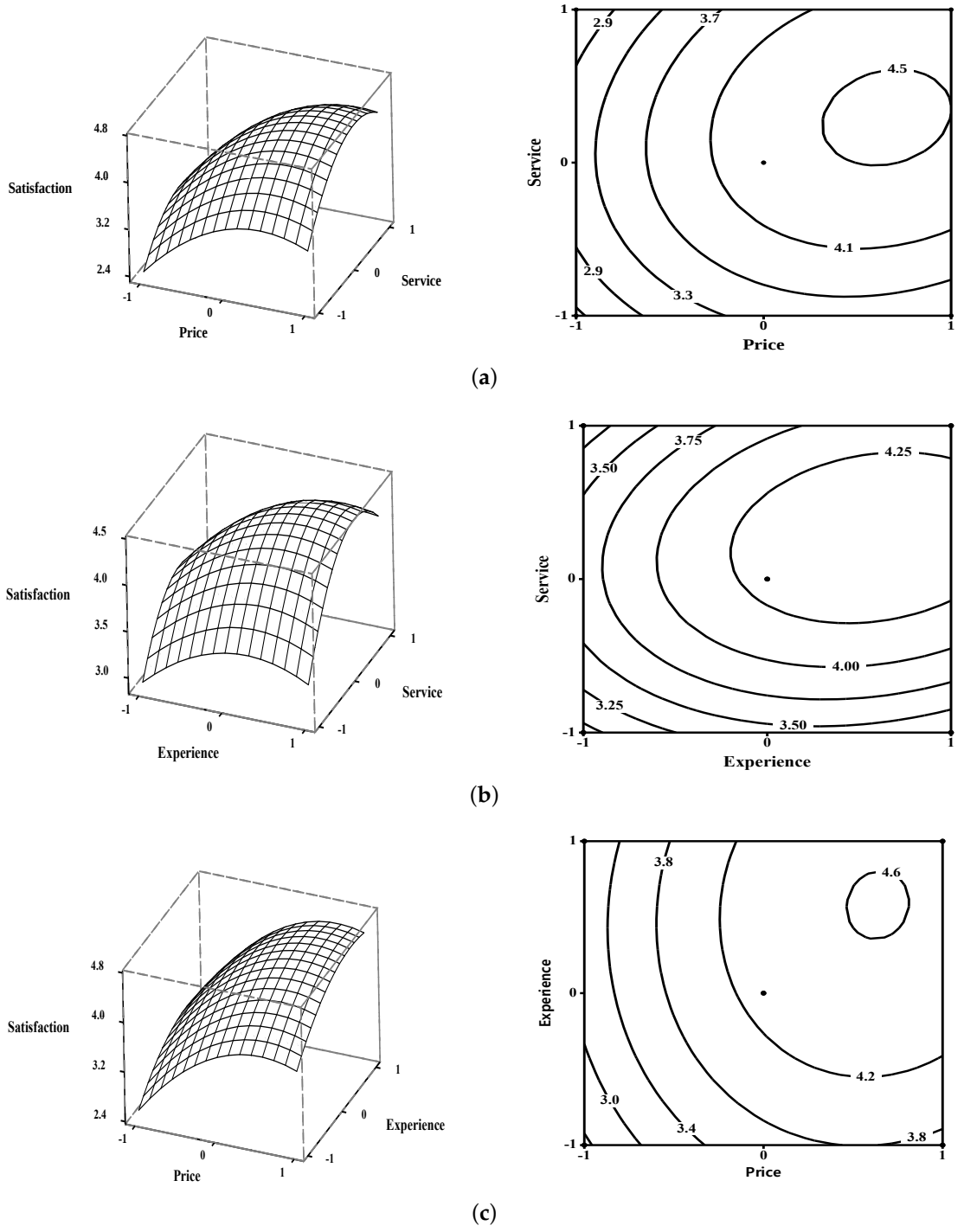

Figure 4. Response surface plots and contour plots of the attributes.

4.4. Regression Analysis with Dummy Variables

Regarding the application of regression analysis, we need to compute the mean of the performance's ratings on the actual rural tourism experience, which used five-point rating scale representing "very dissatisfied", "dissatisfied", "neither dissatisfied nor satisfied", "satisfied" and "very satisfied". It is shown that the mean of the three attributes' performance values are (price, activity, service) = (3.790, 4.333, 4.306). Then the dummy variables need be recorded before running the regression with dummy variables. The performance of attribute was coded as "low performance" (0, 1), "high perform" (1, 0), and "average performance" (0, 0). As the survey used

5-point Likert level, we define ratings 1 and 2 as "low performance", 3 as "average performance", 4 and 5 as "high performance".

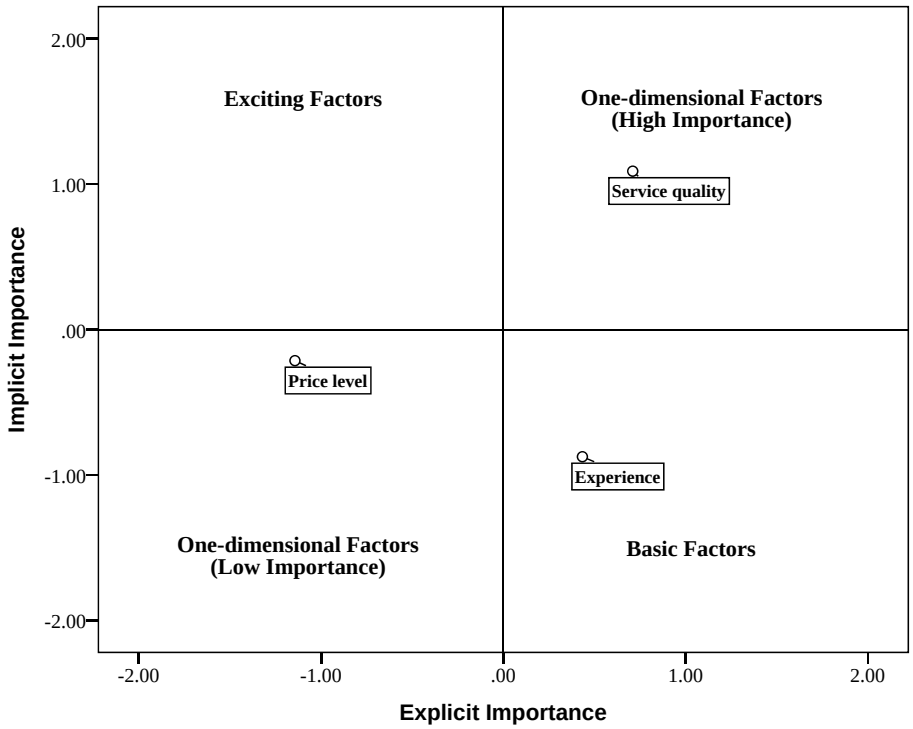

Figure 5. Factor structure based on the importance grid analysis.

According to the coding scheme, a multiple regression analysis with two dummy variables was conducted. For each attribute, we obtained two regression coefficients to measure the impact when performance is high or low. Table 10 shows the results of the regression analysis.

Table 10. Statistical results of dummy variable regression.

Attributes	Low performance	High Performance
Price level	0.030 ^{ns} (−0.213, 0.343)	−0.088 ^{ns} (−0.373, 0.066)
Experience of rurality	−0.327 **** (−0.743, −0.294)	0.151 ^{ns} (0.040, 0.613)
Tourism service quality	0.264 **** (−0.628, −0.193)	0.159 ** (0.049, 0.639)

Note: R^2 = 0.404 (adj R^2 = 0.382); Confidence intervals in brackets; ns = not significant; **** $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$.

Through analyzing the impact of attribute performance on overall customer satisfaction, the factor structure of customer satisfaction can be identified (as shown in Figure 6). Figure 7 illustrates the changes of attribute importance value depending on the satisfaction. It is shown that "experience of rurality" can be classified as the basic factor, "tourism service quality" is a high-performance factor, and "price level" is a low-performance factor. It is shown that the same classification results are acquired from regression method and the integration method of response surface and importance grid analysis.

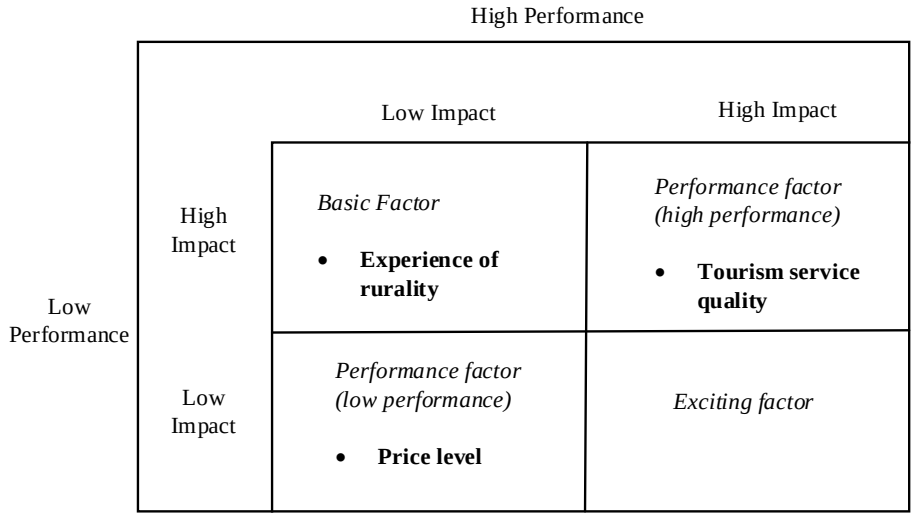

Figure 6. Factor structure based on regression analysis.

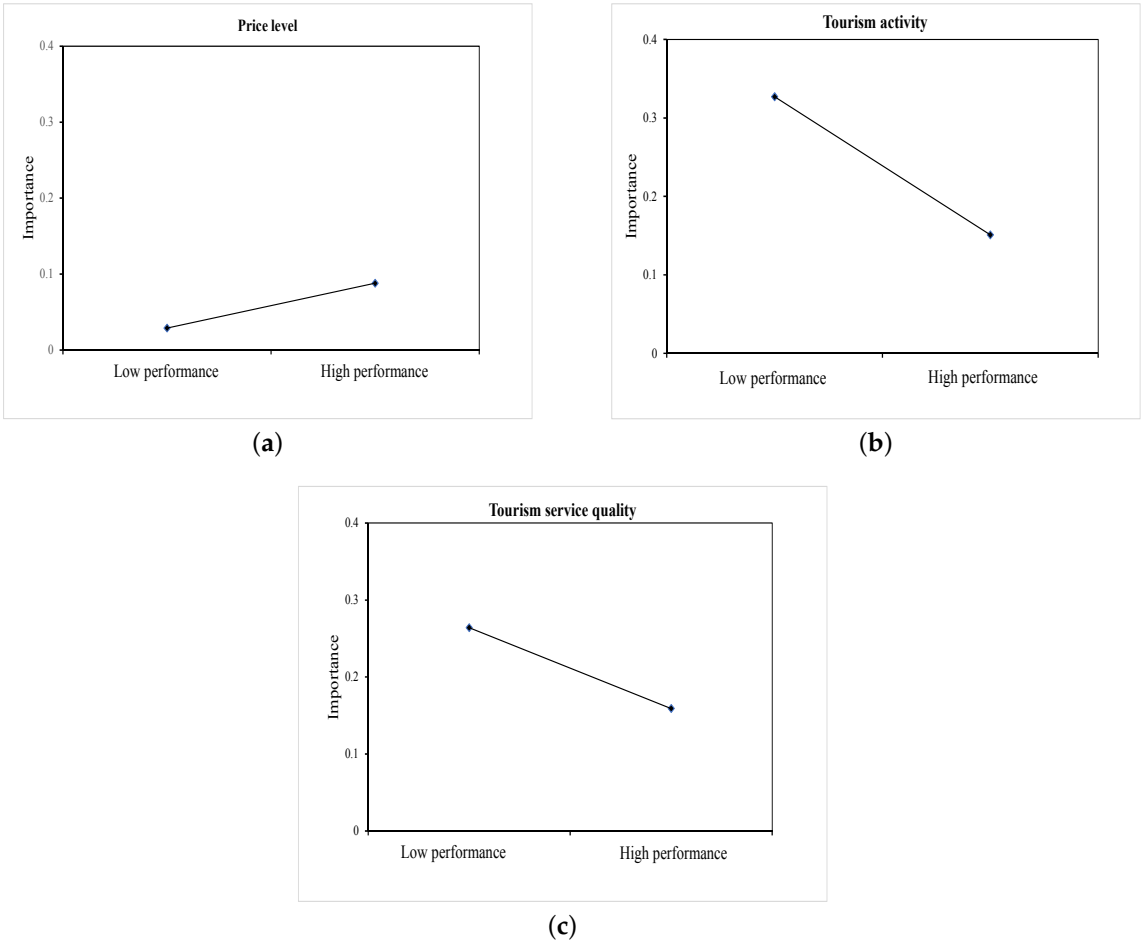

Figure 7. Importance and performance changes.

5. Discussion and Conclusions

5.1. Discussion

Until now, many techniques have been employed to clarify product or service attributes' priority for enhancing the overall customer satisfaction. However, each technique has limitations such as the linear assumptions, complexity of equation and difficult to conduct a survey. Therefore, the objective of this study is to propose a better approach which can categorize the factors properly, and express the nonlinear relationship between attributes and satisfaction. With this purpose, this study proposed a new approach that combines response surface and importance grid analysis method to analyze the priority of attributes which need to be improved. Moreover, the regression analysis with dummy variable was also conducted for the comparison.

As shown in Figures 5 and 6, "experience of rurality" is identified as a basic factor, "tourism service quality" is the high-performance factor, and "price level" is the low performance factor. According to the result, the design and management of tourism activity should be improved for avoiding customer dissatisfaction. Since "experience of rurality" is categorized as a basic factor, the increase in the performance of it is not going to result in customer delight. On the other hand, "tourism service quality" and "price level" are the performance factors, which might lead to customer dissatisfaction or delight. Especially for "tourism service quality", it will provide more customer delight with the increase of performance for it is a high-performance factor.

Also Figure 7 illustrates the changes of attribute importance value depending on performance. In this study, "experience of rurality" can be classified as a basic factor. Its impact on overall satisfaction is higher when performance is low, but lower when performance is high. "Price level" and "tourism service quality" are performance factors, which have the reverse impact on overall satisfaction when attribute performance is high or low.

5.2. Conclusions

This paper presents a new approach to assessing the prioritization of product or service attributes. It uses self-stated method and experiment design at the same time to measure the explicit and implicit importance of attributes. Response surface method was selected to analyze the attributes' importance, and importance grid analysis method was utilized for categorizing the attributes. Through comparing the results of regression analysis with the dummy variable method, the same classification of the attributes was acquired. Due to the response surface method having a standard experiment design method and the asymmetric relationship among the attributes can be shown in the result, the integrated approach is a more efficient analysis technique than regression analysis with the dummy variable method.

Identification of key attributes is important for managers to achieve a higher level of customer satisfaction. It has been the research focus of various studies and several techniques have been implemented. However, satisfaction will not always show the corresponding increase with the improvement of key attributes because of the asymmetric relationship between attribute performance and satisfaction. Therefore, research on the theory and technique of asymmetric relationship can promote the firm to make proper managerial decisions. Furthermore, regarding the survey was conducted in rural settings, the better sustainable practices are necessary for the development of rural destinations. This study can provide managers of rural tourism destination with a useful guide to how to enhance overall satisfaction through identifying the factors which have the direct impact on satisfaction, thereby fostering destinations' profitability and sustainable tourism.

With regards to its limitations, this study can be improved in third aspects. First, considering characteristics of the survey location and techniques this study implemented, we considered only three attributes in this survey. Although we referred to other rural tourism studies and tourism researchers' suggestion, the number of attributes selected seems not enough and will not applicable to applied in another satisfaction research. In fact, customers might consider and compare more attributes before

and after buying. At the same time, managers also need consider the various factors for seeking improvement. Future studies therefore should select more attributes to analyze for providing more practical suggestions. Second, as the number of attribute and level increase, response surface method will become more complicated both in the experimental designs and analysis. In response surface work, 2^k or 3^k factorial design (k factors with two or three levels) is widely used and the designs are simple to fit the second or higher order response surface. Therefore, response surface method will have several limitations when attributes with multiple levels need to be considered. Third, we analyzed the characteristics of rural tourism attributes in present study, however, it is not enough for representing the general conclusion for other service industry. The sample which has wider range of respondents and accessible investigation methods are also suggested in the future research.

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