Integrating Fuzzy SERVQUAL into Refined Kano Model to Determine the Critical Service Quality Attributes of Chain Restaurants

Pei-Ling Hsieh
Department of Leisure and Recreation Management,
Da-Yeh University, Taiwan

Tsu-Ming Yeh*
Department of Leisure and Recreation Management, Da-Yeh University, Taiwan

Jia-En Chen
Department of Leisure and Recreation Management, Da-Yeh University, Taiwan

ABSTRACT

Service quality is believed to be the key factor that successfully attracts consumers to make repurchases, and assisting enterprises in establishing a competitive advantage that distinguishes enterprises from other competitors in the service-oriented society. In this study, a questionnaire survey targeting the consumers of the chain restaurant industry was conducted. The fuzzy Kano and Fuzzy refined Kano model were adopted as the analysis methods in order to explore the critical service quality attributes of the chain restaurant industry. The results show that the chain restaurant industry should exclude "care-free quality" items, use "high attractive quality attributes" to strengthen the focus on improvement-as these attributes are able to strengthen the advantages of chain restaurants - and strive to maintain "high value-added quality attributes" and "critical quality attributes." To enhance and maintain customer satisfaction, the abovementioned attributes are combined with potential quality attributes as a strategic weapon to highlight competitive advantage. For service quality centered on "concentrate here," "critical quality attributes" and "high value-added quality attributes" are currently most in need of improvement. As "high attractive quality attributes" and "potential quality attributes" do not directly affect consumer satisfaction, they can be viewed as a second priority for improvement.

Keywords: Service Quality, Kano model, Refined Kano model.

1. INTRODUCTION

In recent years, the service industry in many developing and developed countries has surpassed industry and commerce, and it continues to expand rapidly (Lovelock et al., 2009). The service industry is the world's largest industrial sector, and is composed of many industries, including the wholesale and retail trade industry, the transportation industry, the accommodation and catering industry, and the tourism industry. The service industry has become central to global economic development, and it is able to increase incomes and private investment, while also promoting the development of economy and society, and enhancing international competitiveness (Lee and Chen, 2006).

As the restaurant industry does not require significant amounts of capital or technology, barriers to entry are low. Restaurants can easily mimic each other, resulting in constant increases in the number of operators in the industry. In Taiwan, competition in the restaurant industry is intense, with the presence of most major international restaurant brands in the market. Zeithaml and Bitner (1996) pointed out that in this highly competitive environment, in order to retain customers and maintain a competitive advantage, operators have recognized consumer assessment of service quality as an area of priority. If consumers are not satisfied with the service provided, they may to choose to take their business elsewhere (Vroman and Luchsinger, 1994). However, if consumers have a positive perception of service quality, businesses can retain customers, thereby delivering greater profits (Deshpande et al., 1993). Rust et al. (1995) also argued that service quality is a key factor determining profitability. For consumers, the pursuit of high-quality services is an important trend. Providing good service quality is a vital strategy for businesses to survive and prosper (Parasuraman et al., 1985; Reichheld and Sasser, 1990).

As service is comprised of four major characteristics of intangibility, heterogeneity, perishability, and inseparability (Parasuraman et al., 1985; Kano, 1996; Ladhari, 2009; Kotler and Keller, 2012), there is a lack of specific evaluation criteria to measure service performance, making objective assessment difficult. Therefore, to measure service quality, Parasuraman et al. (1985; 1988) looked at the gap between expectations and actual perception of service, revising Oliver's (1980) theory of expectation-disconfirmation, to produce a model of the service quality gap and develop the SERVQUAL scale. This scale has been widely applied to various services industries to measure service quality. However, Stevens et al. (1995) argued that the SERVQUAL scale is not the best measure of service quality in restaurants. Therefore, using the SERVQUAL scale as a basis for an empirical survey on consumers in fine dining, casual dining, and quick service restaurants, they developed a specialized measure of restaurant service quality, which they name the DINESERV scale.

Kano et al. (1984) proposed the Kano two-dimensional quality model, arguing that consumers do not perceive quality according to the traditional one-dimensional quality model, but rather a two-dimensional quality model. The Kano model can be applied to product development in order to improve customer satisfaction and enhance competitiveness (Matzler and Hinterhuber, 1998). The Kano model can also be applied to service quality in medical and care facilities (Jané and Domínguez, 2003) and can uncover the key quality items for products and services, and meet the potential demands of consumers (Cheng and Lin, 2011).

This study combines the DINESERV scale with fuzzy Kano model to explore the critical aspects of service quality for the chain restaurant industry. The findings provide a reference for operators in the chain restaurant industry aiming to produce maximum benefits from the smallest possible amount of resources.

2. LITERATURE REVIEW
2.1 Service Quality

With the booming service industry, delivering improvement in service quality has become a crucial issue. Zeithaml et al. (1996) believed that good service quality produces positive behavioral intentions in consumers, including a willingness to purchase and recommend to others, and strengthening loyalty. Service quality is also

regarded a critical factor in attracting repeat purchasing (Heskett et al., 1994). In addition, in a service-orientated society, service quality can provide businesses with a strong competitive advantage by differentiating it from competitors. Devlin and Dong (1994) also believed that in a highly competitive environment, service quality is the key factor to business success. Providing high quality services ensures that profit, costs, and market share are closely tied. Therefore, the question of how to improve service quality has become a key issue for managers (Murgulets et al., 2001; Denguir-Rekik et al., 2009).

With the four major characteristics of service being intangibility, heterogeneity, perishability, and inseparability (Parasuraman et al., 1985; Kano, 1996; Ladhari, 2009; Kotler and Keller, 2012), it is not easy to provide a specific description of actual attributes of service quality (Crosby, 1979). Therefore, the question of how to measure and improve service quality is an important issue for companies to consider. Grönroos (1984) pointed out that consumer satisfaction with service quality is measured by the gap between their original expectations and actual perceptions of service. Service quality can also be defined as consumers' overall impression of a company and the relative efficiency of its service (Park et al., 2004). Etzel et al. (2001) measured service quality by comparing the actual experiences of consumers with their original expectations. Consumer expectations of service are influenced by their own needs, previous experiences, and public reputation. Parasuraman et al. (1985) applied a user-based approach to define service quality as an attitude reflecting the difference between consumers' expectations of service and their actual perceptions. When the actual experiences of customers exceed their original expectations, service quality is naturally higher. The same logic also works in reverse; that is, better service quality retains existing consumers, while also attracting new consumers. Consumers may even be won over from a competitor (Petruzzellis et al., 2006).

Parasuraman et al. (1985) proposed a detailed conceptual model for service quality using the difference between consumers' expectations of service and their actual perceptions to assess the level of service quality. They proposed the following ten dimensions of service quality: tangibles, reliability, responsiveness, competence, courtesy, credibility, security, access, communication, and understanding. In 1988, they reduced the measures of service quality to five dimensions: tangibles, reliability, responsiveness, assurance, and empathy, producing the SERVQUAL scale. Although the SERVQUAL scale has a lengthy the measuring time (Babakus and Boller, 1992) and it cannot be applied to every service organization (Oyewole, 1999), as an effective method to measure the quality of service, the SERVQUAL scale has sufficient support in the literature. Therefore, when measuring service quality, some researchers, while not using the SERVQUAL scale directly, use it as a basis to develop different measurement approaches.

To measure service quality in the hotel industry, Knutson et al. (1990) developed a LODGSERV scale based on the SERVQUAL scale as an empirical tool for empirical research on the industry and its customers. Subsequently, using research based on the LODGSERV scale as a basis for empirical research on consumers in fine dining, casual dining, and quick service restaurants, Stevens et al. (1995) develop a specialized measure of restaurant service quality, which they named the DINESERV scale. This scale uses factor analysis to identify twenty-nine items measuring customer expectations for restaurant service, which are categorized into five dimensions

according to the SERVQUAL scale proposed by Parasuraman et al. (1988). Using the DINESERV scale, restaurant operators are able to understand consumer perceptions of restaurant quality to identify any issues with the restaurant and learn how to solve these problems. The DINESERV scale also provides restaurant operators with a quantitative measure of consumer expectations (Kim et al., 2009).

2.2 Kano Two-Dimensional Quality Model

When performing research on consumer demand for television sets, Kano et al. (1984) discovered that consumers do not perceive quality according to the traditional one-dimensional quality model, but rather a two-dimensional quality model. Therefore, based on the motivator-hygiene theory, developed by Herzberg et al. (1959), Kano et al. proposed a new quality measurement model, commonly known as Kano's Model or the Kano two-dimensional quality model. Kano uses the horizontal axis to measure the extent to which a given quality element is present. Moving right along the horizontal axis indicates that the quality element has a greater presence, while moving left along the axis indicates the quality element is lacking. In other words, positions to the right indicate the quality element is abundant, and positions to the left indicate the quality element is insufficient. The vertical axis indicates consumer satisfaction. Higher positions indicate higher customer satisfaction, while lower positions indicate lower customer satisfaction. This model divides the product quality elements into five categories, namely: attractive quality element, one-dimensional quality element, must-be quality element, indifferent quality element, and reverse quality element. Although the Kano two-dimensional quality model has been widely used in the analysis of service quality decision making, the model still has some deficiencies. Therefore, Yang (2005) proposed the refined Kano's model, expanding the original four quality attributes in the Kano model to eight attributes (see Figure 1): high attractive quality attributes, low attractive quality attributes, high value-added quality attributes, low value-added quality attributes, critical quality attributes, necessary quality attributes, potential quality attributes, and care-free quality attributes.
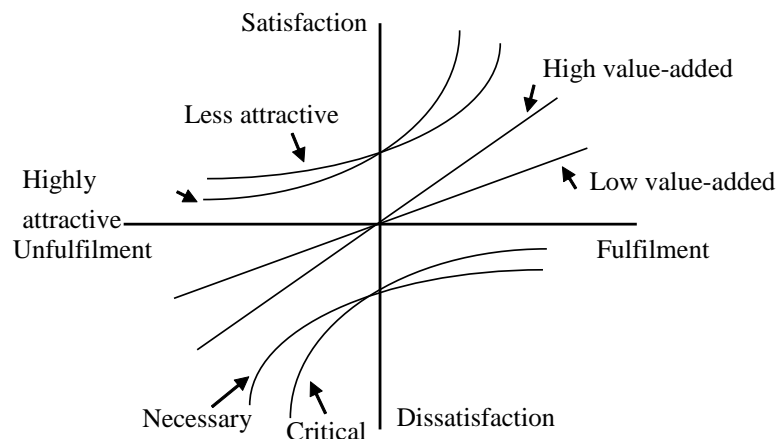

Figure 1. Refined Kano's model

Schvaneveldt et al. (1991) used the Kano two-dimensional quality model to examine four types of service industry: banks, dry cleaners, restaurants, and supermarkets, and found that the five quality attributes vary according to the industry.

Kuo (2004) applied the Kano model to examine service quality for web communities and calculated quality indicators that increase or decrease satisfaction, using analyzed quality attributes as a basis for future improvements. Lee and Chen (2006) used the Kano model to measure service quality for hot spring hotels in Taiwan and found that consumers with different demographic variables and using different modes of travel had significantly different views on satisfaction with service quality. They suggested that the hot springs hotel industry should differentiate the target markets and provide services tailored to different types of consumers. Lee et al. (2007) used the Kano model to investigate health care service quality and customer satisfaction and found that patients are more concerned about the care provided by doctors than health care costs. Therefore, enhancing the communication skills of doctors and nurses can narrow the gap between medical staff and patients, and thus improve patient satisfaction. Shen et al. (2000) integrated the Kano and quality function deployment (QFD) methods, with the aim of meeting or even exceeding the expectations of consumers during the product innovation stage.

2.3 Fuzzy Kano Model

Fuzzy set theory was first proposed by Zadeh (1965) with the aim of solving the fuzzy phenomenon prevalent in everyday life. Its purpose is to represent the approximate extent of adjectives used in natural human language. Fuzzy set theory is also an expression of uncertainty, including language or information characterized by blur, vagueness, or ambiguity.

The traditional Kano Model questionnaire requires single answers or answers within a given range obtained through sample surveys. However, human thinking is characterized by complexity, subjectivity, and uncertain preferences, meaning that when providing answers, respondents are typically unable to express their views on questionnaire items fully using a single scale or value (Deng and Pei, 2007). If individuals can use membership functions to express their perceptions according to their own choices, the answers obtained will be closer to people's actual thinking (Lin, 2002). Wu and Sun (2004) proposed some advantages of fuzzy questions, including (1) reducing the problem of evaluator subjectivity, making the evaluation process more robust and consistent; (2) highlighting self-potential through expression of individual difference; (3) providing guidance to evaluators that offer encouragement and stimulation; and (4) developing self-reliance to strengthen individual characteristics. The disadvantage of this approach is that it is more difficult to calculate than traditional statistical methods.

Lee and Li (2006) applied the fuzzy Delphi method to the Kano model to explore the possibility of developing an e-marketplace for Taiwan's floral industry. Cheng and Chiu (2007) proposed the integration of the Kano model, QFD, and fuzzy inference methods. Aside from using QFD House of Quality to show positive and negative question items, the triangular membership function is used to quantify semantic scales for positive and negative questions and define the membership function for the five quality attributes, to make inferences about what quality attributes customers seek according to the questionnaire scores. Lee and Huang (2009) proposed applying the fuzzy concept to the Kano model. As well as improving the questionnaire, the concept of discrete membership function is used to revise the traditional Kano two-dimensional quality model.

The biggest difference between traditional and fuzzy Kano questionnaires is that traditional questionnaires only allow respondents to provide a single answer, while fuzzy questionnaires provide for a more flexible approach that allows respondents to respond according to their own criteria. Therefore, the use of fuzzy questionnaires provides a better understanding of what consumers really think.

3. RESEARCH METHODS

3.1 Research Framework

To measure the gap between service expectations and actual perceptions, Parasuraman et al. (1985) developed the PZB service quality gap model to explain the formation of service quality. In addition, consumer satisfaction when a service attribute is present and not present are plotted in the Kano two-dimensional quality model, enabling us to easily identify the key aspects of service quality in the minds of consumers. Therefore, this study combines the PZB model, Kano model to provide a comprehensive assessment of service quality in the chain restaurant industry, establish consumer service quality demands, identify key priorities for quality improvement, and provide recommendations and proposals for improvement. The research framework is shown in Figure 2.
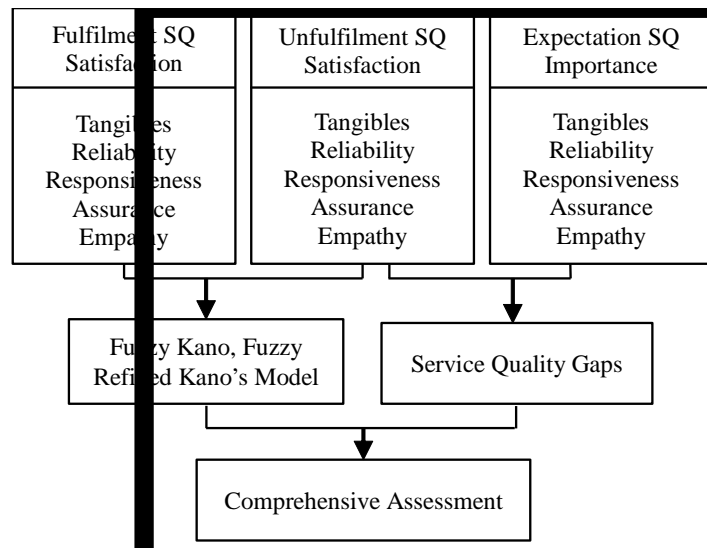

Figure 2. Research Framework

3.2 Questionnaire Design

This study investigates the key aspects of service quality for the chain restaurant industry, and seeks to understand the gap in expectations and actual experiences of service quality for ordinary consumers in the chain restaurant industry. In addition, as many different types of chain restaurant exist, this study focuses on eleven chain restaurants under the Wowprime Corp.

The questionnaire was distributed to consumers who had visited the restaurants under Wowprime Corp. within the past year, using convenience sampling to identify survey respondents. The questionnaire is divided into four parts: basic personal information, consumer behavior, the Kano questionnaire. For the Kano questionnaire, this study adopts the PZB service quality gap model proposed by Parasuraman et al. (1985). Due to the deficiencies of the SERVQUAL scale when applied to measurement

of restaurant service quality, this study uses the DINESERV scale proposed by Stevens et al. (1995) as the main measurement scale. This scale is divided into five dimensions, with a total of twenty-nine questions items. The five dimensions are tangibles, reliability, responsiveness, assurance, and empathy.

The DINESERV scale is used as a framework to develop the Kano two-dimensional quality model, together with a five-point Likert scale, which uses "very satisfied," "somewhat satisfied," "no opinion," "somewhat dissatisfied," and "very dissatisfied" to indicate the level of satisfaction of services that are either provided or not provided.

3.3 Fuzzy Set Theory

Fuzzy set theory was first proposed by Lotfi A. Zadeh of the University of California, Berkeley in 1965. In order to allow the extension of concepts mathematically, Zadeh used membership functions to indicate fuzzy characteristics. Therefore, to resolve the problem of subjectivity in everyday human speech, Zadeh developed a tool for quantitative expression, defined as: let U be a universal set, containing fuzzy subset $\widetilde{A}$ any $x \in U$, displays a real number $u_{\widetilde{A}}(x) \in [0, 1]$, $u_a(x)$ is the membership function of fuzzy set $\widetilde{A}$, if $0 < u_{\widetilde{A}}(x) < 1$, element x belongs to the fuzzy set $\widetilde{A}$.

Linguistic variables are variables whose values are contained in natural language (Zadeh, 1975). Variables corresponding to different semantic scales of human language can be divided into appropriate and effective semantic scales, for instance "very dissatisfied," "somewhat dissatisfied," "no opinion," "somewhat satisfied," and "very satisfied," or "very unimportant," "somewhat unimportant," "no opinion," "somewhat important" and "very important," allowing respondents to choose their own semantic response, as shown in Figure 3.
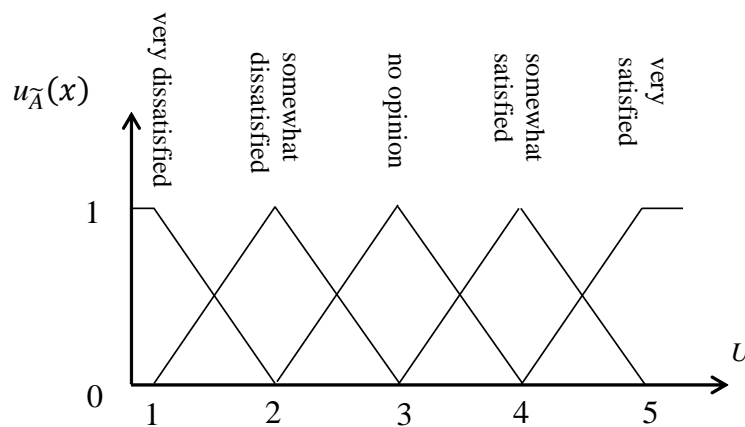
Figure 3. Triangular Fuzzy Membership Functions for Five Semantic Responses

Using triangular fuzzy numbers to represent the fuzzy characteristics of satisfaction and importance expressed by respondents not only avoids the problem of losing the distinctive characteristics of some respondents when geometric mean is used to represent the answers given by respondents, but it can also provide a solution to the subjective, fuzzy, and uncertain characteristics of human thought. Triangular fuzzy numbers can be obtained through the following algorithm:

$\widetilde{A}_{ij} = (lij, mij, rij)$

$\tilde{A}_{ij}$: triangular fuzzy numbers

l_{ij} : the L-value of the triangular fuzzy number with membership function of 0 for the ith factor and the jth appraisal indicator as expressed by the respondent.

m_{ij}: the mid-value of the triangular fuzzy number with membership function of 1 for the ith factor and the jth appraisal indicator as expressed by the respondent.

r_{ij}: the R-value of the triangular fuzzy number with membership function of 0 for the ith factor and the jth appraisal indicator as expressed by the respondent.

Linguistic variables are used to express appraisals of satisfaction or importance. Chen and Hwang (1992) have developed a method for converting linguistic terms or fuzzy numbers into clear values. They suggest eight conversion scales to transform linguistic terms into fuzzy numbers. Using Chen and Hwang's defuzzification method, we can obtain clear values for each of the terms under the eight different scales, converting the linguistic variables on the evaluation scale into fuzzy evaluation values. The values after conversion are shown in Table 1.

Table 1. Evaluation Scale for Fuzzy Linguistic Values

Fuzzy numbers	Linguistic variables	Triangular fuzzy numbers
$\tilde{5}$	Very satisfied / very important	(4, 5, 5)
$\tilde{4}$	Somewhat satisfied / somewhat important	(3, 4, 5)
$\tilde{3}$	No opinion	(2, 3, 4)
$\tilde{2}$	Somewhat dissatisfied / somewhat unimportant	(1, 2, 3)
$\tilde{1}$	Very dissatisfied / very unimportant	(1, 1, 2)

Source: Chen and Hwang (1992)

Defuzzification is a method for converting fuzzy sets into clear values. The defuzzification method has many types, including the center of gravity method, the center of area method, and the mean of maximum method. Of these, the center of gravity method is most commonly used; this method is also adopted in this study to carry out defuzzification. When the fuzzy numbers are triangular fuzzy numbers, the center of gravity method is expressed as follows:

$$F_i = \frac{[(r_i - l_i) + (m_i - (l_i))]}{3} + l_i \ , \forall i, \ j$$

(1)

4. RESEARCH RESULTS
4.1 Analysis of Sample Background Characteristics

In this study, 500 questionnaires were distributed for the formal questionnaire survey and 457 questionnaires were returned, of which 435 were valid questionnaires, giving a response rate of 87%. The results are shown in Table 2. The majority of respondents were women (272) compared to 163 men, and most respondents (170) fell into the age range "20 years or under," followed by "31~40 years" (103). The majority of respondents (68.3%) had a "university/college" education, followed by 18.9% with a "high school/vocational" education. Respondents from central Taiwan made up the greatest number, with 223 respondents, followed by 101 respondents from northern Taiwan. For occupational status, "student" was the largest category, with 207

respondents, followed by "business," with 89 respondents. Average monthly income of "NT$10,000 or less" had the most respondents, accounting for 46.2% of respondents, followed by "NT$20,001~NT$40,000" accounting for 29.0% of respondents. "Tasty" was the most frequently chosen restaurant, with 104 visitors, followed by "Tokiya Meals," with 69 visitors.

Table 2. Analysis of Sample Background Characteristics

Background variable	Classification	Number of people	%	Background variable	Classification	Number of people	%
Sex	Male,	163	37.5	Place of	Northern Taiwan	101	23.2
	Female	272	62.5	residence	Central Taiwan	223	51.3
Age	20 years or under	170	39.1		Southern Taiwan	100	23.0
	21~30 years	70	16.1		Eastern Taiwan	10	2.3
	31~40 years	103	23.7		Outlying islands	1	0.2
	41~50 years	72	16.6	Average	NT$10,000 or less	201	46.2
	51 years and over	20	4.6	monthly	NT$10,001~NT$20,000	45	10.3
Education	Junior high school	15	3.4	income	NT$20,001~NT$20,000	126	29.0
	High school/vocational	82	18.9		NT$40,001~NT$60,000	39	9.0
	University/college	297	68.3		NT$60,001~NT$80,000	14	3.2
	Masters	34	7.8		NT$80,001 or more	10	2.3
	Ph.D.	7	1.6	Restaurant	Wang Steak	49	11.3
Occupation	Business	89	20.5		Tasty	104	23.9
	Labor	38	8.7		Tokiya Meals	69	15.9
	Military and government	29	6.7		Giguo	33	7.6
	Student	207	47.6		YakiYan Japanese BBQ	67	15.4
	Homemaker	19	4.4		Chamonix	34	7.8
	Self employed	28	6.4		Pintian	47	10.8
	Other	25	5.7		12hotpot	32	7.4

4.2 Reliability Analysis

We test importance, satisfaction, satisfaction when a service is fulfilled, and satisfaction when a service is unfulfilled using Cronbach's α coefficient. The reliability of each importance dimension is between $0.603 \sim 0.847$, with a Cronbach's α coefficient of 0.923 for the overall importance scale. The reliability of each satisfaction dimension is between $0.687 \sim 0.824$, with a Cronbach's α coefficient of 0.933 for the overall satisfaction scale. The reliability of each satisfaction dimension when a service is fulfilled is between $0.700 \sim 0.891$, with a Cronbach's α coefficient of 0.949 for the overall satisfaction scale when a service is fulfilled. The reliability of each satisfaction dimension when a service is unfulfilled is between $0.684 \sim 0.842$, with a Cronbach's α coefficient of 0.936 for the overall satisfaction scale when a service is unfulfilled. These results indicate that the reliability of the questionnaire is good.

4.3 Classification of Kano Two-Dimensional Quality Attributes

Lin (2002) pointed out that fuzzy linguistic scales that use fuzzy numbers to represent linguistic terms are better able to reflect the true feelings of subjects than the Likert scale, which uses equal intervals to represent linguistic terms. Similarly, the use of fuzzy linguistic scales for questionnaires produces better reliability and validity. Therefore, after the valid questionnaires were returned, we converted the Likert scale into a fuzzy linguistic scale, using the Kano two-dimensional quality model and the refined Kano model to classify quality attributes for service quality in the chain restaurant industry.

According to Matzler and Hinterhuber's (1998) proposed classification of Kano two-dimensional quality attributes, this study uses the relative majority as the standard for classification, using satisfaction with "fulfillment" and "unfulfillment" of the

twenty-nine service quality items to carry out cross-table analysis. Using the Kano two-dimensional quality attribute classification, the quality attributes are revised as one-dimensional (O), must-be (M), attractive (A), indifferent (I), reverse (R), and questionable (Q), as shown in Table 3.

Table 3. Classification of Kano Quality Attributes

Dimension	Items	Quality Attributes (%)						Category
		A	O	M	I	R	Q	
Tangibles	1. Good parking and attractive appearance	21.1	20.0	8.3	50.6	-	-	I
	2. Atmosphere and decor of dining areas is good	23.2	17.0	8.7	50.8	-	-	I
	3. Service staff dressed neatly	20.9	20.0	8.5	50.6	-	-	I
	4. Restaurant's decor typical to its image and price range	20.7	16.1	9.2	54.0	-	-	I
	5. Easily readable menu	22.3	17.0	10.1	50.6	-	-	I
	6.Visually attractive menu, reflecting the characteristics and image of the restaurant	21.1	13.3	10.8	54.7	-	-	I
	7. Comfortable and spacious dining area	20.7	26.4	13.1	39.8	-	-	O
	8. Clean restrooms	14.9	36.3	13.1	35.6	-	-	O
	9. Clean dining areas	15.4	37.9	13.6	32.9	0.2	-	O
	10. Comfortable seating	19.3	26.0	14.5	40.2	-	-	O
Reliability	11. Service staff provide immediate service	18.4	27.6	10.6	43.2	-	0.2	O
	12. Service staff quickly correct mistakes	15.2	26.7	14.5	43.7	-	-	O
	13. Service staff are dependable and provide consistent service	20.9	23.7	9.0	46.4	-	-	O
	14. Bills are accurate	14.7	34.3	11.5	39.5	-	-	O
	15. The ingredients and taste of the menu items served meet customer expectations	18.6	23.2	11.5	46.5	-	0.2	O
Responsiveness	16. Staff help each other to maintain quality of service during busy times	20.9	20.5	12.4	46.2	-	-	A
	17. Provision of prompt and accurate service	19.3	27.8	9.4	43.4	-	-	O
	18. Provision of extra service to meet customer special requests	20.0	15.4	8.0	56.3	0.2	-	I
Assurance	19. Service staff are able to quickly respond to customers' questions	20.7	19.8	9.2	50.3	-	-	I
	20. Service staff are able to provide individual attention	25.3	18.4	8.7	47.6	-	-	A
	21. Service staff provide information about the ingredients and preparation methods for menu items	21.4	14.3	11.3	53.1	-	-	I
	22. Make customers feel safe	20.2	21.6	9.9	48.3	-	-	O
	23. Service staff are well-trained, competent, and experienced	20.7	21.6	11.7	46.0	-	-	O
	24. The restaurant provides service staff with the skills and authority necessary to do their job	18.2	19.1	10.8	52.0	-	-	I
Empathy	25. Service staff do not ignore customer requests in order to comply with company rules	20.5	22.8	11.7	45.1	-	-	O
	26. Customers are made to feel valued by service staff	16.6	34.7	11.3	37.2	-	0.2	O
	27. Service staff first consider the needs of customers	17.7	28.3	10.8	43.0	-	0.2	O
	28. In case of any mistakes in service, service staff show a willingness to accept the response of customers	13.8	31.5	10.3	44.4	-	-	O
	29. Always thinking of the customers' interests	16.1	28.0	10.1	45.7	-	-	O

A: Attractive Quality；O: One-dimensional Quality；M: Must-be Quality；I: Indifferent Quality；R: Reverse Quality；Q: Invalid Quality

The analysis shows that the "reliability" and "empathy" service quality dimensions belong to the "one-dimensional" quality attribute, the "tangibles" dimension of service quality belongs to the "indifferent" and "one-dimensional" quality attributes, the "staff help each other to maintain quality of service during busy times" attribute under the responsiveness dimension, and "service staff are able to provide individual attention" for the assurance dimension are part of the "attractive quality" for chain restaurants.

In this study, restaurants are divided into low, medium, and high price categories, with Kano quality attributes classified according to the three types. The classification of Kano quality attributes for the three price categories is shown in Table 4.

4.4 Classification of Refined Kano Quality Attributes
Based on the Refined Kano Model proposed by Yang (2005), the importance

attached by consumers to each of the Kano quality attributes are added, categorizing chain restaurant industry service quality into Refined Kano quality attributes. We compare the mean score for each item to the mean score for the questionnaire as a whole; if the mean score for an item is larger than the overall mean, it is deemed to be relatively important to consumers. In contrast, if the mean score for an item is lower than the overall mean, it is considered to be of relatively less importance to consumers. In this study, the overall average for the level of importance is 4.138. We use this mean score as the basis to categorize service quality in the chain restaurant industry as Refined Kano quality attributes, as shown in Table 5.

In this study, restaurants are divided into low, medium, and high price categories, and the service quality items categorized for the three price groups into refined Kano quality attributes. The average level of importance for low price restaurants was 4.096, for medium price restaurants, it was 4.145, and for high price restaurants, it was 4.171. The classification of refined Kano quality attributes for the three price categories is shown in Table 6.

Table 4. Classification of Kano Quality Attributes for Restaurants according to Price Category

Dimension	Items	Price category		
		Low	Medium	High
Tangibles	1. Good parking and attractive appearance	I	I	A
	2. Atmosphere and decor of dining areas is good	I	A	A
	3. Service staff dressed neatly	I	I	O
	4. Restaurant's decor typical to its image and price range	I	I	A
	5. Easily readable menu	I	A	A
	6. Visually attractive menu, reflecting the characteristics and image of the restaurant	I	I	A
	7. Comfortable and spacious dining area	I	O	A
	8. Clean restrooms	O	O	O
	9. Clean dining areas	O	O	O
	10. Comfortable seating	A	O	O
Reliability	11. Service staff provide immediate service	O	O	O
	12. Service staff quickly correct mistakes	I	O	O
	13. Service staff are dependable and provide consistent service	I	O	O
	14. Bills are accurate	O	O	O
	15. The ingredients and taste of the menu items served meet customer expectations	I	O	O
Responsiveness	16. Staff help each other to maintain quality of service during busy times	I	A	M
	17. Provision of prompt and accurate service	O	O	O
	18. Provision of extra service to meet customer special requests	I	I	I
Assurance	19. Service staff are able to quickly respond to customers' questions	I	I	A
	20. Service staff are able to provide individual attention	I	A	A
	21. Service staff provide information about the ingredients and preparation methods for menu items	I	A	A
	22. Make customers feel safe	I	O	O
	23. Service staff are well-trained, competent, and experienced	O	O	A
	24. The restaurant provides service staff with the skills and authority necessary to do their job	I	I	O
Empathy	25. Service staff do not ignore customer requests in order to comply with company rules	O	O	O
	26. Customers are made to feel valued by service staff	O	O	O
	27. Service staff first consider the needs of customers	O	O	O
	28. In case of any mistakes in service, service staff show a willingness to accept the response of customers	O	O	O
	29. Always thinking of the customers' interests	O	O	O

A: Attractive Quality；O: One-dimensional Quality；M: Must-be Quality；I: Indifferent Quality；R: Reverse Quality

Table 5. Classification of Refined Kano Quality Attributes

Dimension	Items	Average Level of Importance	Kano Model	Refined Kano
Tangibles	1. Good parking and attractive appearance	4.083	I	CF
	2. Atmosphere and decor of dining areas is good	4.148	I	PQ
	3. Service staff dressed neatly	4.102	I	CF
	4. Restaurant's decor typical to its image and price range	4.011	I	CF
	5. Easily readable menu	4.131	I	CF
	6. Visually attractive menu, reflecting the characteristics and image of the restaurant	3.980	I	CF
	7. Comfortable and spacious dining area	4.225	O	HV
	8. Clean restrooms	4.285	O	HV
	9. Clean dining areas	4.368	O	HV
	10. Comfortable seating	4.200	O	HV
Reliability	11. Service staff provide immediate service	4.192	O	HV
	12. Service staff quickly correct mistakes	4.182	O	HV
	13. Service staff are dependable and provide consistent service	4.169	O	HV
	14. Bills are accurate	4.251	O	HV
	15. The ingredients and taste of the menu items served meet customer expectations	4.177	O	HV
Responsiveness	16. Staff help each other to maintain quality of service during busy times	4.177	A	HA
	17. Provision of prompt and accurate service	4.193	O	HV
	18. Provision of extra service to meet customer special requests	3.934	I	CF
Assurance	19. Service staff are able to quickly respond to customers' questions	4.096	I	CF
	20. Service staff are able to provide individual attention	4.106	A	LA
	21. Service staff provide information about the ingredients and preparation methods for menu items	3.867	I	CF
	22. Make customers feel safe	4.027	O	LV
	23. Service staff are well-trained, competent, and experienced	4.110	O	LV
	24. The restaurant provides service staff with the skills and authority necessary to do their job	4.026	I	CF
Empathy	25. Service staff do not ignore customer requests in order to comply with company rules	4.100	O	LV
	26. Customers are made to feel valued by service staff	4.294	O	HV
	27. Service staff first consider the needs of customers	4.171	O	HV
	28. In case of any mistakes in service, service staff show a willingness to accept the response of customers	4.261	O	HV
	29. Always thinking of the customers' interests	4.122	O	LV
	Overall average level of importance	4.138		

A: Attractive Quality；O: One-dimensional Quality；I: Indifferent Quality；HA: High attractive quality；LA: Low attractive quality；HV: High value-added quality；LV: Low value-added quality；P: Potential quality；CF: Care-free quality

Table 6. Classification of refined Kano Quality Attributes for Restaurants according to Price Category

Dimension	Items	Price category		
		Low	Medium	High
Tangibles	1. Good parking and attractive appearance	CF	CF	LA
	2. Atmosphere and decor of dining areas is good	CF	HA	HA
	3. Service staff dressed neatly	CF	CF	LV
	4. Restaurant's decor typical to its image and price range	CF	CF	LA
	5. Easily readable menu	CF	HA	LA
	6. Visually attractive menu, reflecting the characteristics and image of the restaurant	CF	CF	LA
	7. Comfortable and spacious dining area	HV	HV	HA
	8. Clean restrooms	HV	HV	HV
	9. Clean dining areas	HV	HV	HV
	10. Comfortable seating	HA	HV	HV
Reliability	11. Service staff provide immediate service	HV	HV	HV
	12. Service staff quickly correct mistakes	PQ	HV	HV
	13. Service staff are dependable and provide consistent service	PQ	HV	HV
	14. Bills are accurate	HV	HV	HV
	15. The ingredients and taste of the menu items served meet customer expectations	CF	HV	HV

Table 6. Classification of refined Kano Quality Attributes for Restaurants according to Price Category (cont.)

Dimension	Items	Price category		
		Low	Medium	High
Responsiveness	16. Staff help each other to maintain quality of service during busy times	PQ	HA	CQ
	17. Provision of prompt and accurate service	HV	HV	HV
	18. Provision of extra service to meet customer special requests	CF	CF	CF
Assurance	19. Service staff are able to quickly respond to customers' questions	CF	CF	LA
	20. Service staff are able to provide individual attention	CF	LA	LA
	21. Service staff provide information about the ingredients and preparation methods for menu items	CF	LA	LA
	22. Make customers feel safe	CF	LV	LV
	23. Service staff are well-trained, competent, and experienced	LV	LV	LA
	24. The restaurant provides service staff with the skills and authority necessary to do their job	CF	CF	LV
Empathy	25. Service staff do not ignore customer requests in order to comply with company rules	HV	LV	HV
	26. Customers are made to feel valued by service staff	HV	HV	HV
	27. Service staff first consider the needs of customers	HV	HV	LV
	28. In case of any mistakes in service, service staff show a willingness to accept the response of customers	HV	HV	HV
	29. Always thinking of the customers' interests	HV	LV	HV
	Overall average level of importance	4.096	4.145	4.171

HA: High attractive quality ; LA: Low attractive quality ; HV: High value-added quality ; LV: Low value-added quality ;
PQ: Potential quality ; CF: Carefree quality

5. CONCLUSION

Past studies have shown that fuzzy linguistic scales, which use fuzzy numbers to represent linguistic terms, are better able to reflect the true feelings of subjects than the Likert scale, which uses equal intervals to represent linguistic terms. Therefore, after the valid questionnaires were returned, we converted the Likert scale into a fuzzy linguistic scale, using the Kano two-dimensional quality model and the refined Kano model to classify quality attributes for service quality in the chain restaurant industry.

According to the analysis under the refined Kano model, we recommend removing "care-free quality" items and investing resources to meet basic customer demands for "critical quality" and "necessary quality" items. After these two quality attributes have been satisfied, to enhance consumer satisfaction, improvement can focus on "high value-added quality" items. When satisfaction has reached a certain level, resources can be invested in "high attractive quality" items to strengthen competiveness with other businesses in the industry. Only if spare capacity remains should resources be invested in "low value-added quality," "low attractive quality," and "potential quality" items.

Overall, we recommend a strategy of excluding "care-free quality" items, using "high attractive quality attributes" to strengthen the focus on improvement— as these attributes are able to strengthen the advantages of chain restaurants—and striving to maintain "high value-added quality attributes" and "critical quality attributes." To enhance and maintain customer satisfaction, these attributes are combined with potential quality attributes as a strategic weapon, to highlight competitive advantage. For service quality centered on "concentrate here," "critical quality attributes" and "high value-added quality attributes" are currently most in need of improvement. As "high attractive quality attributes" and "potential quality attributes" do not directly affect consumer satisfaction, they can be viewed as a second priority for improvement.

REFERENCES

[1] Babakus, E., Boller, G. W., (1992), An Empirical Assessment of SERVQUAL

Scale. *Journal of Business Research*, 24, 253-268.

[2] Chen, S. J., Hwang, C. L., (1992), *Fuzzy Multiple Attribute Decision Making: Methods and Applications*. New York: Springer-Verlag.

[3] Cheng, B. W., Chiu, W. H., (2007), Two-Dimensional Quality Function Deployment: An application for deciding quality strategy using fuzzy logic. *Total Quality Management and Business Excellence*, 18(3-4), 451-470.

[4] Cheng, M.S., Lin, C.C., (2011), Appling Kano's Model to Explore Service Quality Attributes in Hypermarkets, *Journal of Customer Satisfaction*, 7(2), 223-257

[5] Crosby, P. B., (1979), *Quality is free*. New York: McGraw-Hill Co.

[6] Deng, W.J., Pei, W., (2007), The Impact Comparison of Likert Scale and Fuzzy Linguistic Scale on Service Quality Assessment, *Chung Hua Journal of Management*, 8(4), 19-37.

[7] Denguir-Rekik, A., Montmain, J., Mauris, G., (2009), A Possibilistic-Valued Multi-Criteria Decision-Making Support for Marketing Activities in e-Commerce: Feedback Based Diagnosis System. *European Journal of Operational Research*, 195(3), 876-888.

[8] Deshpande, R., Farley, J., Webster, F., (1993), Corporate Culture, Customer Orientation, and Innovativeness in Japanese Firms: A quadrate Analysis. *Journal of Marketing*, 57(1), 23-27.

[9] Devlin, S. J., Dong, H. K., (1994), Service Quality from Customers' Perspective. *Marketing Research*, 6(1), 5-13.

[10] Etzel, M. J., Bruce, J. W., William, J. S., (2001), *Marketing Management* (12th ed.). Irwin: McGraw-Hill.

[11] Grönroos, C., (1984), A Service Quality Model and Its Marketing Implications. *European Journal of Marketing*, 18(4), 36-44.

[12] Herzberg, F., Mausner, B., Snyderman, B. B., (1959), *The Motivation to Work*. New York: John Wiley & Sons.

[13] Heskett, J. L., Jones, T. O., Loveman, G. W., Sasser, W. E., Schlesinger, L. A., (1994), Putting the Service-Profit Chain to Work. *Harvard Business Review*, 72(2), 164-174.

[14] Jané A. C., Domínguez, S. M., (2003), Citizens' Role in Health Services: Satisfaction Behavior: Kano's Model, Part 2. *Quality Manage Health Care*, 12(1), 72-80.

[15] Kano, N., (1996), *Guide to TQM in Service Industries* (3rd ed.). Tokyo: Asian Productivity Organization.

[16] Kano, N., Seraku, N., Takahashi, F., Tsuji, S., (1984), Attractive Quality and Must-Be Quality. *The Journal of Japanese Society for Quality Control*, 14(2), 38-48.

[17] Kim, W. G., Ng, C. Y. N., Kim, Y. S., (2009), Influence of Institutional DINESERV on Customer Satisfaction, Return Intention, and Word-of-Mouth. *International Journal of Hospitality Management*, 28(1), 10-17.

[18] Knutson, B., Stevens, P., Wullaert, C., Patton, M., Yokoyama, F., (1990), LODGSERV: A Service Quality Index for the Lodging Industry. *Hospitality Research Journal*, 14(2), 277-284.

[19] Kotler, P., Keller, K., (2012), *Marketing Management* (14th ed.). Prentice Hall Inc.

[20] Kuo, Y. F., (2004), Integrating Kano's Model into Web-Community Service Quality. *Total Quality Management and Business Excellence*, 15(7), 925-939.

[21] Ladhari, R., (2009), A Review of Twenty Years of SERVQUAL Research. *International Journal of Quality and Service Sciences*, 1(2), 172-198.

[22] Lee, T. R., Li, J. M., (2006), Key Factors in Forming an E-Marketplace: An Empirical Analysis. *Electronic Commerce Research and Applications*, 5, 105-116.

[23] Lee, W. I., Chang, T. H., Chao, P. J., (2007), The Relationship between Quality of Healthcare Service and Customer Satisfaction: An Example of Hospitals in Taiwan. *Journal of the Chinese Institute of Industrial Engineers*, 24(1), 87-95.

[24] Lee, Y. C., Huang, S. Y., (2009), A New Fuzzy Concept Approach for Kano's Model. *Expert Systems with Applications*, 36(3), 4479-4484.

[25] Lee, Y. H., Chen, T. L., (2006), A Kano Two-dimensional Quality Model in Taiwan's Hot Spring Hotels Service Quality Evaluations. *The Journal of American Academy of Business*, 8(2), 301-306.

[26] Lin, Y. H., (2002), The Construction of Fuzzy Linguistic N umbers for Questionnaire and Its Empirical Study, *Survey Research - Method and Application*, 31-71

[27] Lovelock, C. H., Wirtz, J.,Chew, P., (2009), *Essentials of Services Marketing*. Singapore: Prentice-Hall.

[28] Matzler, K., Hinterhuber, H. H., (1998), How to Make Product Development Projects More Successful by Integrating Kano's Model of Customer Satisfaction into Quality Function Deployment. *Technovation*, 18(1), 25-38.

[29] Murgulets, L., Eklöf, J., Dukeov, I., Selivanova, I., (2001), Customer Satisfaction and Retention in Transition Economies. *Total Quality Management*, 12(7), 1037-1046.

[30] Oliver, R. L., (1980), Cognitive Model of the Antecedents and Consequences of Satisfaction Decision. *Journal of Marketing Research*, 17, 460-469.

[31] Oyewole, P., (1999), Multi-Attribute Dimensions of Service Quality in the Fast Food Restaurant Industry. *Journal of Restaurant & Foodservice Marketing*, 3(3/4), 65-91.

[32] Parasuraman, A., Zeithaml, V. A., Berry, L. L., (1985), A Conceptual Model of Service Quality and its Implications for Future Research. *Journal of Marketing*, 49(4), 41-50.

[33] Parasuraman, A., Zeithaml, V. A., Berry, L. L., (1988), SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perception of Service Quality. *Journal of Retailing*, 64(1), 12-40.

[34] Park, J. W., Robertson, R., Wu, C. L., (2004), The Effect of Airline Service Quality on Passengers' Behavior Intentions: A Korean Case Study. *Journal of Airline Transport Management*, 10(6), 435-439.

[35] Petruzzellis, L., D'Uggento, M. A., Romanazzi, S., (2006), Students' Satisfaction and Quality of Service in Italian Universities. *Managing Service Quality*, 16(4), 349-364.

[36] Reichheld, F. F., Sasser, W. E., (1990), Zero Defections: Quality Comes to Services. *Harvard Business Review*, 68, 105-110.

[37] Rust, R. T., Zahorik, A. J., Keiningham, T. L., (1995), Return on Quality (ROQ): Making Service Quality Financially Accountable. *Journal of Marketing*, 59(2), 58-70.

[38] Schvaneveldt, S. J., Enkawa, T., Miyakawa, M., (1991), Consumer Evaluation Perspectives of Service Quality: Evaluation Factors and Two-Way Model of

Quality. *Total Quality Management*, 2(2), 149-161.

[39] Shen, X. X., Tan, K. C., Xie, M., (2000), An Integrated Approach to Innovative Product Development Using Kano's Model and QFD. *European Journal of Innovation Management*, 3(2), 91-99.

[40] Stevens, P., Knutson, B., Patton, M., (1995), DINESERV: a Tool for Measuring Service Quality in Restaurants. *Cornell Hotel and Restaurants Administration Quarterly*, 36(2), 56-60.

[41] Vroman, H. W., Luchsinger, V. P., (1994), *Managing Organizational Quality*. Boston: Irwin.

[42] Wu, B., Sun, C. M., (2004), Fuzzy Statistical Analysis for Human Thought With Fuzzy Data. *In International Workshop on Fuzzy Systems and Innovational Computing*, 389-397.

[43] Yang, C. C., (2005), The refined Kano's model and its application. *Total Quality Management*, 16(10), 1127-1137.

[44] Zadeh, L. A., (1965), Fuzzy Sets. *Information and Control*, 8(3), 338-353.

[45] Zeithaml, V. A., Bitner, M. J., (1996), *Services Marketing*. New York: McGraw-Hill.

[46] Zeithaml, V. A., Berry, L. L., Parasuraman, A., (1996), The Behavioral Consequences of Service Quality. *Journal of Marketing*, 60, pp. 31-46.