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## A Case Study of Applying Kano's Model and ANOVA Technique in Evaluating Service Quality

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**Abstract:** Since the Kaohsiung Rapid Transit System (KRTS) in Taiwan started to operate, the KRTC has continued to rack up a heavy loss. The major reason why Kaohsiung Rapid Transit Corporation suffered such big deficit is that the actual passenger volume is far below than the expected passenger volume. Thus, it is critically important to not only attract more passengers having a trip on the KRTC trains but also retain current passengers by understanding and fulfilling their various needs. In this study, an integrated approach of Kano's model and ANOVA technique is applied to first understand passengers' service quality requirements of KRTS services from psychological viewpoints and then identify significant demographic variables for market segmentation. When passengers are classified into several clusters in terms of demographic variables, the preferences among the clusters can be easily identified and the management can further make different marketing strategies to meet different passengers' needs in order to provide customer-oriented services.

**Key words:** Kano's model, ANOVA technique, demographic variable, market segmentation, Kano category, marketing strategy

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### INTRODUCTION

The Kaohsiung Rapid Transit System (KRTS) in Taiwan has been operated since April 2008. The KRTS consists of two lines with thirty eight stations and the total length is 42.7 km. The expected average daily passenger volume of KRTS in the planning period is set to 360,000 in 2009 and 500,000 in 2010, but no more than 130,000 passengers daily have been reached in average figure per month by the end of May 2010. Thus, Kaohsiung Rapid Transit Corporation continues to rack up a heavy loss due to low passenger volume. Though attracting more passengers for KRTS seems to be a critical issue, Kotler and Armstrong (2005) have stated that retaining customers is far more important from the viewpoints of marketing management since losing a customer means not only losing more than a single sale but also losing the entire stream of purchase that the customer would make over a lifetime of patronage. Specifically, Kotler and Armstrong (2005) considered delight customer is the major way to retain customers because delighted customers will remain loyal and talk favorably to others about the company and its products or services. Under such circumstances, if KRTS passengers or users can be delighted, they will continuously take KRTS transit service and talk favorably

to others. Thus, more and more passengers will be attracted to resolve the problem of low passenger volume.

However, customer satisfaction and customer delight is somewhat different. In Berman (2005) explanations, delight is a construct related to but separate from satisfaction because of different things based on. In the same way that dissatisfaction is related to but distinct from satisfaction. Customer satisfaction is generally based on exceeding one's expectations, while customer delight requires that customers receive a positive surprise beyond their expectations. SERVQUAL is a popular model that proposes satisfaction is based on customers' evaluation of their expectation and perception of services and assumes a linear relationship between customer satisfaction and attribute performance. It provides marketers with important information on gaps between predicted and perceived service levels. On the other hand, Kano's model that assumes the relationship depends on different forms of attributes provides marketers with the implications of closing gaps for different attributes and enables marketers to see the sources of satisfaction and delight and to differentiate these from must haves as well. In Wu and Pan (2009) suggestion, Kano's model can help the decision-maker value the service features from customers' viewpoints in multiple dimension and ANOVA

technique can enable the decision-maker to identify significant variables for market segmentation. Thus, an integration of Kano's model and ANOVA technique is first to understand the different preferences and then to meet the different needs among different clusters by providing better customer-oriented service features.

This study, therefore, intends to use the philosophy of Kano's model to investigate passengers' service quality requirements of KRTS and apply ANOVA technique to identify significant demographic variables for market segmentation. By classifying customers into appropriate groups with similar usage patterns, the management would be able to improve service quality and provide specific marketing strategies for different types of passengers.

### KANO'S MODEL

Traditionally, customer satisfaction is used to evaluate quality of products or services and treated as one-dimensional meaning customer satisfaction and dissatisfaction results from fulfillment and unfulfillment of customer attributes (Cheng and Chiu, 2007) or the higher the perceived product quality, the higher the customer satisfaction and vice versa (Matzler and Hinterhuber, 1998). The earlier concept of two-dimensional quality was released by Herzberg *et al.* (1959) book "The Motivation to Work" in 1959. Herzberg (1966) wrote *Work and Nature of Man* to elaborate on the Two-Factor Theory (also known as Motivation-Hygiene (M-H) Theory) which posits job satisfaction and job dissatisfaction result from separate factors. In other words, the opposite of job satisfaction is not job dissatisfaction but, rather, no job satisfaction; similarly, the opposite of job dissatisfaction. Besides, motivator factors (for example, recognition for achievement) are the primary causes of job satisfaction, while hygiene factors (for example, working conditions) are the primary causes of job dissatisfaction (Lofgren and Witell, 2008).

Inspired by Herzberg's work of M-H theory, Kano and Takahashi (1979) proposed the concept of M-H property of quality, which assumed that quality is not a one-dimensional construct (Lofgren and Witell, 2005, 2008). Further, Kano *et al.* (1984) named the M-H theory as attractive quality and must-be quality to avoid unfortunate mix-ups or confuse with Herzberg (1966) M-H theory (Lofgren and Witell, 2008; Liu, 2009). Kano's model is also known as the theory of attractive quality and presents five quality attributes or dimensions on the basis of the relationship between the degree of sufficiency of a given quality attribute in horizontal axis and customer satisfaction with that quality attribute in vertical axis to

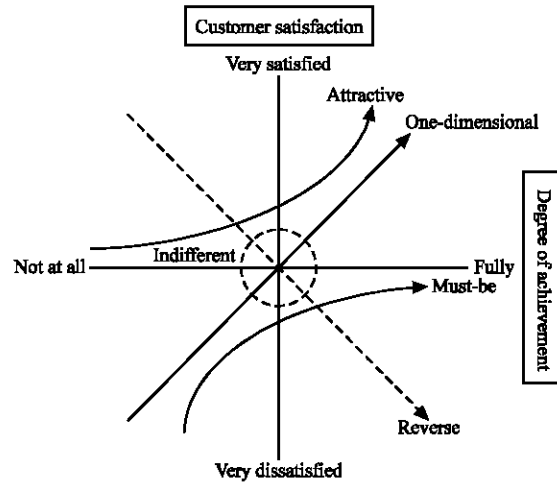


Fig. 1: The Kano's model

illustrate that product or service quality customer perceived and customer satisfaction are multi-dimensions. The model is depicted in Fig. 1 and the philosophy is depicted as follows (Kuo, 2004; Chen and Lee, 2006; Lee *et al.*, 2008; Liu, 2008a, b; Chang *et al.*, 2009; Lee and Huang, 2009; Hsieh, 2009; Shieh *et al.*, 2010):

Attractive quality attributes (A) are not normally expected by customers but can unexpectedly surprise and delight customers. When these attributes are sufficient or fulfilled, customers can be excited and satisfied. However, when these attributes are insufficient or unfulfilled, customers cannot be dissatisfied but accept its absence. These attributes are often unspoken to customers.

One-dimensional quality attributes (O) are explicitly demanded and spoken by customers. Customer satisfaction of these attributes is proportional (linear impact) to the level of sufficiency or insufficiency. When these attributes are sufficient, customers can be satisfied; whereas, they can be dissatisfied.

Must-be quality attributes (M) are expected and fundamental to customers. Customers feel dissatisfied while these quality attributes are unfulfilled. That is, the more insufficient attributes, the more customers' dissatisfaction. However, customers just take these attributes for granted while they are sufficient, that means customer satisfaction cannot be intensified even if these attributes are fulfilled.

Indifferent quality attributes (I) are of little significance for customers. No matter whether these attributes are sufficient or not, they will result in neither customer satisfaction nor customer dissatisfaction. In fact, customers have no different feelings.

The term Reverse quality attributes (R) are referred to have proportional or linear relationship between

satisfaction and insufficient level of attributes and between dissatisfaction and sufficient level of attributes. A high degree of achievement of these attributes results in dissatisfaction and vice versa. In other words, customers are satisfied when these attributes are absent, but are not satisfied when present.

The theory of attractive quality posits that quality attributes are dynamic and can change over time. According to Kano (2001), a successful quality attribute follows a life cycle and will change from being indifferent, to attractive, to one-dimensional and finally to being a must-be. Researchers' using a specific Kano's questionnaire and Kano's evaluation table, all service quality features provided by a particular organization that a respondent perceived can be grouped into one of various categories. For the classification of service quality features from a group of respondents, the Kano's category is determined by the most responses frequency counted, that is the Kano category = maximum (A, O, M, I, Q, R). However, the Center for Quality Management (CQM) revised the classification technique by the following formula (Gitlow, 1998): Kano category = maximum (A, O, M) if  $(A+O+M) > (I+Q+R)$  or

maximum (I, Q, R) if  $(A+O+M) \leq (I+Q+R)$ , where A, O, M, I, Q and R represent attractive, one-dimensional, must-be, indifferent, questionable and reverse quality attributes, respectively.

## RESEARCH METHOD

**Questionnaire design:** The measurement instrument in this study is based on the SERVQUAL's five distinct dimensions of 22-item scale proposed by Parasuraman *et al.* (1988) and Su (2008) evaluation instrument on KRTS service quality and Su (2001) measurement instrument about Taipei Metropolis Areas MRT service quality. We mainly take 22 statements of five dimensions in SERVQUAL instrument as the principal and refer to service quality features (question items) of rapid transit system contained in each dimensions presented on Su (2001, 2008) researches to obtain the final 27 amended question items (Table 1) in the questionnaire and take as the KRTS service quality features in this study.

**Measures:** The questionnaire is close-ended and anonymous for measuring customers' (passengers)

Table 1: The amended items of questionnaire

No.	Items
<b>Tangibles: Physical facilities, equipment and appearance of personnel</b>	
01	There are well air conditioning and lighting in box car
02	There are clean and tidy in box car
03	There are clean and tidy in station
04	The station staff is well dressed and appears neat
05	The indicator inside the station is clear and easy to understand
06	Train-waiting area is spacious enough and you have no crowded feeling
07	The box car is spacious enough and you have no crowded feeling
<b>Reliability: Ability to perform the promised service dependably and accurately</b>	
08	It is quickly and smoothly to enter and exit the station
09	It's convenient to transit
10	It feels safe, smooth and has low noise inside the moving box car
11	There are low failure rate of entire system (i.e., train, ticket issuing, value-added machine, automatic gate, elevator and so on) in station
12	The scheduled train is with on-time departure and arrival
13	KRTC offers specific timetable to passengers
<b>Responsiveness: Willingness to help customers and provide prompt service</b>	
14	Any information or activities can be delivered to passengers promptly
15	The station staff can promptly provide and meet passengers' services required
16	The station staff is willing to actively help passengers
17	The station staff can handle passengers' complaint instantly
<b>Assurance: Knowledge and courtesy of employees and their ability to inspire trust and confidence</b>	
18	The messages are broadcasted clearly and volume is moderately inside station and box car
19	The instruction of safety equipments is clearly indicated inside station and box car
20	The station staff is friendly
21	The station staff is professional
<b>Empathy: Caring, individualized attention the firm provides its customers</b>	
22	There are adequate facilities for passengers who are physically handicapped
23	The traffic hour fulfills passengers' requirements
24	They offer different type of tickets to meet different passengers' needs
25	The fare is reasonable
26	The scheduled train run is tight enough to meet passengers' requirements
27	It is convenient to purchase a ticket (that is auto ticket issuing machine and stored-value machine is simple, easy to use)

service quality requirements of KRTS services and comprises two sections. The first section of questionnaire is question items used to assess passengers' perceived importance and performance (satisfaction) to 27 service quality features of KRTS. To each question item, respondents are required to answer functional and dysfunctional scales by choosing one of five alternatives and answer their individual satisfied level at the same time with five-point Likert scale which one is denoted very highly dissatisfied, two is highly dissatisfied, three is neutral, four is highly satisfied and five is very highly satisfied. Among five alternatives scale of Kano's pair questions, moreover, I dislike it that way chosen gives one point, I can live with it that way chosen gives two, I am neutral chosen gives three, It must be that way chosen gives four and I like it that way chosen scores five marks. The second section is background questions consisting of 11 items, such as gender, age, occupation, education, monthly income, living place, purpose of taking KRTS, frequency of taking KRTS, ticket type used, regular transportation tool and satisfactory level of KRTS entire services.

**Population, sample and data collection:** Passengers who have experiences of taking the KRTC trains are the subjects in this study. The sampling survey research was undertaken at Kaohsiung Main Station of KRTS from 27th to 31st May 2009 and from 22nd to 25th August 2009 separately. A total of 494 questionnaires were randomly delivered to passengers who entered and left the Kaohsiung Main Station entrance of KRTS. Before filling out the questionnaire, respondents were asked whether they had traveled on KRTC trains ever to confirm the qualified subjects.

**Data analysis:** Reliability and validity estimating of a measurement instrument are essential to ascertain the quality of survey. The internal consistency measure, Cronbach's  $\alpha$  ranging from 0 to 1, is commonly used to test the reliability. Higher alpha value indicates greater reliability. Nunnally (1978) advised the lower acceptable bound for alpha value is 0.70. In terms of validity, content validity judged by researchers from the content and scope of measurement instrument is concerned in this study. The basic descriptive statistic is utilized to look over the correct of coding and to summarize the passengers' characteristics. Factor analysis is deployed for data reduction and summarization to acquire key factors or components that respondents concerned. Kano's classification is applied to analyze passengers' service quality requirements of KRTS service. In addition, the independent sample t-test and one-way ANOVA are

employed to explore differences between passengers' demographic characteristics and the service quality requirements.

## RESULTS

**Sample statistic:** A total of 473 valid questionnaires were received and the valid return rate was 95.94%. The preliminary data analysis is demographic and personal information of respondents. Concerning the characteristics of the respondents, frequency distributions and percentage analysis illustrate that 40.4% of respondents is aged less than 20 and 38.7% of respondents is aged 21 to 30; males is 52.2% of respondents which is slightly more than female; monthly income which is under 20,000 NT dollars is in the majority (68.3%) in the sample; students are the dominant group at 61.9% of respondents that is far outnumbered the other variables. Among the respondents, college and university occupied 46.3% of respondents that is the most and senior high school possessed 31.3% of respondents which is the next; most of the subjects are inhabitant of Kaohsiung; the majority of the respondents are travelling for leisure or tour (35.9%) and shopping (32.1%); around 81% of respondents travel on KRTC trains 1 to 5 times a week; moreover, 44.6% of the respondents use Single Journey Tickets to take KRTC trains. With regard to transportation vessel, 45.9% of the respondents, compare to 15.6% on taking KRTC trains, usually ride a motorcycle. In terms of the general service quality provided by KRTS, most of the respondents indicate they are satisfied (51.2%) or highly satisfied (11.2%); only a few of respondents feel dissatisfied (4.2%) and highly dissatisfied (0.6%).

**Reliability and validity:** The reliability of five service quality dimensions for functional, dysfunctional and individual satisfaction scales of the measurement instrument were measured by Cronbach's  $\alpha$ . All  $\alpha$  values of dimensions for functional, dysfunctional and individual scales reach at least 0.70. The values of entire service features for three scales are 0.902, 0.950 and 0.948, respectively. In terms of validity, the questionnaire and question items (service quality features) are designed based on the relevant theories and studies proposed by previous scholars or researchers that had been testified by scientific research techniques academically and showed excellent validity tolerable. Consequently, our measurement instrument also possesses excellent content validity. Although content validity is not sufficient to assess the validity of a measure, Malhotra (2007) stated it is helpful to common sense interpretation of the scale scores.

Table 2: The result of factor analysis

Item	Factor loading					
	1	2	3	4	5	6
24	0.718	0.193	-0.009	0.072	0.048	0.085
23	0.715	0.082	0.135	0.187	0.115	0.160
22	0.664	0.121	0.300	0.119	0.093	0.066
21	0.600	0.074	0.383	0.068	0.135	0.156
07	0.185	0.824	0.113	0.078	0.134	0.186
06	0.130	0.790	0.020	0.099	0.184	0.131
08	0.105	0.580	0.223	0.065	0.063	0.371
13	0.120	0.514	0.343	0.232	0.064	-0.112
15	0.148	0.163	0.766	0.092	0.155	0.047
16	0.102	0.041	0.759	0.063	0.161	0.264
17	0.317	0.204	0.657	0.113	0.024	0.053
26	0.069	0.089	0.105	0.845	0.053	0.093
25	0.132	0.176	0.050	0.792	0.059	0.056
27	0.199	0.043	0.120	0.732	0.081	0.276
02	0.135	0.048	0.123	0.060	0.843	0.160
03	0.082	0.109	0.156	0.046	0.780	0.164
01	0.084	0.201	0.056	0.083	0.748	0.102
12	-0.006	0.101	0.053	0.270	0.171	0.739
11	0.225	0.103	0.237	0.099	0.126	0.724
10	0.212	0.209	0.040	0.052	0.183	0.619
Eigenvalue	6.121	1.665	1.566	1.327	1.078	1.029
Cronbach's $\alpha$	0.714	0.764	0.736	0.773	0.774	0.683
Variance (%)	11.132	10.993	10.810	10.567	10.514	9.713
Cumulative (%)	11.132	22.126	32.935	43.603	54.217	63.930

**Factor analysis and name assigning:** The varimax of orthogonal rotations techniques with eigenvalues exceeding 1 and the factor loading of greater than 0.5 are undertaken for factor analysis. The structure in factor analysis went well with the structure of the measurement instrument with the Kaiser-Meyer-Olkin measure of sampling adequacy value of 0.874 exceeding the recommended acceptable value of 0.6 (Kaiser, 1974) and the Bartlett's test of sphericity value of 3109.345 with 0.000 significance level reaching statistical significance ( $p < 0.05$ ). The two statistical measures generated indicate a great supporting for the performance of factor analysis.

In consequence of a failure factor loading, six items, including item no. 04, 05, 14, 18, 19 and 20, are deleted at the first performance of factor analysis and one item, item no. 09, is cut out at the second process. Accordingly, the principal components analysis reveals the presence of six components with eigenvalues exceeding 1, explaining 11.132, 10.993, 10.810, 10.567, 10.514 and 9.713% of the variance, respectively and the cumulative percentage of variance is 63.930 as summarized in Table 2. Finally, six factors extracted of 20 items in total are retained and assigned names as empathy, reliability, responsiveness, convenience, tangibles and assurance in sequential based on the content domains and descriptions of items contained in a same set of factors or components. The reliability of the six new dimensions and the three scales are reassessed for careful and precise of survey research and represent well as depicted in Table 3 with alpha values if item deleted.

Table 3: Reliability of measurement scales extracted and retained

Dimension/Item	Cronbach's alpha if item deleted		
	Functional	Dysfunctional	Individual satisfaction
Tangibles	0.774	0.863	0.875
01	0.761	0.930	0.927
02	0.617	0.930	0.928
03	0.703	0.930	0.928
Reliability	0.750	0.764	0.773
06	0.661	0.659	0.681
07	0.597	0.654	0.672
08	0.712	0.691	0.718
13	0.770	0.810	0.788
Assurance	0.683	0.779	0.816
10	0.632	0.777	0.803
11	0.530	0.664	0.703
12	0.604	0.659	0.731
Responsiveness	0.736	0.815	0.891
15	0.644	0.742	0.853
16	0.628	0.709	0.837
17	0.677	0.783	0.844
Empathy	0.714	0.808	0.829
21	0.649	0.759	0.795
22	0.629	0.729	0.779
23	0.622	0.758	0.775
24	0.717	0.790	0.787
Convenience	0.773	0.797	0.759
25	0.706	0.702	0.685
26	0.648	0.736	0.633
27	0.725	0.732	0.766
Total	0.876	0.933	0.930

**Passengers' requirements of KRTS service quality:**

After the analyses with the classification technique suggested by Gitlow (1998), there are 10 service quality items, occupied most, categorized into must-be quality attributes, representing indispensable of service quality; 9 service quality items are categorized into one-dimensional, meaning the more sufficiency of those are the more customer satisfaction will result in and vice versa and 1 service quality item is categorized into attractive, indicating this attribute delights and attracts customers as represented in Table 4. No one is identified as indifferent, reverse or questionable quality attributes. Hence, if the KRTC plan to enhance passengers' satisfaction, the attractive and one-dimensional quality attributes should be given precedence to deliver. However, if they mean to improve the current performance and eliminate passengers' dissatisfaction, taking 10 must-be quality attributes scattered on each service quality dimensions into account are top priorities.

**Independent sample t-test and one-way ANOVA:**

The independent sample t-test and one-way ANOVA are employed to explore differences between passengers' demographic characteristics (variables) and requirements of KRTS service quality attributes for practicing market segmentation of KRTS passengers. Thus, based on Kano's classification result of 20 KRTS service quality items we score A, O, M, I and Q and R in turn with five,

Table 4: Kano's classification of KRTS service quality

Item	A	O	M	I	Q	R	Kano's classification
<b>Tangibles</b>							
01	68	160	177	68	0	0	Must-be
02	46	188	176	62	0	1	One-dimensional
03	61	157	161	92	2	0	Must-be
<b>Reliability</b>							
06	80	111	119	163	0	0	Must-be
07	90	132	122	125	3	1	One-dimensional
08	76	117	124	153	3	0	Must-be
13	81	81	129	179	1	2	Must-be
<b>Assurance</b>							
10	79	138	133	121	2	0	One-dimensional
11	47	134	170	120	1	1	Must-be
12	50	158	157	105	2	1	One-dimensional
<b>Responsiveness</b>							
15	83	111	127	151	0	1	Must-be
16	112	141	94	124	1	1	One-dimensional
17	56	147	146	122	0	2	One-dimensional
<b>Empathy</b>							
21	72	103	152	143	1	2	Must-be
22	64	81	138	186	2	2	Must-be
23	77	126	117	150	2	1	One-dimensional
24	102	75	71	220	1	4	Attractive
<b>Convenience</b>							
25	64	141	158	102	5	3	Must-be
26	80	153	123	111	4	2	One-dimensional
27	72	143	130	123	4	1	One-dimensional

Table 5: Comparison of Kano's classification and values transformed

Kano's classification	Value
A	5
O	4
M	3
I	2
Q/R	1

four, three, two and one marks (Table 5) to transform the original data into the form of input data for the analysis of independent sample t-test and one-way ANOVA.

After our employing the mean difference between two gender groups by independent sample t-test, the result (Table 6) shows that in general females are correctly identified a high mean to males except for item no. 11. In terms of the statistical significance, the t statistic and p value, males and females have a mean difference ( $p < 0.10$ ) on item no. 01, 02, 07, 10, 13, 21, 22, 24 and 27, representing 9 of 20 items in total has a significant difference between gender groups.

Following up, one-way ANOVAs with post hoc tests (if appropriate) are conducted to compare means on the other demographic variables. The results summarized in Table 7 indicate that the numbers of significant mean differences among six age groups, eight occupation groups, five education groups, five monthly income groups, three living place groups, seven purpose of taking groups, four frequency of taking groups, eleven ticket used groups and five usual or regular transportation tool groups are 5, 2, 4, 5, 5, 7, 1, 0 and 6 of 20 items, respectively, even though the post hoc tests are found few or none of differences lie among the individual groups of various variables.

Table 6: Independent sample t-test result of gender variable

Item	Mean		t-value	p-value (sig.)
	Male	Female		
01	3.41	3.56	1.833	0.067*
02	3.39	3.53	1.828	0.068*
03	3.37	3.41	0.394	0.694
06	3.16	3.31	1.549	0.122
07	3.25	3.54	2.972	0.003*
08	3.22	3.25	0.334	0.738
10	3.27	3.46	1.959	0.051*
11	3.26	3.17	-0.951	0.342
12	3.29	3.33	0.459	0.647
13	3.04	3.22	1.758	0.079*
15	3.23	3.29	0.609	0.543
16	3.47	3.54	0.672	0.502
17	3.27	3.29	0.273	0.785
21	3.13	3.30	1.764	0.078*
22	2.94	3.13	1.887	0.060*
23	3.24	3.31	0.660	0.509
24	2.92	3.31	3.435	0.001*
25	3.30	3.35	0.445	0.657
26	3.35	3.46	1.151	0.250
27	3.24	3.42	1.788	0.074*

\* $p < 0.10$

**Differences between passengers' demographic characteristics and requirements of KRTS service quality:**

On the basis of independent sample t-test and one-way ANOVA findings, gender and purpose of taking KRTS are the two variables that have the most items of significant mean difference among the total 20 service quality items of KRTS services. Therefore, we take these two demographic variables to practice the market segmentation. Taking two groups of gender variable and six groups (group others with 3 samples are excluded) of purpose of taking variable as the principal, we finally divide a total market formed by 470 samples into 12 market groups ( $2 \times 6$ ) consisting of passengers who have relatively similar characteristics and then investigate the service quality attributes of each market group by reclassifying the 20 KRTS service quality items based on categorization of Kano's model. If the classifications to each question item possess two or more quality attributes categories, the one with lower level of contribution of quality attributes categorized is taken.

The 12 market groups are including female with commuting for school on KRTC trains, female with commuting for work on KRTC trains, female with going shopping on KRTC trains, female with having a leisure or tour on KRTC trains, female with taking KRTC trains on a public errand, female with visiting relatives and friends on KRTC trains, male with commuting for school on KRTC trains, male with commuting for work on KRTC trains, male with going shopping on KRTC trains, male with having leisure or tour on KRTC trains, male with

Table 7: One-way ANOVA result of the demographic variables

Item	p-value				
	Age	Occupation	Education	Income	Place
01	0.021*	0.721	0.000*	0.430	0.422
02	0.677	0.818	0.246	0.005*	0.393
03	0.727	0.391	0.616	0.366	0.447
06	0.617	0.674	0.472	0.316	0.393
07	0.994	0.743	0.733	0.581	0.040*
08	0.958	0.829	0.260	0.481	0.520
10	0.545	0.537	0.310	0.322	0.743
11	0.989	0.588	0.123	0.793	0.392
12	0.250	0.949	0.268	0.803	0.397
13	0.074*	0.387	0.017*	0.006*	0.004*
15	0.775	0.884	0.422	0.321	0.964
16	0.202	0.874	0.091*	0.452	0.782
17	0.858	0.645	0.756	0.912	0.087*
21	0.807	0.737	0.583	0.160	0.587
22	0.260	0.036*	0.093*	0.241	0.081*
23	0.208	0.821	0.455	0.629	0.388
24	0.077*	0.680	0.290	0.459	0.195
25	0.002*	0.077*	0.233	0.006*	0.729
26	0.150	0.603	0.931	0.033*	0.895
27	0.008*	0.664	0.266	0.011*	0.027*

Item	Purpose	Frequency	Ticket	Transportation
1	0.373	0.791	0.137	0.008*
2	0.612	0.609	0.599	0.841
3	0.303	0.906	0.451	0.432
6	0.131	0.033*	0.68	0.009*
7	0.643	0.571	0.78	0.068*
8	0.099*	0.469	0.545	0.281
10	0.452	0.365	0.756	0.983
11	0.329	0.134	0.225	0.206
12	0.549	0.355	0.57	0.99
13	0.015*	0.59	0.103	0.011*
15	0.618	0.792	0.526	0.191
16	0.944	0.624	0.237	0.312
17	0.065*	0.639	0.839	0.99
21	0.384	0.231	0.499	0.716
22	0.043*	0.925	0.494	0.005*
23	0.032*	0.313	0.521	0.193
24	0.087*	0.982	0.748	0.127
25	0.779	0.386	0.296	0.215
26	0.201	0.449	0.914	0.98
27	0.057*	0.44	0.101	0.054*

taking KRTC trains on a public errand and male with visiting relatives and friends on KRTC trains. The respondents for these 12 groups are 23, 6, 93, 78, 4, 22, 43, 15, 59, 92, 8 and 27, respectively. The Kano's classification result of the market groups is depicted as Table 8.

Passengers who are in market group one mostly regard 20 KRTS service quality items as must-be quality attributes; only one-fifth of items are grouped into one-dimensional; in market group two, attractive are 2, must-be are 4 and one-dimensional as well as indifferent are 7 items each; the numbers of attractive, one-dimensional and must-be quality attributes are 1, 13 and 6, respectively in market group three; for market group four, there are 17 items grouped into must-be, 2 items classified into attractive and 1 item categorized

into one-dimensional; items of one-dimensional, must-be and indifferent are 4, 14 and 2, respectively in market group five; items grouped into must-be contain 12, one-dimensional are 7 and indifferent totals only 1 in market group six; the number of items is 2 in attractive, 11 in one-dimensional, 5 in must-be and 2 in indifferent quality attributes for market group seven; as to market group eight, items grouped into one-dimensional (12 items) are in the majority; others are classified into attractive (3 items) and must-be (5 items); the numbers of items are 6 in one-dimensional, 13 in must-be and only 1 in indifferent for market group nine; for market group ten, 1 item is grouped into attractive, 6 are classified into one-dimensional, 12 belong to must-be and only 1 is indifferent; in market group eleven, one-dimensional contains 7 items, must-be includes 11 items and indifferent



Table 8: Kano's classification results for segmented market

Item		Market group												Total
		1	2	3	4	5	6	7	8	9	10	11	12	
Tangibles	01	M	O	O/M	O	M	O	M	O	M	M	M	O	M
	02	M	O	M	M	M	O	M	O	M	O	M	O	O
	03	M	O	O	M	A/O/M	O/M	M	O	M	M	O	O	M
Reliability	06	M	A	O	O/M	M	M	O	O	M	O	O	M	M
	07	O	O	O	M	M	A/M	O	M	M	O	O/M	M	O
	08	A/M	A	O	M	O	M	O	O	O	M	I	M	M
Assurance	13	M	I	M	M	I	M	A	A	M	M	I	M	M
	10	M	I	O	M	M	M	O	O	M	A	O	M	O
	11	M	I	O/M	M	I	M	O	O/M	M	M	O/M	O	M
Responsiveness	12	M	O	O	M	O/M	O	O	O	O/M	M	M	O	O
	15	O/M	A/O	O	M	M	O/M	M	O/M	M	M	O	M	M
	16	A/O	A/O	O	A	O	O	A	O	O	O	O/M	A	O
Empathy	17	O/M	I	O	M	M	O	O	O	O	M	O	M	O
	21	M	I	M	M	A/O/M	O	M	M	M	M	M	O	M
	22	M	I	M	M	M	M	I	A	M	M	M	I	M
Convenience	23	O	M	O	M	O	O	O	O/M	M	M	O	M	O
	24	O	I	A	A	A/O/M	I	I	A	I	I	O	I	A
	25	M	O/M	O	M	M	M	O	O	O	M	M	O	M
	26	O/M	M	O	M	O	M	O	O	O	O	M	M	O
	27	M	M	O	M	M	M	O	O	O	O	M	M	O

holds 2 items; and to market group twelve, there is 1 item grouped into attractive, 7 items classified into one-dimensional and 10 items belonged to must-be.

**CONCLUSION**

This study uses Kano's model and ANOVA technique to investigate passengers' service quality requirements to KRTS service and classify groups of passengers into appropriate segments by demographic and personal information. Kano's model can provide marketers with the implications of closing gaps for different attributes and enables marketers to see the sources of satisfaction and delight and to differentiate these from must haves as well; and the ANOVA technique helps decision-makers identify significant variables used for market segmentation (Gitlow, 1998; Kuo, 2004; Chen and Su, 2006; Chen and Lee, 2006; Cheng and Chiu, 2007; Wu and Pan, 2009; Shieh *et al.*, 2010). The application of Kano's model and ANOVA technique thus enables the management to understand the different preferences and needs and then to meet in various segments. The results show that passengers in market groups one, four, five, six, nine, ten, eleven and twelve seem to have a strict requirement of KRTS service quality since most of items are viewed as must-be quality attributes, ranging from 10 to 17 items. Being dissimilar to those, passengers in market groups two, three, seven and eight mostly regard KRTS services as one-dimensional quality attributes; items of this quality attribute count up to half of total items except for market group two with 7. Therefore, for the purpose of keeping these customers (passengers), the management must perform these

items of must-be and one-dimensional quality attributes shown in distinctive market group table well in priority, or the customers will feel dissatisfactory and refuse to use KRTS. Besides, they can refer to different service quality requirements among various segments to make diverse quality management or marketing management strategies to retain and then attract more KRTS users.

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