

# REVISITED THE IMPORTANCE AND PERFORMANCE ANALYSIS (IPA) AND KANO MODEL FOR CUSTOMER SATISFACTION MEASUREMENT

HAERYIP SIHOMBING<sup>1</sup>, YUHAZRI<sup>2</sup>, M.Y., YAHAYA<sup>3</sup>, S.H., MYIA YUZRINA<sup>4</sup>, Z.A. and AINUL AZNIZA<sup>5</sup>, A.Z.

<sup>1,2,3</sup> Faculty of Manufacturing Engineering  
Universiti Teknikal Malaysia Melaka  
Hang Tuah Jaya, 76100 Durian Tunggal, MALAYSIA  
<sup>1</sup>iphaery@utem.edu.my  
<sup>2</sup>yuhazri@utem.edu.my  
<sup>3</sup>saifudin@utem.edu.my

<sup>4,5</sup> Department of Mechanical Engineering  
Politeknik Merlimau Melaka  
Jalan Jasin, 77300 Merlimau, Melaka, MALAYSIA  
<sup>4</sup>myia@pmm.edu.my  
<sup>5</sup>ainul@pmm.edu.my

## ABSTRACT

*This study is to find out what the result of qualitative and quantitative approaches related to customer satisfaction if its measurement is carried out by integrating the measurement of customer satisfaction refers to the importance-performance (IPA) concept and Kano model into SERVQUAL attributes format. By considering the attributes aspects of SERVQUAL related to criteria of quality service with a case in education institution, the survey using questionnaires developed on the importance-satisfaction analysis (IPA) of 5 point of Likert scale were then performed in order to investigate the current of satisfaction condition. While the Kano criteria associated to the dichotomous statements contain of functional and dysfunctional of quality attributes level were then used to quantify the qualitative response. In this study, the domain of functional and dysfunctional of Kano is discussed and reviewed, including how their correlation against IPA and vice versa. By integrating of both approaches, the correlation between both will represent each of their characteristics as to be compared to each other, in which the result can be justified as the priorities of customer satisfaction. In addition, the consistencies of response data based on the approaches related to the criteria of KANO diagram against the functional and dysfunctional element can be defined in order to characterize the background and types of survey questionnaires*

**Keywords:** Kano Model, SERVQUAL, Dysfunctional and Functional criteria, Importance and Performance

## 1.0 INTRODUCTION

The customer satisfaction, according to Rahman (2004, p.426), constitutes a cardinal indicator for assessing the success of an enterprise. However, as like Hart (2007, p.1) said that "*the changes in companies' customer satisfaction scores don't happen overnight; they have to work their way through complex value chains that ultimately affect quarterly profits and stock prices*". In this context, Zingheim and Schuster (2007, p.9) asserted about the successful of financial performance and business growth due to the listening customer input in decision processes in which they are formulated to encourage the innovation and creativity directed to the development of new or enhanced products and services (see i.e. Venkataraman & Ramanujam, 1985; Erdil *et al.*, 2004; Verhees & Meulenbergh, 2004; Pérez & Canino, 2009, etc). Previously, through the case of Swedish customer satisfaction barometer on whether the companies' condition is healthy and having prospect for the future or not, Fornell (1992, p.6) argued that it can be indicated from how the company can satisfy their customer. In this sense, with a case study carried out in the supermarket context in Brazilian related to Norwegian Customer Satisfaction Barometer, Slongo and Vieira (2007, p.191) empirically proved that satisfaction plays an important role in determining affective commitment and has a positive influence on corporate image. Specifically, Gerson (2003) in this sense had clearly state about the fulfilment of customer's need that depends on the existence and performance of the product/ services in which Söderlund and Vilgon

(1991, p.18) on this issue has identified several significant associations between variables in the customer satisfaction - repurchase intentions - purchase behaviour - customer profitability chain.

Considering on this, to understand customer satisfaction the companies therefore need to understand the customer's need and the expectation. First, according to Tse and Wilton (1988), companies need to consider the customer response related to the mismatches (disconfirmation) perceived between prior expectations and actual performance of a product. Thus, the perceived performance is compared with the expectations as a level of customer feelings (Kotler, 2003). Second, the companies should sensitive also to an emotional challenge of the experience towards the consumption of a product / service (Wilkie, 1990), in which the purchase evaluation is required against the customer's expectations and dissatisfaction of the selected alternatives, especially if the expectations results (outcome) were not met (Engel *et al.*, 1990). On this, for an instance, Collier (1995, p.5) discussed about the combination of customer satisfaction and price related to the process in creating and delivering the value to customers in the marketplace. This perspective interprets today's competitive market as an opportunity with crucial effort in creating a loyal customer by capturing and retaining them. On how to achieve customer satisfaction, the company should be going through the justification on whether a product is good quality or not. Here, related to the aim of satisfying customer, Chen and Lee (2006) added about how the company must to correctly attribute the factors of quality identified so that the correct decision can be made. This is due to the customer requirements are much more technically complex than in consumer market Kultanan *et al.*, (2006, p.855).

Related to this issue, McQuitty *et al.*, (2000, p.1) put the assumption that a customer will learn from experience where the decreasing levels of expectations disconfirmation against goods and services will affect customer satisfaction. Previously, Matzler and Hinterhuber (1998, p.26) discussed about the using of satisfaction ratings as the performance indicator of products and services delivered, beside the indicator of the company's future. However, Zemla (2008, p.41) realized that since many approaches to measurement of product quality (especially in service sector in which they have been or might be successfully implemented) are still in scientific debate on superiority of one method over another, then such methods usually not treated as complementary rather as alternative tools. On this, previous studies carried out had proposed several approaches in order to measure the customer satisfaction. (i.e. IPA to improve order-winner criteria and win order (Lee *et al.*, 2009), IPA with strength and weakness (Zemla, 2008), IPA with Kano Model and Dematel (Yu *et al.*, 2009), MUSA method (Grigoroudis & Spyridaki, 2003), structuring the customer requirement model with Quality Function Deployment (Kultanan *et al.*, 2006; Matzler & Hinterhuber, 1998; Lai *et al.*, 2004), the weighted average score model toward Kano model (Bhattacharyya & Rahman, 2004; Lin & Niu, 2009), customer satisfaction through creating loyal customers (Rahman, 2004), the influences the components of products and services (Sauerwin *et al.*, 1996; Sauerwein, 1997), the importance of quality attributes using 8 categories of Kano model (Yang, 2005), potential benefit acquired with quality elements classified into 3 categories of Kano models (Hsu *et al.*, 2007), interactivity-satisfaction relationship (Zhao & Dholakia, 2009), integrated approach of Kano model and ANOVA technique (Lai & Wu, 2011), SERVPEX (Robledo, 2001), integrative configuration of customer value by 3-angle view (Khlaifa, 2004), to convert of attractive quality attribute to must-be quality attribute and one-dimensional quality attribute (Lee *et al.*, 2009), integration of FMEA and Kano model (Shahin, 2003), integrating the Kano model, AHP, and planning matrix (Bayraktađlu & Özgen, 2007), the multistage method for weighting customer satisfaction (Crostack *et al.*, 2010), Brady and Cronin's model toward Kano Model (Högstrom *et al.*, 2010), better-worse diagram of Kano model (Witell & Löfgren, 2007), the dynamic of service attributes of attractive quality in Kano model (Witell & Fundin, 2005), integration of Kano model and exit-voice theory (Lee *et al.*, 2007), life cycle design (Ernzer & Kopp, 2003, etc). They, however, do not directly discuss about the aspects of performance-importance to the priorities of improvement from the attributes' positioning based on current level performance related against the differences of Kano quality elements were resulted. Grigoroudis *et al.*, (2006, p.1) stated that a number of measurable parameters is directly linked to several aspects of company's products/services or else that were remain an abstract and intangible notion. They also asserted that a common problem faced while analyzing data from customer satisfaction surveys are about the comparison of stated and derived importance for a set of satisfaction dimension (Grigoroudis *et al.*, 2003, p.229). In this sense, Mikulić (2007) previously stated that they could potentially to mislead the implication of customer satisfaction. Especially, toward the analysis of importance and performance that were assumed as the technique of symmetric and linear relationships between attribute level performance and OSC (asymmetric impact on overall customer satisfaction). Specifically about IPA, Abalo *et al.*, (2007, pp.116-117) even commented with criticism against the scholars whose unconsciously had adopted IPA procedure in their studies (e.g. standardized coefficients by multivariate regression, linear regression coefficient, conjoint analysis, partial correlation or logistic regression) but they missed out of the 'inherently of Martilla and James' procedure (Martilla & James, 1977). Through their proposal relating to an alternative of IPA which combines the 4 quadrant and diagonal-based schemes, they agreed with the notion of "direct measures capture the importance of attribute better than indirect measures."

Moreover, Mikulić (2007) also stated that major assumptions of the Kano model is, actually, related to the certain product/service attributes (quality elements) that primarily have an impact on creating satisfaction and

dissatisfaction, where Kano model pointed out the phenomenon of product/service attributes as an asymmetric and nonlinear impact on OCS. Hence, due to the attributes of importance-performance assumed are as the technique of symmetric and linear relationships between attribute level performance, then the assumptions of the Kano model to the certain product/service attributes (quality elements), therefore, need a further identification of the Kano quality elements in which improvement priorities can be determined by analyzing the current level of performance (Tontini & Silveira, 2007, p.497).

## 2.0 LITERATURE REVIEW

### 2.1 Customer Satisfaction

According to Schnaars (1991), the purpose of a business is, basically, to create profit by satisfying the customers. Through the creation of customer satisfaction, will enable the company to generate some benefits to them, including the relationship between the company and its customers as a good foundation for the creation of loyalty and repeat purchase of customers. Based on this sense, the analysis of the difference between expectations and performance/ results (related to the customer satisfaction) depend on their perceptions and expectations. Specifically, in service business whereby most of scholars discussed about the service perceptions and expectations based on the case given. i.e. bank (Alhemoud, 2010; Naeem & Saif 2010; Guo *et al.*, 2008; Jabnoun & Al-Tamimi, 2002), financial & loan funding (Gottschalk, 2008), hospital (Brennan, 1995; Williams *et al.*, 1998; Peltola *et al.*, 2007; Padma *et al.*, 2009), public service (Rodríguez *et al.*, 2009), security firm (Xu & Goedegebuure, 2005), airlines (Gustafsson *et al.*, 1999; Frost & Kumar, 2001), education (Joseph *et al.*, 2005; García-Aracil, 2009), etc.

In brief, they proposed a positive linear relationship between service quality and customer satisfaction to profitability. However, they are not clearly in differentiating the service quality constructed and distinguishing between functional service quality (FSQ), which is means doing things nicely and technical service quality (TSQ) is doing things right (Kumar *et al.*, 2008, pp.176-177). Reflecting on this, First, Hsu and Cai (2009, p.5) therefore asserted that when customer satisfaction is modelled as a function of disconfirmation arising from discrepancies between prior expectations and actual performance, then the expectations as a critical antecedent of satisfaction becomes a determinant of attitude. This means that customer satisfaction is relating to a highly personal assessment and greatly affected by customer expectations. Grönroos (1998, p.329) previously emphasized that how good the quality of the product was perceived by customers, it should be, therefore, accordingly based on the measurement toward what the approaches of attitude determinant of customer satisfaction. Especially, related to the service perceptions and expectations value.

Second, Hanan and Karp (1989) explained the satisfaction related on the customer's experience of both contacts with the organization and personal outcomes. Here, Kotler (2003, p.61) said that customers' feeling of pleasure or disappointment is resulted from comparing a product's perceived performance or outcome in relation to their expectations. Padilla *et al.*, (1996) stated that the customer may be satisfied with a product or service, an experience, a purchase decision, a salesperson, store, service provider, or an attribute in which the high of quality customer relationships are therefore important.

Third, the reality of the market competition through service quality required to improve customer satisfaction. Here, many service industries should pay greater attention to customer service quality and customer satisfaction in order to increase the company's competitiveness. Beside, the deregulation of the total perception related to the quality of a service as the outcome (technical quality), rather than simply addressing service quality from a functional perspective (Grönroos, 1998, p.329; Kumar *et al.*, 2008, p.183; Kang & James, 2004, p.266).

All of aforementioned above are important for company to get more profitability and achieve the profit target margin. Therefore, customer relationship development and management systems need to be focused heavily by companies (Verhoef *et al.*, 2002), while the development of effective customer relationships need to be recognized as an essential component of marketing strategies in service industries (Lymperopoulos *et al.*, 2006, p.366). Hossain and Leo (2009, p.338) said that this is due to quality of services are globally remained as a critical point for businesses strategy to a comparative advantage in the marketplace, where service quality as becoming a primary competitive weapon (Stafford, 1996, p.6).

### 2.2 Importance-Performance Analysis Vs. Kano

Martilla and James (1977) introduced the IPA technique as Importance-Performance analysis of the underlying conceptual multi-attribute model to analyze the organization's performance. IPA model is used to measure the importance of customer satisfaction and performance, and develop relationships based on specific product attributes priority technologies (Sampson & Showalter, 1999). The main purpose of the IPA is as a diagnostic tool to facilitate the identification of attributes, given their importance, products or

services of poor performance or overperforms. For this purpose, the interpretation is presented graphically on a grid divided into four quadrants, which according to the average importance and satisfaction (performance). Four quadrants and the implications of the IPA are shown in Table 1 and Figure 1. The four quadrants are identified as *Concentrate Here*, *Keep the Good Work*, *Low Priority* and *Possible Overkill*.

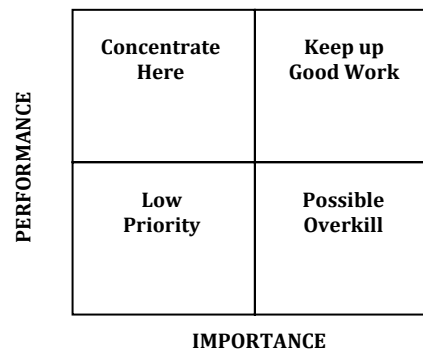


Figure 1: Importance-Performance Analysis Grid

Function of IPA technique is to identify strengths and weaknesses as an approaches related to customer satisfaction based on what customer preferences in making a choice. Since the measurements of the Importance – Performance Analysis (IPA) and the SERVQUAL model are quite similar, by comparing between two criteria of them is used to determine the criterion relative to importance of attributes. These criteria reflects consumers' evaluation of the offering in terms of those attributes, while the SERVQUAL technique identifies the customer satisfaction of service attributes by comparing of two criteria that are customer's expectation and customer's perception in the five dimensions. On this, Parasuraman *et al* (1988, p.23) defined the 5 attributes dimensions of service quality (SERVQUAL) as the method used to measure the quality of service as follows:

- (i) Reliability: ability to perform the promised service, dependably and accurately.
- (ii) Responsiveness: willingness to help customers and provide prompt service.
- (iii) Assurance: knowledge and courtesy of employees as well as their ability to inspire trust and confidence.
- (iv) Empathy: caring, individualized attention the firm provides its customers.
- (v) Tangibles: appearance of physical facilities, equipment, personnel, and communication materials.

Table 1: Importance – Performance Quadrant

<b>Quadrant I</b> <i>Concentrate Here</i>	Attributes are perceived to be very important to respondents, but performance levels are fairly low. This suggests that improvement efforts should be concentrated here.
<b>Quadrant II</b> <i>Keep up the good work</i>	Attributes are perceived to be very important to respondents, and at the same time, the organization seems to have high levels of performance in these activities. The message here is to keep up the good work.
<b>Quadrant III</b> <i>Lower priority</i>	Attributes here are rated as having low importance and low performance. Although performance levels may be low in this cell, managers should not be overly concerned, since the attributes in this cell are not perceived to be very important. Limited resources should be expended on this low priority cell.
<b>Quadrant IV</b> <i>Possible over kill</i>	This cell contains attributes of low importance, but where performance is relatively high. Respondents are satisfied with the performance of the organization, but managers should consider present efforts on the attributes of this cell as being superfluous/ unnecessary.

While, Kano method is used to categorize the attributes of products and services based on how well the product / service is able to satisfy customer needs (Table 2) based on as following:

- (i) Must Be or Basic needs.  
It's taken for granted when this element is sufficient and will not result in more satisfaction, but insufficiency of this element results in non-satisfaction. Fulfilling the 'must-be' requirements will only lead to a state of "not dissatisfied". The customer regards the 'must-be' requirements as prerequisites and therefore does not explicitly demand them. 'Must-be' requirements are in any case a decisive competitive factor, and if they are not fulfilled, customers will be very dissatisfied
- (ii) One-dimensional or performance needs  
If this element is sufficient, customers feel satisfactory. Insufficiency of this element results in non-satisfaction. With regard to these requirements, customer satisfaction is proportional to the level of

- fulfilment – the higher the level of fulfilment, the higher the customer’s satisfaction and vice versa. ‘One dimensional’ requirements are usually explicitly demanded by the customer
- (iii) **Attractive or excitement needs**  
Attractive requirements are neither explicitly expressed nor expected by the customer. However, when this element is sufficient, customers feel satisfactory, but still acceptable if it is not sufficient. Fulfilling these requirements leads to more satisfaction. Even if they are not met, customers do not feel dissatisfied.
  - (iv) **Indifferent**  
This element will not result in satisfaction or not, whether it is sufficient or no. Customers do not care whether they are fulfilled or not.
  - (v) **Reverse**  
Non-satisfaction comes when it is insufficient and on the contrary satisfaction comes when it is sufficient. Category reverse requirement, not only is this product feature not wanted by the customer but he/she even expects the reverse.

Table 2: Kano Diagram

Customer Requirement		DISFUNCTIONAL				
		Like	Must-Be	Neutral	Live-With	Dislike
FUNCTIONAL	Like	Q	A	A	A	O
	Must-Be	R	I	I	I	M
	Neutral	R	I	I	I	M
	Live With	R	I	I	I	M
	Dislike	R	R	R	R	Q

Note: A=Attractive; O=One Dimensional; M=Must Be; I= Indifferent; R = Reverse; Q=Questionable

### 3.0 METHODOLOGY

In order to understand and determine the customer needs and their impact on customer satisfaction, this study categorize the different of customer requirements based on SERVQUAL criteria through the importance-performance attributes of service given. Meanwhile, on how well they are able to achieve customer satisfaction, the analysis is carried out through service quality provided for the customers related to Kano model and quality attribute criteria towards customer satisfaction (see Figure 2).

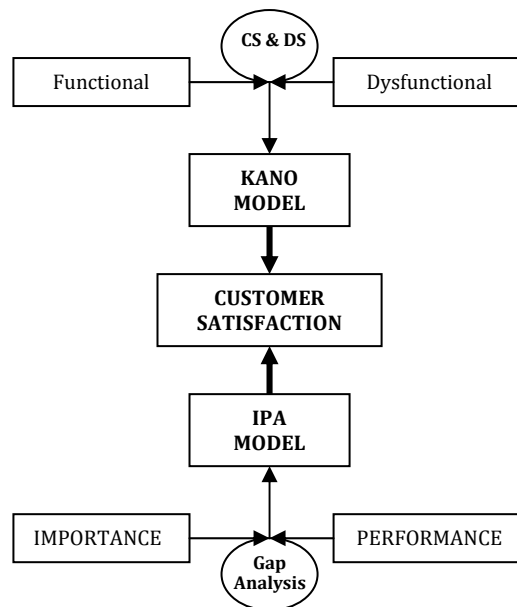


Figure 2: Customer Satisfaction

The survey was carried out through two (2) types of questionnaire developed and used for analyzing the customer satisfaction. First, Kano criteria that contains of two (2) set of questionnaires designed with methods of dichotomous statements (functional and dysfunctional). The application of Kano model is to analyze customer needs that are categorized in the different customer requirements (CRs) based on the quality features with five (5) qualitative-attributes scale (see table 2). The questions generated are related to the customer needs, requirements (CRs), satisfaction, and performance of customer perceptions as a customer satisfaction

form. The details of quality features in Kano model for evaluation are Attractive (A), One-Dimensional (O), Must-Be (M), Indifferent (I), Questionable (Q), and Reverse (R) (see 2.2).

Second, Likert form of the questionnaires with the value of quantitative scale ranged from 1 to 5 that represent as 'very dissatisfaction' till 'very satisfaction'. The statistical method is applied to analyze the general information and responses from the questionnaires method. Meanwhile, to know the different between service given by the provider as the experience of customer toward performance of provider related to service provided, the gap analysis is used to find how the importance of service given related to customer expectation. This is involved a comparison of expectations with performance (Parasuraman *et al.*, 1985, p.44). In addition, on how satisfy the customer based on Kano model is also known by calculating the values of customer satisfaction (CS) and customer dissatisfaction (DS). Therefore,

- (i) The correlation of Kano criteria results related to customer satisfaction toward the importance and performance of service delivered to customer, will depict as follows:
  - a) How satisfy the customer towards the company performance of their service given.
  - b) What the priorities are required by the provider related to the importance of customer's view in order to improve the service delivered.
- (ii) The characteristics of service delivered to customer based on functional and dysfunctional criteria towards importance and performance of service delivered, will depicts as follows:
  - a) What are the elements of functional that customer's view as the importance of service delivered to them.
  - b) What are the elements of dysfunctional that customer's view as do not the importance to them, and how the performance of service delivered to them.

### 3.1 Case: Education

Anderson (1995) on the issue related to service in education institution stated about many reasons and consideration should be put as the pillar of the service quality function in a university. Comparing to the academic units, on the administrative units where the administrative departments of the university, such as the registration office, financial office or library, are more likely to be a replication of the bureaucratic units of governmental or public institutions (Abouchedid & Nasser, 2002, pp.198-199), by providing the high quality service to students will contributes to the positive assessment of the university. This is, especially, due to they are the first exposure of the student to the university (whenever the admission and registrar's services) in which the bureaucracies and inefficient infrastructure to baskets the registration remains a traditional and manual process (Spencer, 1991). This study is carried out towards 74 students of one of College Community in Melaka with the questions as below:

- (i) **Reliability**
  - a) Admission procedures are easy and quick.[Q1]
  - b) Teaching and learning process is run properly and smoothly. [Q2]
  - c) Executed with proper timetable / discipline. [Q3]
  - d) Teaching-learning process easy to understand and be understood.[Q4]
  - e) Conformity with the cost of education facilities.[Q5]
- (ii) **Responsiveness**
  - a) The ability of teachers are professional and on target.[Q6]
  - b) Officer / employee giving clear information, easy to understand.[Q7]
  - c) Clear and precise explanations, if there are questions from students.[Q8]
  - d) Employee attitude to awakening your confident.[Q9]
- (iii) **Assurance**
  - a) Knowledge and teaching skills in teaching.[Q10]
  - b) Skills of teachers and other employees in the work. [Q11]
  - c) Service is polite and friendly. [Q12]
  - d) Security & trust services to service. [Q13]
  - e) Employees are well dressed and attractive.[Q14]
  - f) Security at the time of the learning process.[Q15]
  - g) Parking space and secure.[Q16]
- (iv) **Empathy**
  - a) Service to all students, regardless of social status, and others.[Q17]
  - b) Built up good communication between you and the faculty, staff, and employees.[Q18]
  - c) Being able to give a good impression and depth.[Q19]
  - d) Attention to students' questions is not clear.[Q20]

(v) **Tangibles**

- a) Tables and chairs in good condition and neat.[Q21]
- b) Extensive laboratory and complete.[Q22]
- c) Completeness and readiness tool in teaching and learning.[Q23]
- d) Cleanliness, neatness, and comfort of the classroom.[Q24]
- e) There are clean toilets.[Q25]

**4.0 DATA AND RESULTS****4.1 Traditional Approaches**

Table 2 shows that all the questionnaires criteria related to performance refer to SERVQUAL criteria were unidimensionality to customer satisfaction. This is shown by value of Cronbach alpha, in which all of them are higher than 0.8 (or >0.8). While, on the importance attributes are only on Tangibles. This is also existed on the Functional elements, which are only on Assurance attributes and Dysfunctional elements, except on Tangible criteria. Based on the mean values,

- (i) All of the 'Importance' criteria are having the score more than 4. The customer expectation through what the importance of the criteria refers to SERVQUAL element is between satisfy and very satisfy. The average of the 'Importance' value is 4.43, while the maximum and the minimum value is 4.81 and 4.03 respectively (process of teaching & learning and parking space availability & secureness). The highest and the lowest 'Importance' criteria value of SERVQUAL is 4.58 (Reliability) and 4.34 (Empathy) respectively.
- (ii) All the 'Performance' criteria values are more than 3. The average of the 'Performance' value is 3.83, while the maximum and the minimum is 4.15 and 3.24 respectively. (teaching-learning process delivered and parking space availability and secureness). This is means that the customer view's regarding elements stated in questionnaire as the performance is between neutral and very satisfy. The highest and lowest 'Performance' criteria value of SERVQUAL is 3.98 (Reliability) and 3.52 (Tangibles) respectively.
- (iii) All the 'Functional' values of Kano criteria are more than 1. This is means that the 'Functional' element stated in questionnaire is between 'like it' and 'must-be'. The average of the 'Functional' value is 1.63, while the maximum and the minimum is 1.95 and 1.32 respectively. (teaching-learning process delivered and parking space availability and secureness). The highest and lowest satisfaction of 'Functional' criteria based on SERVQUAL I is 1.95 (Tangibles) and 1.48 (Reliability) respectively.
- (iv) All the 'Dysfunctional' values of Kano criteria are more than 4. This is means that the 'Dysfunctional' element stated in questionnaire is between 'like-it' and 'dislike'. The average of the 'Functional' value is 4.49, while the maximum and the minimum is 4.70 and 4.20 respectively. (security & trust and impression of staff admin). Based on the highest and lowest of Dysfunctional' values related to satisfaction criteria refers to SERVQUAL is 4.57 (Assurances) and 4.41 (Responsiveness) respectively.

Furthermore, the priorities for the improvement can be applied using the simple model of mathematical logic as follows:

$$\{\text{Priorities}\} = \{\text{Gap Analysis}\} \cap \{\text{Class of Ranking}\} \quad (1)$$

Where,

- Gap Analysis = means value of importance – means value of performance.
- Class Ranking = the highest means value of importance – the lowest means value of performance.
- The importance of improvement > means of the gap analysis average value.

Table 5 showed that the priorities based on importance and performance analysis of service in the customers' views are affected to 12 items of service criteria related to SERVQUAL. The highest priorities are element no. 22 (Extensive laboratory and completeness as no.1). Based on SERVQUAL criteria, the priorities given should be on Tangibles since they are having more the elements for improvement required. In this criteria, is also existed the element no.24 (cleanliness, neatness, and comfort of the classroom as no.2).

Moreover, based on customer satisfaction and dissatisfaction (CS and DS) analysis (Berger *et al.*, 1993, p.18), the priorities for improvement is calculated based on as follows:

$$\{\text{Priorities}\} = \{ (\text{CS-DS}) \cap \text{Class of Ranking} \} \tag{2}$$

Where,

- $\text{CS} = (A+O)/(A+O+M+I)$
- $\text{DS} = -(M+O)/(A+O+M+I)$
- Class Ranking = the lowest means value of CS – the highest means value of DS.
- The importance of improvement > means of the CS-DS average value.

In Table 5 also show that the priorities based on customer satisfaction and dissatisfaction (CS & DS) analysis of service in the customers' view are influenced by 7 items of service criteria related to SERVQUAL. While no.8 till 12, we do not consider for the improvement priorities since they are having CS-DS values less than the CS-DS average.

The highest priorities are the element no.13 (Security & trust as no.1). Based on SERVQUAL criteria, the priorities should be given on Tangibles, since they are having more the element for improvement required in which also in this criteria existed the element no.25 (there are clean toilets no.2) and no. 23 (completeness and readiness infrastructure for teaching and learning as no 3).

### 4.2 Re-calculated Approaches

Due to the criteria of IPA refers to SERVQUAL is the developed through the pair questionnaires and the result found on the different focused is in which the importance is focused on Reliability and Empathy, while performance on Reliability and Tangibles, in order to find out the customer satisfaction related to IPA, therefore, should be based on the IPA correlation (Table 6). Bellows, the theorems constructed to Kano matrix (Table 3) as following:

**Table 3: Kano Matrix**

i / j	1	2	3	4	5
1	Q	A	A	A	O
2	R	I	I	I	M
3	R	I	I	I	M
4	R	I	I	I	M
5	R	R	R	R	Q

$$K_X \Leftrightarrow [K_{F_i} \cap K_{D_{F_j}}] \tag{3}$$

Where,

$$F_i = \{i \mid i \in P, i \leq 5\}; D_{F_j} = \{j \mid j \in P, j \leq 5\}; X = \{A, M, O, I, Q, R\}$$

- *Theorem "Attractive":* Attractive [A]  $\Leftrightarrow F_i = \{i \mid i \in P, i = 1\} \cup D_{F_j} = \{j \mid j \in P, 1 < j < 4\}$
- *Theorem "Must-Be":* Must-Be [M]  $\Leftrightarrow F_i = \{i \mid i \in P, 1 < i < 5\} \cup D_{F_j} = \{j \mid j \in P, j = 5\}$
- *Theorem "One Dimensional":* One Dimensional [O]  $\Leftrightarrow F_i = \{i \mid i \in P, i = 1\} \cup D_{F_j} = \{j \mid j \in P, j = 5\}$
- *Theorem "Indifferent":* Indifferent [I]  $\Leftrightarrow F_i = \{i \mid i \in P, 1 < i < 5\} \Leftrightarrow D_{F_j} = \{j \mid j \in P, 1 < j < 5\}$
- *Theorem "Questionable":* Questionable [Q]  $\Leftrightarrow F_i = \{i \mid i \in P, i = 1\}; D_{F_j} = \{j \mid j \in P, j = 1\} \cup F_i = \{i \mid i \in P, i = 5\}; D_{F_j} = \{j \mid j \in P, j = 5\}$
- *Theorem "Reverse":* Reverse [R]  $\Leftrightarrow F_i = \{i \mid i \in P, i > 1\} \Leftrightarrow D_{F_j} = \{j \mid j \in P, j = 1\} \cup F_i = \{i \mid i \in P, i = 5\} \Leftrightarrow D_{F_j} = \{j \mid j \in P, j < 5\}$

Since  $K_X \Leftrightarrow [K_{F_i} \cap K_{D_{F_j}}]$ , therefore if  $\{K \cap K'\} = 0$ , where the opponent is  $\{K \cap K'\}' = 1$  (4)

Then,  $K_F = \sim K'_F$ ;  $K'_F = K_{D_F}$  (5)

So,  $\{K_{D_F} \in K\} \Leftrightarrow \{K_F \in K\}$  (6)

The importance<sub>x</sub> vs. The experience<sub>x</sub> =  $\emptyset$  (7)

The importance<sub>x</sub> vs. The experience<sub>y</sub> =  $\ominus$  (8)

Where,

x and x is same criteria.

x and y is different criteria.



With the assumption where,

- Importance of Reliability vs. Performance Reliability

$$\rho_{X,Y} = \forall KE_{\text{Reliability}} \cap \forall KUA_{\text{Reliability}} \neq 0 \quad \{X \mid x= KE_{\text{Reliability}}; Y \mid y= KUA_{\text{Reliability}}\} \\ \{4.58\} \cap \{3.98\} = 0.61$$

- Importance of Tangible vs. Experience Tangible

$$\rho_{X,Y} = \forall KE_{\text{Tangible}} \cap \forall KUA_{\text{Tangible}} \neq 0 \quad \{X \mid x= KE_{\text{Tangible}}; Y \mid y= KUA_{\text{Tangible}}\} \\ \{4.35\} \cap \{3.52\} = 0.82$$

However, based on correlation shown in Table 6, it is found that both of those two criteria are 0. This means that there are no correlation (strong correlation) existed between 'Importance' and 'Performance' attributes between of Reliability and Tangibles. While, towards Responsiveness, Assurance, and Empathy as follows:

- Importance of Responsiveness vs. Performance Responsiveness

$$\rho_{X,Y} = \forall KE_{\text{Responsiveness}} \cap \forall KUA_{\text{Responsiveness}} = \emptyset \quad \{X \mid x= KE_{\text{Responsiveness}}; Y \mid y= KUA_{\text{Responsiveness}}\} \\ \{4.46\} \cap \{3.92\} = \{0.54\}$$

- Importance of Assurance vs. Performance Assurance

$$\rho_{X,Y} = \forall KE_{\text{Assurance}} \cap \forall KUA_{\text{Assurance}} = \emptyset \quad \{X \mid x= KE_{\text{Assurance}}; Y \mid y= KUA_{\text{Assurance}}\} \\ \{4.42\} \cap \{3.89\} = \{0.53\}$$

- Importance of Empathy vs. Performance Empathy

$$\rho_{X,Y} = \forall KE_{\text{Empathy}} \cap \forall KUA_{\text{Empathy}} = \emptyset \quad \{X \mid x= KE_{\text{Empathy}}; Y \mid y= KUA_{\text{Empathy}}\} \\ \{4.34\} \cap \{3.86\} = \{0.48\}$$

Table 6 show that both of these of two criteria are not 0. This is mean that the correlation existed (strong correlation) between 'Importance' and 'Performance' attributes (among Responsiveness, Assurance, and Empathy). While against the Importance vs. the Performance  $\ominus$  as following:

- Importance of Reliability vs. Performance Tangible

$$\forall KE_{\text{Reliability}} \cap \forall KUA_{\text{Tangible}} = \emptyset \\ \{3.98\} \cap \{4.58\} = 0.6$$

- Importance of Assurance vs. Performance Assurance

$$\forall KE_{\text{Assurance}} \cap \forall KUA_{\text{Assurance}} = \emptyset \\ \{4.42\} \cap \{3.89\} = 0.53$$

Due to the criteria of Kano refers to SERVQUAL is the developed through the pair questionnaires based on dichotomous statement (Functional and Dysfunctional), to find out the customer satisfaction, therefore, should be based on the Kano correlation (Table 7a&7b). Here, the formula as follows:

$$\{K_{\text{Functional}}\} \cap \{K_{\text{Dysfunctional}}\} = F_{\text{Kano}} \quad (9)$$

$$\Rightarrow \{K_{\text{Functional}} \cap K_{\text{Dysfunctional}}\} - F_{\text{Kano}} = 0$$

$$\Rightarrow K_{\text{Functional}} \cap F_{\text{Kano}} = - \{K_{\text{Dysfunctional}} \cap F_{\text{Kano}}\}$$

$$\Rightarrow - \{K_{\text{Functional}} \cap F_{\text{Kano}}\} = K_{\text{Dysfunctional}} \cap F_{\text{Kano}}$$

Table 7a shows that almost of Kano criteria are correlated to Dysfunctional characteristic. This is means that Kano results as justification on how customer satisfy towards the service given of this survey is mostly influenced by Dysfunctional element rather than Functional element. (see the yellow, red, and blue colour marking in Table 7a, 7b and 6).

By the assumption that 'Importance' having correlation with 'Performance', Table 6 show that between Reliability as well as Tangible, there are no correlations at all. However, the customer satisfaction regarding both of elements can be known through the correlation between 'Functional' and 'Dysfunctional' towards Kano criteria, that are on question no. 4 toward Kano-1 and no.5 toward Kano-5

(for Reliability), and question no 22 toward Kano-22, no.25 towards Kano-23 and Kano-25 (for Tangibles). In Table 8 shows that as follows:

- (i) The correlation between 'Importance' towards 'Performance' and the correlation between 'Functional' and 'Dysfunctional' towards Kano can lead the bias (misleading) for the priorities of improvement required and even to ignore it's, if they are mixed together (no.7,8,15,16).
- (ii) However, if they are justified based on correlation between 'Functional' and 'Dysfunctional' towards Kano and null/no correlation between 'Importance' and 'Performance', the bias or misleading condition will occur if the value of gap analysis and CS-DS is less than the total average or average of particular SERVQUAL related. (see Table 3, that is  $0.14 < 0.61$  (or  $0.60$ ) and  $-0.04 > -0.15$  (or  $-0.23$ ).
- (iii) The correlation between 'Functional' and 'Dysfunctional' towards Kano in which by the condition that CS-DS value is less than the total average or average of particular SERVQUAL related (no.13), will results with correct data for the priorities of improvement required. However, this condition should be also by condition if the value of gap analysis is more than average total average or average of particular SERVQUAL related.

**Table 8:** The Priorities for Improvement

SERVQUAL	No	DESCRIPTION	KANO	Importance for Improvement Based on Kano	Importance for Improvement Based on IPA
RELIABILITY	4	Teaching-learning process delivered	O	NO	NO
	5	The cost of education	M	Yes / no.7	Yes / no.12
RESPONSIVENESS	7	The information delivered	M	NO	NO
	8	Response to students' questions.	M	NO	NO
ASSURANCE	13	Security & trust	M	Yes/ no.1	Yes/ no.3
	15	Security in the learning process	O	NO	NO
	16	Parking space availability and secureness	M	Yes/ no.4	Yes/ no.10
TANGIBLE	22	Extensive laboratory and completeness	M	Yes/ no.5	Yes/no. 1
	25	There are clean toilets	M/M	Yes/no.11 ; Yes no.9	Yes/no.3 ; Yes/ no.2

## 5.0 CONCLUSION

The priorities of service delivered (as what were expected by student) are related the cost of education, security and trust, an extensive laboratory facilities and completeness, and the cleanliness of toilet. Although they are only as 'must-be' requirement, they will lead to the dissatisfaction if they are, however, not fulfilled. Therefore, the university has to provide such basic requirement of student expectation and requirements.

Based on the approach of data analysis formulation that are commonly used by many scholars, the priorities for improvement that only depend on Kano results will tend to lead the misleading interpretation of what is actually required and expected by customer. This is also occurred towards the approach of 'Importance' and 'Performance' analysis, since they are only based on the value of gap analysis. Therefore, by combining the approaches of Kano model and IPA into the formulation of the correlation results, the priorities of customer satisfaction based on what are expected and required by customer can be justified clearly and correctly. On this, we can find that no.13 related to security & trust is the most important one, based on 4 quadrants of IPA and Kano methods. This is as supported through the correlation comparison between Functional vs. Kano and Dysfunction vs. Kano. We, therefore, propose the formulation of data analysis by mixed of Kano and IPA as what are reviewed by the case of student satisfaction above.

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**Table 4:** The Validity of Importance and Satisfaction of Service Provided vs. Kano Criteria of Customer Satisfaction

No	SERVICE CRITERIA	Cronbach's Alpha				Mean			
		Importance	Satisfaction	Functional	Dysfunctional	Importance	Performance	Functional	Dysfunctional
<b>RELIABILITY</b>									
1	The admission procedures	0.595	0.844	0.769	0.929	4.58	3.98	1.48	4.52
2	Process of teaching and learning								
3	The timetable / discipline of learning schedule.								
4	Teaching-learning process delivered								
5	The cost of education								
<b>RESPONSIVENESS</b>									
6	The ability of lecturers	0.715	0.837	0.781	0.872	4.46	3.92	1.69	4.41
7	The information delivered								
8	Response to students questions.								
9	Staff attitudes								
<b>ASSURANCE</b>									
10	Knowledge and ability of teaching skills	0.715	0.869	0.848	0.949	4.42	3.89	1.62	4.57
11	Skills of lecturers and experience of employees staff								
12	Service delivered								
13	Security & trust								
14	Appearances of employees								
15	Security in the learning process								
16	Parking space availability and securenness								
<b>EMPATHY</b>									
17	Service provided and delivered	0.705	0.874	0.606	0.841	4.34	3.86	1.61	4.49
18	Communication between students, the faculty, staff, and employees.								
19	Impression								
20	Attention								
<b>TANGIBLES</b>									
21	Facility and availability for learning infrastructure	0.926	0.926	0.773	0.763	4.35	3.52	1.75	4.41
22	Extensive laboratory and completeness								
23	Completeness and readiness infrastructure for teaching and learning								
24	Cleanliness, neatness, and comfort of the classroom								
25	There are clean toilets								
<b>Average</b>		0.912	0.962	0.923	0.97	4.43	3.83	1.63	4.49

Table 5: Importance and Satisfaction of Service Provided vs. Kano Criteria of Customer Satisfaction

No	SERVICE CRITERIA	Expectation	Experience	Gap Analysis	Class Rank	Importance for improvement	Priorities	KANO				CS	DS	CS-DS	Class Rank	Importance for Improvement	Priorities
		Importance	Performance					Functional	Dysfunctional	1 <sup>st</sup> MAX	2 <sup>nd</sup> MAX	Better	Worse				
	<b>RELIABILITY</b>	<b>4.58</b>	<b>3.98</b>	<b>0.61</b>				<b>1.48</b>	<b>4.52</b>			<b>0.59</b>	<b>-0.75</b>	<b>-0.15</b>			
1	The admission procedures	4.23	<b>4.09</b>	0.14	3rd	No		1.35	4.49	O	M	<b>0.71</b>	<b>-0.75</b>	-0.04	2nd	No	
2	Process of teaching and learning	<b>4.81</b>	<b>4.01</b>	<b>0.80</b>	2nd	Yes	5	1.41	4.65	O	M	<b>0.63</b>	<b>-0.84</b>	-0.21	2nd	Yes	8
3	The timetable / discipline of learning schedule.	<b>4.76</b>	<b>3.86</b>	<b>0.89</b>	2nd	Yes	4	1.45	4.54	O	M	<b>0.60</b>	<b>-0.74</b>	-0.14	2nd	Yes	11
4	Teaching-learning process delivered	<b>4.74</b>	<b>4.15</b>	0.59	2nd	No		1.32	4.57	O	M	<b>0.68</b>	<b>-0.78</b>	-0.10	2nd	No	
5	The cost of education	4.36	3.76	<b>0.61</b>	4th	Yes	12	1.85	4.35	M	O	0.36	-0.64	<b>-0.29</b>	3rd	Yes	7
	<b>RESPONSIVENESS</b>	<b>4.46</b>	<b>3.92</b>	<b>0.54</b>				<b>1.69</b>	<b>4.41</b>			<b>0.48</b>	<b>-0.67</b>	<b>-0.19</b>			
6	The ability of lecturers	<b>4.80</b>	<b>4.14</b>	<b>0.66</b>	2nd	Yes	6	1.54	4.49	O	M	<b>0.53</b>	-0.71	-0.18	4th	Yes	9
7	The information delivered	4.35	<b>3.97</b>	0.38	3rd	No		1.80	4.35	M	O	0.43	-0.68	<b>-0.25</b>	3rd	No	
8	Response to students questions.	4.09	3.61	0.49	4th	No		1.95	4.30	M	I	0.35	-0.55	-0.20	3rd	No	
9	Staff attitudes	<b>4.64</b>	<b>4.01</b>	<b>0.62</b>	2nd	Yes	8	1.47	4.49	O	M	<b>0.61</b>	<b>-0.75</b>	-0.14	2nd	Yes	12
	<b>ASSURANCE</b>	<b>4.42</b>	<b>3.89</b>	<b>0.53</b>				<b>1.62</b>	<b>4.57</b>			<b>0.52</b>	<b>-0.77</b>	<b>-0.25</b>			
10	Knowledge and ability of teaching skills	<b>4.74</b>	<b>4.22</b>	0.53	2nd	No		1.42	4.62	O	M	<b>0.69</b>	<b>-0.81</b>	-0.11	2nd	No	
11	Skills of lecturers and experience of employees staff	4.38	<b>4.00</b>	0.38	3rd	No		1.61	4.62	O	M	<b>0.53</b>	<b>-0.79</b>	<b>-0.26</b>	2nd	No	
12	Service delivered	<b>4.49</b>	<b>4.00</b>	0.49	2nd	No		1.62	4.65	O	M	<b>0.57</b>	<b>-0.83</b>	<b>-0.26</b>	2nd	No	
13	Security & trust	<b>4.51</b>	3.78	<b>0.73</b>	1st	Yes	3	1.59	4.70	M	O	0.47	<b>-0.88</b>	<b>-0.40</b>	1st	Yes	1
14	Appearances of employees	4.22	<b>3.89</b>	0.32	3rd	No		1.59	4.36	O	M	<b>0.56</b>	-0.58	-0.01	4th	No	
15	Security in the learning process	<b>4.57</b>	<b>4.08</b>	0.49	2nd	No		1.58	4.62	O	M	<b>0.50</b>	<b>-0.82</b>	<b>-0.32</b>	2nd	No	
16	Parking space availability and secureness	4.03	3.24	<b>0.78</b>	4th	Yes	10	1.92	4.41	M	I	0.30	-0.66	<b>-0.37</b>	3rd	Yes	4
	<b>EMPATHY</b>	<b>4.34</b>	<b>3.86</b>	<b>0.48</b>				<b>1.61</b>	<b>4.49</b>			<b>0.49</b>	<b>-0.71</b>	<b>-0.22</b>			
17	Service provided and delivered	<b>4.66</b>	<b>4.03</b>	<b>0.64</b>	2nd	Yes	7	1.49	4.58	O	M	<b>0.60</b>	<b>-0.77</b>	-0.16	2nd	Yes	10
18	Communication between students, the faculty, staff, and employees.	4.30	<b>3.86</b>	0.43	3rd	No		1.61	4.51	M	O	0.46	<b>-0.74</b>	<b>-0.28</b>	1st	No	
19	Impression	4.04	3.66	0.38	4th	No		1.84	4.20	M	I	0.34	-0.47	-0.14	3rd	No	
20	Attention	4.35	<b>3.89</b>	0.46	3rd	No		1.51	4.66	O	M	<b>0.54</b>	<b>-0.86</b>	<b>-0.32</b>	2nd	No	
	<b>TANGIBLES</b>	<b>4.35</b>	<b>3.52</b>	<b>0.82</b>				<b>1.75</b>	<b>4.41</b>			<b>0.40</b>	<b>-0.72</b>	<b>-0.32</b>			
21	Facility and availability for learning infrastructure	4.09	3.58	0.51	4th	No		1.74	4.32	M	O	0.38	-0.69	<b>-0.31</b>	3rd	No	
22	Extensive laboratory and completeness	<b>4.47</b>	3.46	<b>1.01</b>	1st	Yes	1	1.81	4.30	M	O	0.35	-0.66	<b>-0.31</b>	3rd	Yes	5
23	Completeness and readiness infrastructure for teaching and learning	4.38	3.62	<b>0.76</b>	4th	Yes	11	1.68	4.50	M	O	0.43	<b>-0.76</b>	<b>-0.33</b>	1st	Yes	3
24	Cleanliness, neatness, and comfort of the classroom	<b>4.54</b>	3.64	<b>0.91</b>	1st	Yes	2	1.68	4.49	M	O	0.44	-0.73	<b>-0.29</b>	3rd	Yes	6
25	There are clean toilets	4.24	3.31	<b>0.93</b>	4th	Yes	9	1.84	4.43	M	O	0.39	<b>-0.76</b>	<b>-0.37</b>	1st	Yes	2
	<b>Average</b>	<b>4.43</b>	<b>3.83</b>	<b>0.60</b>				<b>1.63</b>	<b>4.49</b>			<b>0.50</b>	<b>-0.73</b>	<b>-0.23</b>			

Table 6: Correlation between Importance vs. Satisfaction

		Reliability					Responsiveness				Assurance						Empathy				Tangibles											
		KUA 1	KUA 2	KUA 3	KUA 4	KUA 5	KUB 6	KUB 7	KUB 8	KUB 9	KUC 10	KUC 11	KUC 12	KUC 13	KUC 14	KUC 15	KUC 16	KUD 17	KUD 18	KUD 19	KUD 20	KUE 21	KUE 22	KUE 23	KUE 24	KUE 25						
Reliability	KEA1						.289(*) .300(**)																			4.58						
	KEA2										.339(**)						.245(*)															
	KEA3										.246(*)						.241(*)															
	KEA4																															
	KEA5																															
Responsiveness	KEB6	.238(*)					.277(*)				.244(*)						.339(**) .245(*) .295(*)				.300(**)					4.46						
	KEB7						.324(**)				.242(*) .232(*)						.232(*) .347(**) .270(*)															
	KEB8						.264(*) .301(**)				.238(*)						.235(*)															
	KEB9						.319(**)				.257(*)						.281(*)				.258(*)				.334(**) .342(**) .254(*)							
	KEB10										.237(*)						.257(*)				.401(**) .237(*)				.272(*)							
Assurance	KEC11	.306(**)									.248(*)						.289(*)				.239(*)					4.42						
	KEC12						.280(*)				.293(*)						.353(**)															
	KEC13										.362(**) .409(**) .238(*)						.236(*) .304(**)				.348(**) .276(*)				.320(**) .271(*) .291(*)							
	KEC14										.297(*)						.319(**) .388(**)				.260(*) .245(*)				.257(*)							
	KEC15	.305(**)									.354(**)						.276(*) .334(**)				.287(*)				.304(**) .278(*)				.253(*) .237(*)			
Empathy	KED17	.269(*)																								4.34						
	KED18	.284(*)																														
	KED19	.330(**)					.350(**)				.345(**) .311(**) .371(**) .396(**) .290(*)				.268(*) .241(*) .254(*)				.264(*) .279(*)				.252(*) .402(**) .298(**) .372(**)				.280(*) .252(*)					
	KED20										.241(*)																					
	KED21										.292(*)																					
Tangible	KEE22																													4.35		
	KEE23						.230(*)				.275(*) .239(*)				.310(**)																	
	KEE24																.283(*)				.237(*)				.230(*)							
	KEE25																.253(*)															
			3.98					3.92				3.89						3.86				3.52										

\*\* Correlation is significant at the 0.01 level (2-tailed).  
 \* Correlation is significant at the 0.05 level (2-tailed).



**Table 7a:** Correlations between Functional Questions vs. KANO Diagram

	Reliability					Responsive					Assurance					Empathy					Tangibles				
	KANO-A1	KANO-A2	KANO-A3	KANO-A4	KANO-A5	KANO-B6	KANO-B7	KANO-B8	KANO-B9	KANO-C10	KANO-C11	KANO-C12	KANO-C13	KANO-C14	KANO-C15	KANO-C16	KANO-D17	KANO-D18	KANO-D19	KANO-D20	KANO-E21	KANO-E22	KANO-E23	KANO-E24	KANO-E25
FUN-A1						.397(**)	.238(*)							.245(*)											
FUN-A2																									
FUN-A3																									
FUN-A4																									
FUN-A5																									
FUN-B6																									
FUN-B7																									
FUN-B8																									
FUN-B9																									
FUN-C10																									
FUN-C11																									
FUN-C12																									
FUN-C13																									
FUN-C14																									
FUN-C15																									
FUN-C16																									
FUN-D17																									
FUN-D18																									
FUN-D19																									
FUN-D20																									
FUN-E21																									
FUN-E22																									
FUN-E23																									
FUN-E24																									
FUN-E25																									

\*\* Correlation is significant at the 0.01 level (2-tailed).  
 \* Correlation is significant at the 0.05 level (2-tailed).

Table 7b: Correlations between Dysfunctional Questions vs. KANO Diagram

	Reliability					Responsive					Assurance					Empathy					Tangibles				
	KANO- A1	KANO- A2	KANO- A3	KANO- A4	KANO- A5	KANO- B6	KANO- B7	KANO- B8	KANO- B9	KANO- C10	KANO- C11	KANO- C12	KANO- C13	KANO- 14	KANO- C15	KANO- C16	KANO- D17	KANO- D18	KANO- D19	KANO- D20	KANO- E21	KANO- E22	KANO- E23	KANO- E24	KANO- E25
DFUN-A1	-0.277(*)	-0.247(*)	-0.376(**)	-0.293(*)	-0.262(*)				-0.325(**)	-0.271(*)	-0.448(**)	-0.355(**)	-0.342(**)		-0.516(**)	-0.239(*)		-0.267(*)		-0.412(**)	-0.229(*)	-0.424(**)	-0.458(**)	-0.413(**)	-0.441(**)
DFUN-A2	-0.275(*)	-0.256(*)	-0.420(**)	-0.471(**)	-0.317(**)	-0.279(*)		-0.235(*)	-0.515(**)		-0.332(**)	-0.416(**)	-0.319(**)		-0.393(**)	-0.256(*)		-0.356(**)		-0.278(*)	-0.272(*)	-0.383(**)	-0.441(**)	-0.461(**)	-0.336(**)
DFUN-A3	-0.278(*)	-0.266(*)	-0.329(**)	-0.438(**)	-0.358(**)			-0.263(*)	-0.419(**)	-0.269(*)	-0.333(**)	-0.314(**)	-0.323(**)		-0.420(**)	-0.338(**)		-0.262(*)		-0.253(*)	-0.368(**)	-0.370(**)	-0.535(**)	-0.482(**)	-0.262(*)
DFUN-A4	-0.341(**)	-0.262(*)	-0.313(**)	-0.387(**)	-0.386(**)	-0.287(*)		-0.246(*)	-0.457(**)		-0.413(**)	-0.403(**)	-0.401(**)		-0.480(**)	-0.235(*)		-0.349(**)		-0.303(**)	-0.321(**)	-0.422(**)	-0.554(**)	-0.440(**)	-0.369(**)
DFUN-A5	-0.355(**)	-0.328(**)		-0.401(**)	-0.549(**)			-0.333(**)	-0.355(**)	-0.232(*)	-0.420(**)	-0.398(**)	-0.339(**)		-0.489(**)		-0.314(**)	-0.260(*)		-0.379(**)	-0.295(*)	-0.456(**)	-0.499(**)	-0.447(**)	-0.448(**)
DFUN-B6	-0.236(*)			-0.300(**)					-0.241(*)	-0.259(*)	-0.274(*)	-0.268(*)	-0.352(**)		-0.276(*)	-0.257(*)	-0.290(*)	-0.288(*)		-0.302(**)	-0.295(*)	-0.456(**)	-0.499(**)	-0.447(**)	-0.298(**)
DFUN-B7	-0.311(**)		-0.238(*)	-0.314(**)			-0.232(*)		-0.311(**)		-0.320(**)		-0.267(*)		-0.404(**)		-0.229(*)	-0.275(*)				-0.304(**)	-0.482(**)	-0.422(**)	-0.292(*)
DFUN-B8	-0.290(*)	-0.314(**)		-0.374(**)	-0.263(*)	-0.323(**)		-0.366(**)			-0.303(**)	-0.299(**)	-0.343(**)		-0.401(**)		-0.233(*)	-0.318(**)	-0.328(**)	-0.244(*)	-0.352(**)		-0.520(**)	-0.389(**)	
DFUN-B9		-0.272(*)	-0.300(**)	-0.409(**)				-0.260(*)	-0.353(**)	-0.436(**)	-0.286(*)	-0.348(**)		-0.354(**)	-0.271(*)	-0.354(**)	-0.395(**)		-0.266(*)	-0.311(**)		-0.570(**)	-0.512(**)	-0.281(*)	
DFUN-C10	-0.511(**)	-0.268(*)	-0.379(**)	-0.508(**)	-0.368(**)	-0.229(*)		-0.258(*)	-0.458(**)	-0.340(**)	-0.377(**)	-0.516(**)	-0.540(**)		-0.471(**)		-0.279(*)	-0.412(**)		-0.338(**)	-0.265(*)	-0.426(**)	-0.499(**)	-0.504(**)	-0.387(**)
DFUN-C11	-0.428(**)		-0.377(**)	-0.477(**)	-0.365(**)			-0.268(*)	-0.355(**)		-0.391(**)	-0.500(**)	-0.506(**)		-0.435(**)		-0.252(*)	-0.313(**)		-0.406(**)	-0.305(**)	-0.399(**)	-0.401(**)	-0.373(**)	-0.357(**)
DFUN-C12	-0.391(**)	-0.311(**)	-0.358(**)	-0.487(**)	-0.301(**)	-0.343(**)			-0.415(**)	-0.351(**)	-0.539(**)	-0.347(**)	-0.513(**)		-0.481(**)			-0.420(**)		-0.331(**)	-0.317(**)	-0.397(**)	-0.604(**)	-0.477(**)	-0.380(**)
DFUN-C13	-0.414(**)		-0.296(*)	-0.497(**)	-0.373(**)	-0.248(*)		-0.229(*)	-0.375(**)	-0.315(**)	-0.487(**)	-0.405(**)	-0.625(**)		-0.338(**)			-0.320(**)		-0.385(**)	-0.285(*)	-0.440(**)	-0.441(**)	-0.390(**)	-0.350(**)
DFUN-C14			-0.379(**)	-0.411(**)	-0.240(*)				-0.324(**)	-0.272(*)	-0.305(**)	-0.248(*)	-0.250(*)		-0.385(**)	-0.335(**)		-0.300(**)		-0.339(**)	-0.369(**)	-0.407(**)	-0.365(**)		
DFUN-C15	-0.494(**)	-0.312(**)	-0.366(**)	-0.522(**)	-0.385(**)	-0.267(*)		-0.278(*)	-0.475(**)	-0.311(**)	-0.486(**)	-0.482(**)	-0.471(**)	-0.280(*)	-0.556(**)		-0.235(*)	-0.337(**)		-0.378(**)	-0.284(*)	-0.493(**)	-0.592(**)	-0.518(**)	-0.458(**)
DFUN-C16			-0.380(**)	-0.469(**)	-0.242(*)			-0.340(**)	-0.365(**)	-0.289(*)		-0.308(**)		-0.308(**)	-0.485(**)			-0.304(**)		-0.286(*)	-0.372(**)	-0.387(**)	-0.361(**)	-0.350(**)	
DFUN-D17	-0.312(**)	-0.237(*)	-0.237(*)	-0.444(**)	-0.364(**)			-0.305(**)	-0.433(**)	-0.268(*)	-0.420(**)	-0.354(**)	-0.335(**)		-0.386(**)		-0.364(**)		-0.250(*)	-0.410(**)	-0.236(*)	-0.281(*)	-0.474(**)	-0.416(**)	-0.421(**)
DFUN-D18	-0.363(**)		-0.435(**)	-0.483(**)	-0.388(**)			-0.286(*)	-0.333(**)	-0.426(**)	-0.388(**)	-0.457(**)	-0.465(**)	-0.259(*)	-0.311(**)		-0.297(*)	-0.523(**)		-0.331(**)	-0.276(*)	-0.252(*)	-0.475(**)	-0.486(**)	-0.312(**)
DFUN-D19			-0.277(*)	-0.350(**)				-0.237(*)			-0.229(*)				-0.332(**)		-0.303(**)	-0.321(**)		-0.322(**)		-0.369(**)	-0.292(*)		
DFUN-D20	-0.398(**)		-0.334(**)	-0.412(**)	-0.325(**)	-0.253(*)		-0.320(**)	-0.238(*)	-0.492(**)	-0.368(**)	-0.412(**)		-0.417(**)		-0.232(*)		-0.670(**)			-0.403(**)	-0.333(**)	-0.400(**)	-0.442(**)	
DFUN-E21		-0.284(*)	-0.258(*)	-0.332(**)				-0.269(*)			-0.268(*)				-0.409(**)			-0.297(*)			-0.642(**)	-0.359(**)	-0.421(**)	-0.452(**)	-0.310(**)
DFUN-E22	-0.324(**)	-0.324(**)	-0.361(**)	-0.289(*)	-0.406(**)					-0.231(*)	-0.331(**)	-0.308(**)		-0.595(**)		-0.299(**)	-0.294(*)		-0.307(**)	-0.399(**)	-0.582(**)	-0.432(**)	-0.339(**)	-0.431(**)	
DFUN-E23			-0.323(**)	-0.394(**)	-0.235(*)	-0.259(*)		-0.251(*)	-0.442(**)	-0.240(*)	-0.420(**)	-0.291(*)	-0.373(**)		-0.504(**)			-0.322(**)		-0.294(*)	-0.329(**)	-0.545(**)	-0.470(**)	-0.328(**)	
DFUN-E24	-0.368(**)	-0.316(**)	-0.299(**)	-0.383(**)	-0.251(*)			-0.300(**)	-0.337(**)	-0.356(**)	-0.344(**)	-0.285(*)	-0.260(*)	-0.539(**)				-0.341(**)		-0.559(**)	-0.443(**)	-0.594(**)	-0.448(**)	-0.319(**)	
DFUN-E25		-0.267(*)		-0.284(*)				-0.349(**)			-0.273(*)	-0.299(**)		-0.439(**)						-0.262(*)	-0.342(**)	-0.509(**)	-0.379(**)	-0.412(**)	

\*\* Correlation is significant at the 0.01 level (2-tailed).  
 \* Correlation is significant at the 0.05 level (2-tailed).

