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A Model to Improve Service Quality

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Abstract: Improving service quality is a very important task in management. Importance Satisfaction models (I-S model) can identify the service items for improvement but not determine whether the items can really enhance the customer satisfaction. Additionally, Kano model can find the service items enhancing the customer satisfaction but not measure the actual feelings of customers. The present study integrates both abovementioned models to identify the service items which can actually enhance the customer satisfaction. Moreover, a comparison of socio-demographic characteristics can help managers to find groups to enhance the satisfaction. The results give managers a more accurate and faster way to achieve the goal of enhancing customer satisfaction.

Key words: Importance-satisfaction model, Kano model, service quality

INTRODUCTION

Presently, service quality is a comparison of expectations with business performance. A conceptual model of service quality was firstly presented by Parasuraman *et al.* (1985) to define the perceived service quality. It is obtained from the executive interviews of the focus groups and it used ten determinants including reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding the customer and tangibles to assess the service quality. Later, Parasuraman *et al.* (1988) developed a SERVQUAL with a 22-item instrument to assess customer perceptions of service quality and refined the construct of service quality with scale purification.

Both I-S and Kano models are widely used measurement tools on the service quality applications. I-S model analyzes the current satisfaction status and finds out the service items for improvement. The structure of I-S model is based on the Importance Performance Analysis (IPA) proposed by Martilla and James (1977) and the major difference is the change of “performance” with “satisfaction” (Tonge and Moore, 2007; Yang, 2003). Sampson and Showalter (1999) indicated that the importance is a function of performance and evaluated the

attributes of products or services. Matzler *et al.* (2004) pointed out I-S model helps check the service attributes for managers to achieve high customer satisfaction. I-S model can be graphically presented on a grid divided into four quadrants as shown in Fig. 1. The vertical axis and the horizontal axis display the perceived importance and experienced satisfaction of customers for selected service attributes, respectively. The four quadrants are presented

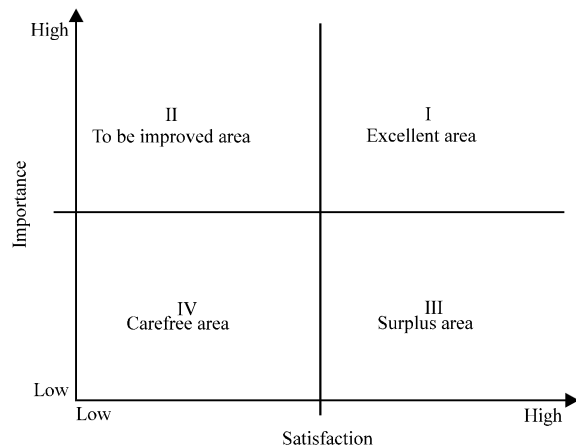


Fig. 1: I-S model

as excellent area, surplus area, to be improved area and carefree area. Excellent area means the service factor with high importance and satisfaction for customers and it should be made efforts to maintain. Surplus area contains service items with low importance but high satisfaction for customers, managers should adjust resources on these service items to avoid possible surplus. To be improved area includes service items with high importance but low satisfaction which in urgent need of improvement. Carefree area includes service items with low importance and satisfaction for customers. Managers should not be overly concerned since the service items in this cell are not perceived to be very important.

Kano model is proposed by Kano *et al.* (1984) and is a two-dimensional quality measurement tool. It has been widely used in many research areas, such as new product development and customer demand analysis (Xu *et al.*, 2009; Meng *et al.*, 2011; Tontini, 2007; Chang and Chen, 2011). Also, it combines with various tool such as FMEA (Shahin, 2004), SEM (Eskildsen and Kristensen, 2006) and Fuzzy (Lee *et al.*, 2008) for further study.

Kano model classifies the service quality into categories for the benefit of quality strategy as shown in Fig. 2. The horizontal axis and vertical axis represent the fulfillment degree of quality items and the customer satisfaction degree, respectively. Hence, Kano model classifies the service items into attractive quality, one-dimensional quality, must-be quality, indifferent quality and reverse quality. The attractive quality factor means that customers will be satisfied when the service items are fulfilled and the dissatisfaction will not be sensed if it is unfulfilled. The one-dimensional quality factor means customer satisfaction is proportional to the fulfillment degree of service factor. The higher the degree of fulfillment, the higher the customer satisfaction and vice

versa. The must-be quality items are that customer will be extremely dissatisfied if they are not fulfilled. In addition, as customers take these service items for granted, the fulfillment will not increase their satisfaction. The indifferent quality factor is that customers do not care whether it is fulfilled or not. The reverse quality items are that customers are dissatisfied when they are fulfilled but satisfied when they are unfulfilled.

Each quality attribute and quality item is paired using the two-dimensional quality model and these service items are checked according to the feeling of respondents. That is, service quality attributes are classified by investigating the degree of perceived service quality of customers.

Though I-S and Kano models are widely used in the application of service quality, both models have their strengths and weaknesses in the analysis of service quality. The former lacks the ability to check whether the service items can actually improve customer satisfaction and the latter loses the linkage of current satisfaction status of customers. The present study uses an integrated model to identify the service items with high importance and low satisfaction that can actually improve customer satisfaction. Section 2 presents the index for the measurement of service items. A case study with data analysis is implemented to verify the effectiveness of the proposed model in section 3. The findings of this study are summarized in section 4.

THE SERVICE QUALITY IMPROVEMENT METHOD

Service items need to be improved: Since, the I-S model can measure the current status of the satisfaction, an index is defined to measure the degree of service items in need of improvement. The index is defined by:

$$S/I = \frac{\text{Satisfaction}}{\text{Importance}} \tag{1}$$

A large S/I value means the service item has a high satisfaction and low importance. The degree of improvement of the service item is low. Otherwise, if the service item has a small S/I value (low satisfaction and high importance), the degree of improvement of the item is relatively high. For example, we use seven scales to measure the importance from “very unimportant” to “very important” and satisfaction from “very dissatisfied” to “very satisfied.” The scores were given 1-7. We then have the range of S/I belong to [1/7, 7]. The mapping of I-S model to S/I index is showed in Fig. 3. The improved service items will have a small S/I value which correspond to a high importance and low satisfactions. Moreover,

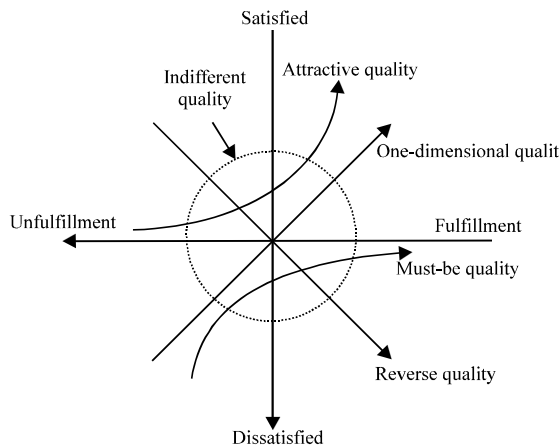


Fig. 2: Kano model

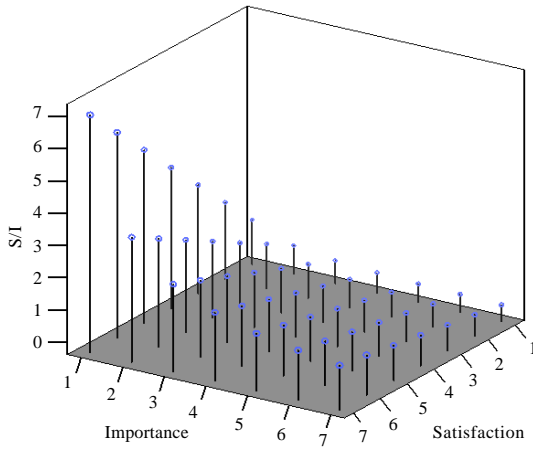


Fig. 3: The mapping of I-S model to S/I index

service items need not to be improved will have a large S/I value which correspond to a low importance and high satisfactions.

Service items can improve the customer satisfaction: The Kano model can classify the service items to find out which items can improve the customer satisfaction. The traditional Kano model is qualitative and uses the statistic to classify service items. Berger *et al.* (1993) proposed a quantitative Kano model that uses the arithmetic mean to measure the central data tendency. This study followed the quantitative Kano model and proposed an index to measure the satisfaction enhancement degree of service items. The index is defined by:

$$F/U = \frac{\text{Satisfaction of fulfillment}}{\text{Satisfaction of unfulfillment}} \quad (2)$$

For example, we use seven scales to measure the satisfaction with fulfilling the service items and unfulfilling them. The scores were given 1-7. We then have the range of F/U belong to [1/7, 7]. The mapping of kano model to F/U index is showed in Fig. 4.

A large F/U value means that fulfilling the service items will enhance customer satisfaction and not fulfilling them will reduce customer satisfaction. Fulfilling the items with larger F/U values will greatly enhance customer satisfaction. Otherwise, if the service item has a smaller F/U value, fulfilling the service items will not enhance customer satisfaction significantly. Note that, the indexes and the following model was first proposed by Wu and Zheng (2012), here we give a more detail discussions and make a comparison of socio-demographic characteristics.

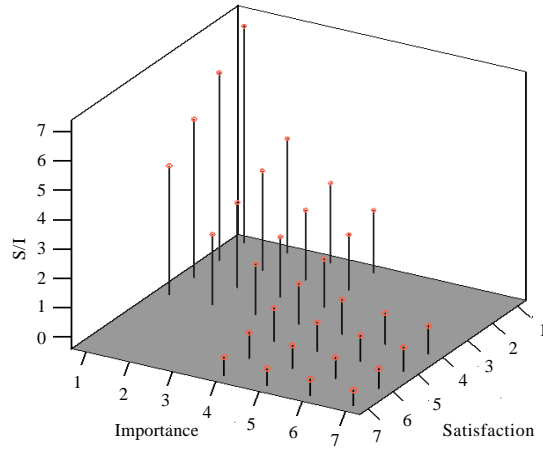


Fig. 4: The mapping of kano model to F/U index

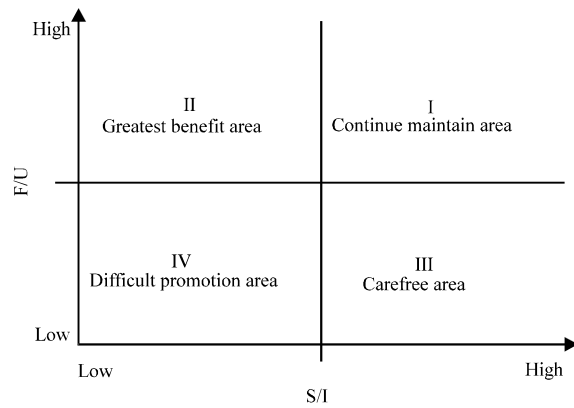


Fig. 5: The integrated model

The service quality improvement model: Similar to the I-S model, the proposed integrated model is graphically presented on a grid divided into four quadrants as shown in Fig. 5. The vertical axis shows the F/U index values of service items and the horizontal axis shows the S/I values in relation to these service items. The four quadrants are greatest benefit area, difficult promotion area, continue maintain area and carefree area. The details of four quadrants are as follows:

- **Greatest benefit area:** The service items located in this area are with lower customer satisfaction and to improve them is to enhance the customer satisfaction
- **Difficult promotion area:** Though the service items are with lower customer satisfaction, fulfilling these service items cannot increase the customer satisfaction significantly. However, service items in this area are also needed to be improved and they

almost belong to the Must-be quality in the Kano model (i.e., if these service items are not fulfilled, the customer will be extremely dissatisfied. However, as the customer takes these service items for granted, the fulfillment will not increase their satisfaction)

- **Continue maintain area:** The service items in this region do enhance the customer satisfaction and customers are already satisfied with the service items. So just keep moving
- **Carefree area:** The service items in this area do not enhance the customer satisfaction but the customer satisfaction reaches a certain level. Customers are already satisfied with them and managers need not care about these service items too much

The case study and data analysis: The case analysis used the questionnaire as a research tool and the target students are studied in Department of Information Management, a University of Science and Technology. We used the construct of P.Z.B. (Parasuraman *et al.*, 1985; 1988), model and referred the related literature to perform our questionnaire. Reliability and factor analysis are also implemented in this case study.

In I-S model, the scale of the service quality is measured the service importance and the customer satisfaction. Seven scales are to measure the service importance from “very unimportant” to “very important” and the customer satisfaction from “very dissatisfied” to “very satisfied.” The scores were given 1-7. Each score of the service item is the average of the sum of the item scores of all questionnaires. If the item score is closer to 7, the students think of this service item as more important or more satisfied.

In Kano model, seven scales are also used to measure the customer satisfaction when fulfilling and not fulfilling the service items. The satisfaction selected options include “extremely dissatisfied,” “unsatisfactory,” “acceptable,” “no difference or did not feel,” “must be,” “satisfied,” and “very satisfied” and the scores are given 1-7, respectively. The customer satisfaction scores of fulfillment and un-fulfillment of each service item is the average of the sum of the item scores of all questionnaires. If the item score of fulfillment is more close to 7, fulfilling the service item will enhance the perceived satisfaction of students. Conversely, if the service item score of un-fulfillment is closer to 7, to fulfill the service item will decrease the perceived satisfaction of students.

Factor analysis of satisfaction items is implemented to extract five constructs including “Responsiveness”, “Reliability”, “Assurance”, “Tangibility” and “Empathy”. Cronbach’s α coefficient is to test the reliability of

questionnaires and the results are shown in Table 1. It is noted that “Fac” and “Com” denote the “factor loading” and “communalities.” The Cronbach’s α , greater than 0.9, shows a very high degree of consistency. In validity, we implemented the factor analysis with the principal component extraction and the varimax rotation to extract dimensions. The extracted dimensions are with eigenvalues greater than 1 and factor loadings greater than 0.5. Table I. lists the results of factor analysis which suggested a five-dimension solution, included 39 attributes (service items) and explained 69.487% of the variance in the data.

Table 1 also shows the importance, satisfaction, satisfaction with fulfillment and satisfaction with un-fulfillment which are denoted by “Imp,” “Sat,” “Ful,” and “Unf,” respectively. The I-S model, illustrated in Fig. 6., indicated that the service items 27, 31, 32 are with higher importance and much lower satisfaction which calls for improvement. The service items 15 and 16 for the respondents were considered relatively unimportant. However, I-S model cannot tell us whether improving these items can enhance satisfaction. So we combine the Kano model to propose a new strategy to deal with this problem.

The integrated model is illustrated in Fig. 7. The indexes S/I and F/U, defined in Section 2, are listed in last two columns of Table 1. The S/I index measures the degree to which the service items need to be improved and the F/U index measures the satisfaction enhancement degree of fulfilling service items. Figure 7 shows that the service items 10, 11, 14, 19, 20, 24, 34, 35, 36 and 39 have high S/I and F/U values which means low degree of improvement (low importance and high satisfaction) and closer to one-dimensional quality (high satisfaction with fulfillment and low satisfaction without fulfillment). The service items in this area have reached the expectation of

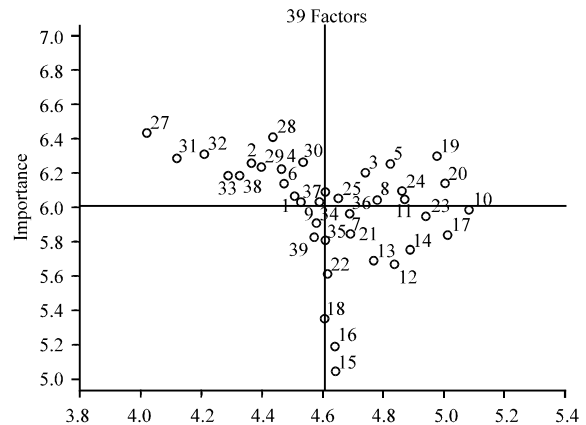


Fig. 6: I-S model for 39 service items

Table 1: Results of factor analysis

	Fac	Com	Imp	Sat	Ful	Unf	S/I	F/U
Responsiveness ($\alpha = 0.928$)^a (EV=6.312)^b (Pct of Var = 16.184%)^c								
Good administrative services	0.770	0.743	6.073	4.497	5.25	2.01	0.74	2.61
Effective response to your comments	0.765	0.730	6.270	4.348	5.32	2.15	0.69	2.47
Convenient means of information query	0.696	0.739	6.225	4.757	5.31	1.98	0.76	2.69
Pleasant staff offering good services	0.692	0.644	6.236	4.446	5.44	2.00	0.71	2.72
Correct announcement and message	0.669	0.671	6.270	4.847	5.70	1.73	0.77	3.30
Diverse elective courses	0.644	0.722	6.146	4.458	5.25	2.16	0.73	2.43
Online teaching system is completely	0.577	0.630	5.853	4.695	4.91	2.53	0.80	1.94
Concern over effect of learning on student	0.542	0.672	6.051	4.803	5.30	2.30	0.79	2.30
Employing teaching methods as per student's abilities	0.532	0.690	6.039	4.588	5.10	2.26	0.76	2.26
Reliability ($\alpha = 0.934$) (EV = 5.927) (Pct of Var = 15.197%)								
Teacher teaching seriously	0.780	0.781	5.989	5.141	5.62	1.71	0.86	3.30
Fair and objective ratings	0.740	0.745	6.051	4.904	5.36	1.93	0.81	2.78
Teacher seriously marking students' assignments	0.731	0.738	5.665	4.858	5.34	2.12	0.86	2.52
Complete class tutor system	0.681	0.682	5.684	4.785	5.14	2.24	0.84	2.30
Complete teaching plans and content	0.664	0.700	5.750	4.920	5.28	1.99	0.86	2.66
Complete roll call system	0.635	0.700	5.011	4.652	5.25	2.58	0.93	2.04
Complete family mentoring system	0.593	0.578	5.165	4.650	5.03	2.76	0.90	1.82
Correct record of student information	0.560	0.599	5.836	5.057	5.18	2.17	0.87	2.39
Complete examination system	0.555	0.665	5.331	4.607	5.36	2.11	0.86	2.54
Protect student privacy	0.544	0.655	6.322	5.017	5.38	1.82	0.79	2.95
Assurance ($\alpha = 0.927$) (EV = 5.604) (Pct of var = 14.368%)								
Provide certified counseling	0.724	0.752	6.146	5.051	5.36	2.03	0.82	2.65
Arrange off-campus professional lecturer	0.722	0.732	5.910	4.723	5.14	2.17	0.80	2.37
Provide life counseling	0.698	0.728	5.596	4.616	4.90	2.64	0.82	1.86
Provide academic counseling	0.668	0.569	5.949	4.978	5.07	2.43	0.84	2.09
Professional faculty	0.655	0.715	6.112	4.887	5.39	2.04	0.80	2.65
Courses combine theoretical and practical aspects	0.654	0.752	6.056	4.657	5.29	2.04	0.77	2.60
Courses are designed to meet the need of the changing times	0.569	0.656	6.101	4.607	5.39	1.94	0.76	2.78
Tangibility ($\alpha = 0.900$) (EV = 5.240) (Pct of var = 13.435%)								
Good computer equipment	0.810	0.737	6.461	3.955	4.83	2.03	0.61	2.38
Good professional classroom	0.795	0.746	6.427	4.416	4.96	1.88	0.69	2.64
Good teaching aids	0.748	0.754	6.249	4.375	5.18	1.86	0.70	2.79
Good wireless Internet environment	0.701	0.619	6.277	4.531	5.08	2.33	0.72	2.18
Comfortable school environment	0.665	0.728	6.315	4.073	5.15	1.89	0.65	2.72
Clean toilets	0.641	0.531	6.326	4.169	5.35	1.93	0.66	2.78
Good reading rooms and meeting places	0.537	0.574	6.198	4.264	5.32	2.09	0.69	2.55
Empathy ($\alpha = 0.912$) (EV = 4.018) (Pct of var = 10.303%)								
Provide further education counseling	0.657	0.793	5.910	4.582	5.19	1.97	0.78	2.63
Arrange students to participate in extracurricular competitions	0.648	0.731	5.798	4.610	5.28	2.01	0.80	2.63
Provide employment counseling	0.633	0.821	5.966	4.699	5.43	1.91	0.79	2.84
Provide work-study opportunities	0.628	0.707	6.039	4.522	5.36	1.91	0.75	2.81
Provide scholarships	0.593	0.656	6.197	4.303	5.44	1.93	0.69	2.83
Provide diverse activities	0.530	0.717	5.826	4.571	5.44	2.00	0.78	2.72

^aCronbach's α ; ^bEV: Eigenvalue, ^cPct of var: Percentage of variance explained? 69.487% total variance is explained

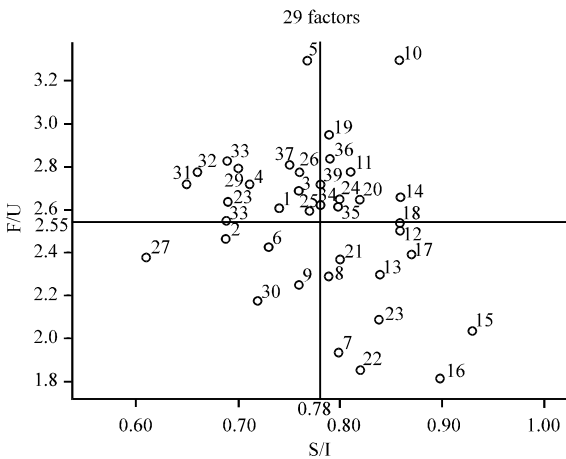


Fig. 7: The integrated model for 39 service items

university students and they should be moving on. The service item 10 which represents the teachers are teaching hard is the most significant. The service items 1, 3, 4, 5, 25, 26, 28, 29, 31, 32, 37 and 38 have high F/U but low S/I values which means high degree of improvement (high importance and low satisfaction) and closer to one-dimensional quality (high satisfaction with fulfillment and low satisfaction without fulfillment). The integrated model shows to improve the service items 31 (comfortable class) and 32 (clean toilets) can raise the satisfaction of the respondents and let policy makers obtain the most benefit. The service items 7, 8, 12, 13, 15, 16, 17, 18, 21, 22 and 23 have high S/I but low F/U values which means low degree of improvement (low importance and high satisfaction) and closer to reverse quality (high satisfaction without fulfillment and

low satisfaction with fulfillment). The service items 15 (do a roll call) and 16 (mentoring program) are too significant to be improved with resources for policy makers. The service items 2, 6, 9, 27, 30 and 33 have low S/I and low F/U values which means high degree of improvement (high importance and low satisfaction) and closer to reverse quality (high satisfaction without fulfillment and low satisfaction with fulfillment). The items in this area are with low priority and the policy makers should focus the items located in the greatest benefit area. The service item 27 is the first one in need of improvement in I-S model; however, its improvement is limited in the integrated model. In that students believe that “good” computer equipment is supposed to a must and the item 27 is must-be quality in Kano model.

The items fall in this area need to be improved though it cannot raise the real satisfaction of students. Respondents will feel unsatisfactory with the un-fulfillment of the items in this area. The service items 2, 6, 9, 27, 30 and 33 fall into to be improved area in I-S model; however, they are not the priority part for improvement. Figure 7 shows the integrated analysis of each dimension. The dimension “Tangible” falls into to be improved area in I-S model; most of it falls into greatest benefit area and the rest of it falls into difficult promotion area. It means the dimension “Tangible” does not have a comprehensive improvement.

Next, this study used the integrated model to analyze gender and skipping class or not and drew the figures in accordance with the values of the questionnaire as shown in Fig. 8 and 9, respectively. Based on the integrated

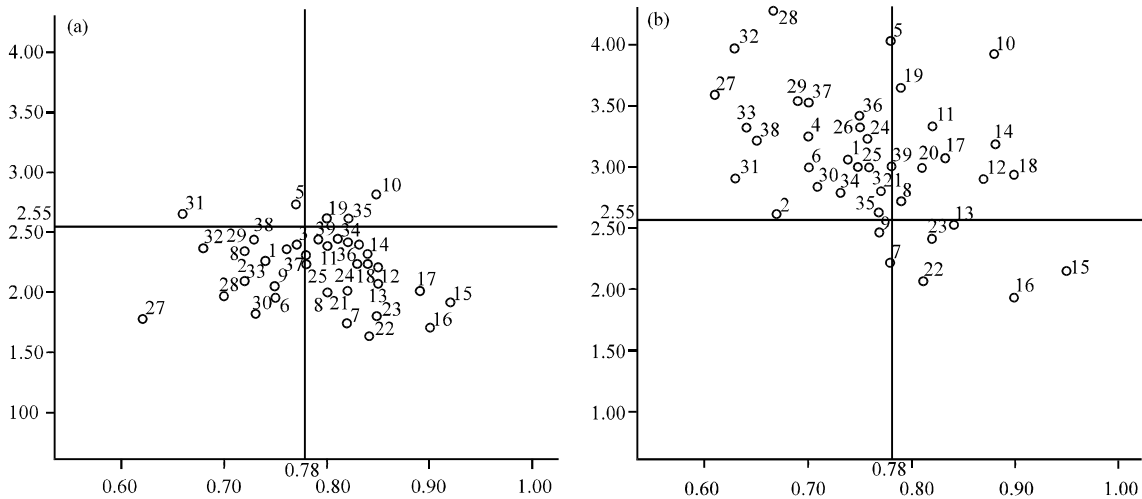


Fig. 8(a-b): The integrated analysis of 39 attributes of male and female students (a) Male and (b) Female

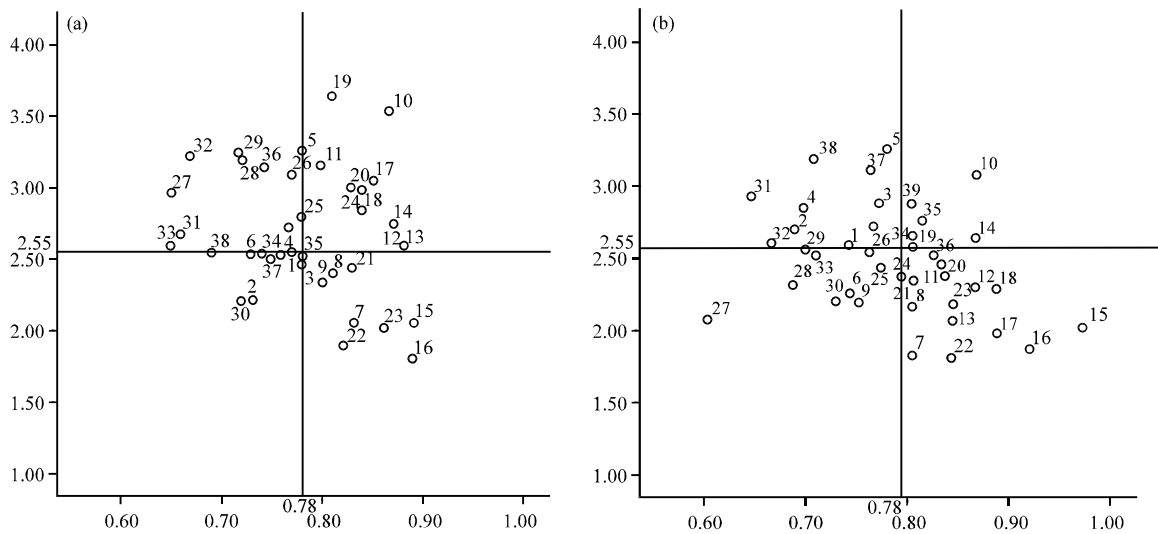


Fig. 9(a-b): The integrated analysis of 39 attributes of (a) non-skipping-class students and (b) occasional absent students

model, we found that there are significant differences between gender and skipping class or not in the collected data. The service items 5 and 31 of male are located in the greatest benefit area and it is the direction that providing correct announcement and messages as well as a comfortable university environment can really improve the satisfaction. The service item 27 is located in the difficult promotion area and it is limited to enhance the satisfaction. Male students believe that good computer equipment is a must. Additionally, we found that most of the service items of female are located in the greatest benefit area and items 27, 28 and 32 are more significant. It implies that having good computer equipment, professional classroom and clean toilet is able to enhance the satisfaction of female students. Otherwise, items 15 and 16 which fall into the carefree area is more significant for policy makers to avoid wasting the resources on them. Overall, the degree of most of the service items to raise the female students' satisfaction is higher than that of male students.

In Figure 9a, the service item 32 which is located in the greatest benefit area is significant for non-skipping-class students and it means having clean toilets is able to enhance the satisfaction of these students. The service item 10 located in the continue maintain area shows that teachers' hard-teaching meets the demand of students. The service item 16 represents the mentoring program is complete for no more improvement. In Fig. 9b, the service items 31 and 38 are of high importance but low satisfaction for occasional absent students and they show that providing comfortable university environment and scholarships is able to enhance the satisfaction of these students. The service item 10 located in the continue maintain area shows that it already meets the demand of students. It is noted that the number of service items of occasional absent students falling into difficult promotion area and carefree area is more than those of non-skipping-class students.

CONCLUSION

To enhance the service satisfaction is important to managers; however, it will take much resource and time to improve all the service items with low satisfaction. An integrated service quality improvement strategy which combines the strength of I-S model and Kano model is able to enhance the service quality as much as possible under the condition of limited resource. That is, to improve the service items located in the greatest benefit area is to gain the maximum benefit. To identify the service items located in the carefree area makes the decision maker avoid wasting money and time and save more manpower and resource.

The case study showed the superiority in finding service items to enhance satisfaction. The comparisons of the groups of gender and skipping class or not can provide the manager more information to adopt different improvement strategy for different groups. The proposed model allows managers to concentrate on the target service items and achieve the goal of enhancing the satisfaction of service quality.

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