

Measurement education quality

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Measurement of Education Quality with KANO Model : A Case Study on Elementary School

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ABSTRACT

Quality is the important and necessary to get serious attention of the company in running its operations strategy including in the elementary school. Measuring the quality of services is more complicated because of the is intangible that each customer has different perceptions about the quality of services. KANO's model has been widely applied in measuring service quality. The purpose of this study is to measure the level of satisfaction of expectation of parents towards education and perform the classification of the KANO model of educational service attributes. Measurement of education based on 5 dimension of services quality Zeithaml, Parasuraman, dan Berry (1990), that is tangible, reliability, responsiveness, assurance dan empathy. The result showed that there is still a gap between the level satisfaction and expectation that are the completeness of the library books, cleanliness of toilets and computer laboratory. Furthermore, the results of the classification attributes using KANO model of education services found that 25 attributes in the category of One Dimensional, 4 attributes in the category of Attractive and 1 attribute is categorized in Indifferent

Keywords

service quality, customer satisfaction, elementary school, KANO model

→ 1. INTRODUCTION

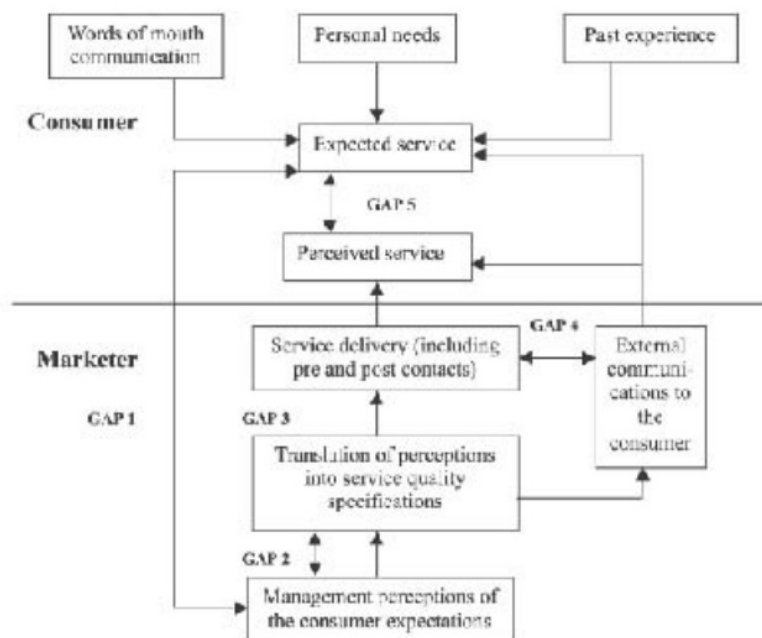
Based on Herzberg's 'Motivator-Hygiene Theory', Kano *et al.* [1] defined the product quality element of different categories that impact customer satisfaction in different ways. Which namely: attractive quality attribute, must-be quality attribute, one-dimensional quality attribute, indifferent quality attribute and reverse quality attribute. Using Kano's model, quality attributes that have the greatest influence on customer satisfaction can therefore be identified, and these can then be used to focus on priorities for product or service development and improvement [2]. With such advantage, Kano model is widely used in quality management [3], logistics services [4] product development [5-7] as well as QFD integration [8-10]. Kano model also used to evaluate quality evaluation of education [11-13]. Quality in education is as important as the quality of business. Elementary school is an important stage of education, where basic values instilled child begins. Basic education in elementary school will influence the child's subsequent development of thinking. Thus every school, including elementary schools, should improve the quality of education services. Considering on this, to understand customer satisfaction of the education institution, we need to understand the customer's need and the expectation. Improving the quality of education would have to focus on customer satisfaction. Kano *et al.* [1] developed a model to categorize the attributes of a product or service based on how well they are able to satisfy customer. Mostly service qualities have both poor and versatile characteristics because service quality is based on the customers' feelings. Therefore, the evaluation of service quality is more difficult than that of the product quality. Parasuraman *et al.* [14] developed the instrument SERVQUAL for measuring customers' perceptions of service quality needs. In this paper, service quality of elementary school was measured and analyzed by service gaps and classified by KANO's method.

2. CONCEPTUAL BACKGROUND

2.1. Service Quality

A firm in order to compete successfully must have an understanding of consumer perception of the quality and the way service quality is influenced. Managing perceived service quality means that the firm has to match the expected service and perceived service to each other so that consumer satisfaction is achieved [15]. Parasuraman *et al.* [16] proposed that service quality is a function of the differences between expectation and performance along the quality dimensions. They developed a service quality model (Figure 1) based on gap analysis. The various gaps visualized in the model are:

- Gap 1: Differences between consumers' expectation and management's perceptions of those expectations, for example not knowing what consumers expect.
- Gap 2: Differences between management's perceptions of consumer's expectations and service quality specifications, for example improper service-quality standards.
- Gap 3: Differences between service quality specifications and service actually delivered for example the service performance gap.
- Gap 4: Differences between service delivery and the communications to consumers about service delivery, for example whether promises match delivery?
- Gap 5: Differences between consumer's expectation and perceived service. This gap depends on size and direction of the four gaps associated with the delivery of service quality on the marketer's side.

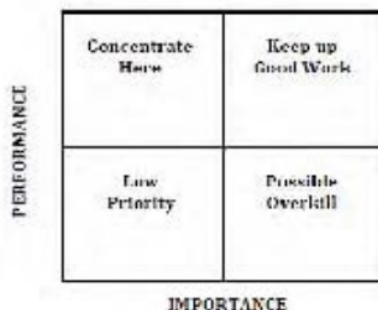


Source : Parasuraman, et.al [16]

Figure 1: Gap Analysis Model

2.2. Importance-Performance Analysis and KANO Model

Importance-Performance Analysis (IPA) technique is 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. 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 over perform. For this purpose, the interpretation is presented graphically on a grid divided into four quadrants, which according to the average importance and satisfaction (performance)[17]. Four quadrants and the implications of the IPA are shown in Table 1 and Figure 2. The four quadrants are identified are *Concentrate Here*, *Keep the Good Work*, *Low Priority* and *Possible Overkill*.



Source : Hae-rvip Sitorubing, et. al[17]

Figure 2: Importance-Performance Analysis Grid

Table 1: Importance-Performance Quadrant

Quadrant I <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.
Quadrant II <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.
Quadrant III <i>Low priority</i>	Attributes have a level of perceived 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.
Quadrant IV <i>Possible overkill</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.

Source : Hae-rvip Sitorubing, et. al[17]

Parasuraman *et al* [14] defined the 5 attributes dimensions of service quality (SERVQUAL) as the method used to measure the quality of service as follow:

- (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

Kano *et al* [17] developed a model to categorize the attributes of a product or service based on how well they are able to satisfy customer needs. The Kano model is a theory of product development and customer satisfaction developed in the 80s by Professor Noriaki Kano which classifies customer preferences into five categories: (i) Attractive, (ii) One-Dimensional, (iii) Must-be, (iv) Indifferent, (v) Reverse. The one-dimension quality model focuses on one quality element. It states that if the quality element is not sufficient then the customer is satisfied, otherwise the customer is not satisfied. Two-dimension quality model argued that quality elements sufficiently may not enough to satisfy the customers' quality expectation. Sometimes it may result in an satisfaction or no feeling for the customer. This is the core concept of the two-dimension quality model. The concept of the two-dimension quality is proposed by Herzberg in 1987. Kano called the Herzberg's Motivator-Hygiene theory as the quality's (Motivator-Hygiene) M-H theory. Due to this terminology is too complicate to use it, Kano refines the

quality's M-H theory as attractive quality and must-be quality, and distinguished the service quality in terms of attractive quality elements, one-dimension quality elements, must-be quality elements, indifferent quality elements and reverse quality elements. The following are the quality elements categories:

These categories have been translated into English using various different names (delighters/exciters, satisfiers, dissatisfiers, etc.), but all refer to the original articles written by Kano (see Figure 3)[8].

1. **Attractive Quality:** These attributes provide satisfaction when achieved fully, but do not cause dissatisfaction when not fulfilled. These are attributes that are not normally expected. For example, a thermometer on a package of milk showing the temperature of the milk. Since these types of attributes of quality unexpectedly delight customers, they are often unspoken.
2. **One-dimensional Quality:** These attributes result in satisfaction when fulfilled and dissatisfaction when not fulfilled. These are attributes that are spoken of and ones which companies compete for. An example of this would be a milk package that is said to have ten percent more milk for the same price will result in customer satisfaction, but if it only contains six percent then the customer will feel misled and it will lead to dissatisfaction.
3. **Must-be Quality:** These attributes are taken for granted when fulfilled but result in dissatisfaction when not fulfilled. An example of this would be package of milk that leaks. Customers are dissatisfied when the package leaks, but when it does not leak the result is not increased customer satisfaction. Since customers expect these attributes and view them as basic, then it is unlikely that they are going to tell the company about them when asked about quality attributes.
4. **Indifferent Quality:** These attributes refer to aspects that are neither good nor bad, and they do not result in either customer satisfaction or customer dissatisfaction.
5. **Reverse Quality:** These attributes refer to a high degree of achievement resulting in dissatisfaction and to the fact that not all customers are alike. For example, some customers prefer high-tech products, while others prefer the basic model of a product and will be dissatisfied if a product has too many extra features.

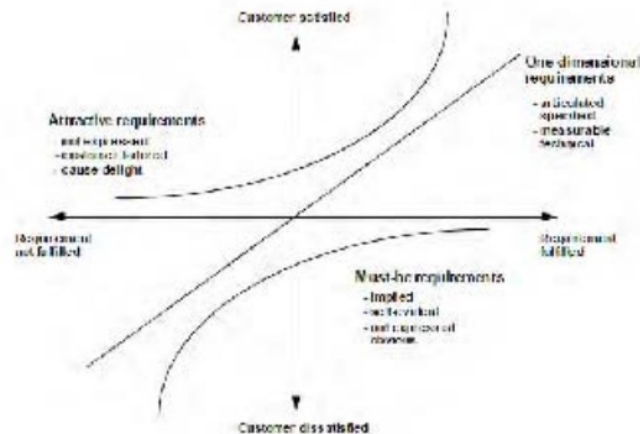


Figure 3: KANO's Model Customer Satisfaction

3. METODHOLOGY

The framework of this study can be seen on figure 4.

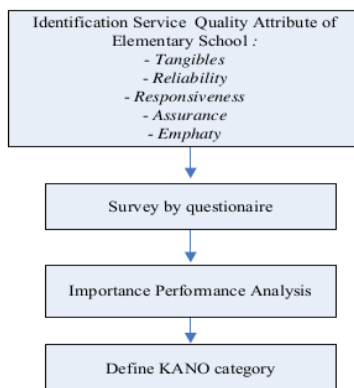


Figure 4. Framework of study

Service quality attribute of elementary school as in table 2 below :

Table 2. Service Quality Attribute of Elementary School

Dimension	Attribute	Code
Tangibles	Academic calendar availability	A1
	Academic calendar implemented as planned	A2
	Teacher have a good capability	A3
	Teachers teach subjects according to educational background	A4
	Teaching are always conducted as scheduled	A5
	Availability of the agenda book	A6
Reliability	Classrooms are clean and comfortable	B1
	Facilities and modern teaching equipment	B2
	A completely of library	B3
	Sports facilities	B4
	Availability of student activity	B5
	Cleanliness of toilets	B6
	Computer laboratory	B7
	Completed and updated school's website	B8
	Cleanliness school environment	B9
	Teachers and staff dressed	B10
	Parking area	B11
	School location is easy to access	B12
Responsiveness	Teachers respond to questions and complaints of parents well	C1
	Teachers are willing to talk to parents about child's problem	C2
Assurance	Number of teacher	D1
	The use of teaching methods	D2
	Availability of textbooks	D3
	The number of students in one class	D4
	Education about manners, responsibility and honesty	D5
Empathy	Communication between teachers and parents	E1
	Regular meetings between teachers and parents	E2
	Parent organization	E3

The survey was carried out through two type of questionnaire to analyze parent satisfaction. The first one is used for analyzing importance and performance. On the first questionnaire, respondents give rank of importance and performance for every

attribute by Likert scale between 1 and 5. The second questionnaire is used to categorize service quality attribute by KANO Model. To apply the Kano classifications to divide the quality elements into attractive, one-dimensional, must-be, indifferent, and reverse quality elements is used by table 3 [19]

Table 3. KANO Evaluation Table
 Source : Matzler & Hinterhuber (1998)

Product requirement ↓		Dysfunctional form of the question				
		I like that way	It must be that way	I am neutral	I can live with it that way	I dislike that way
Functional form of the question	I like that way	Q	A	A	A	O
	It must be that way	R	I	I	I	M
	I am neutral	R	I	I	I	M
	I can live with it that way	R	I	I	I	M
	I dislike that way	R	R	R	R	Q

Where : Q= questionable, A = attractive, O = one dimensional, R=reverse, I = indifferent, M =must be

To classify attribute we used Blauth's formulas :

- If (one dimensional + attractive + must be) > (indifferent + reverse + questionable) then the category is maximum [one dimensional; attractive; must be]
- if (one dimensional + attractive + must be) < (indifferent + reverse + questionable) then the category maximum [indifferent; reverse; questionable]

4. RESULTS AND DISCUSSION

This study includes 150 respondents. The respondents are parents of elementary school. Summary of respondent can be seen at table 4.

Table 4. Summary of respondent

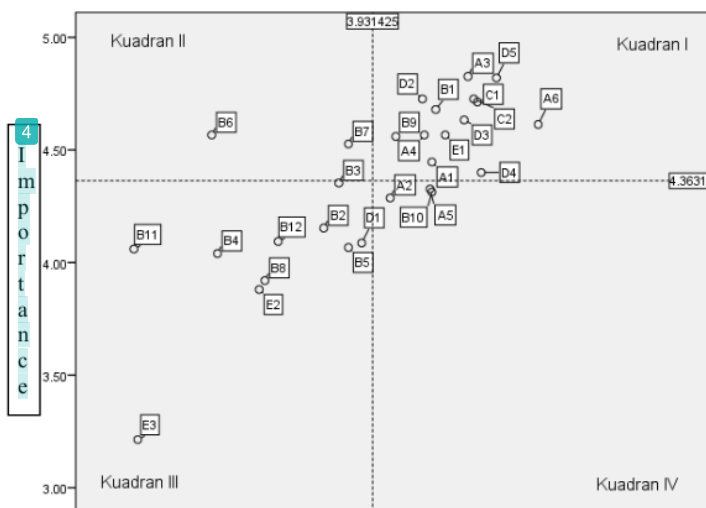
Item	Category	Amount	Percentage
Age	< 25 year	0	0.00
	25 – 30	5	3.33
	30 - 35	34	22.67
	35 - 40	47	31.33
	40 - 45	43	28.67
	>45	21	14.00
Occupation	Gov. Officer	13	8.67
	Private Officer	58	38.67
	Entrepreneur	26	17.33
	Military	13	8.67
	Doctor	1	0.67
	Teacher/Lecturer	10	6.67
	Others	29	19.33
Eductaion	High School	50	33.33
	Diploma	19	12.67
	Undergraduate	67	44.67
	Master	9	6.00
	Doctoral	0	0.00
	Military	2	1.33
	Others	3	2.00

Gap analysis conduct to analyze whether there are differences in the level of importance and performance of each service attribute. Summary of importance and performance of each service attribute can be seen in Table 5. The mean level of assessment and the level of interest then made Cartesian diagram as shown in figure 5.

Table 5. Average of Importance and Performance

Item	Average of Importance	Average of Performance

A1	4.4467	4.1400
A2	4.2867	3.9933
A3	4.8267	4.2667
A4	4.5667	4.1133
A5	4.3267	4.1333
A6	4.6133	4.5133
B1	4.6800	4.1533
B2	4.1533	3.7600
B3	4.3533	3.8133
B4	4.0400	3.3867
B5	4.0667	3.8467
B6	4.5667	3.3667
B7	4.5267	3.8467
B8	3.9200	3.5533
B9	4.5600	4.0133
B10	4.3133	4.1400
B11	4.0600	3.0933
B12	4.0933	3.6000
C1	4.7133	4.3000
C2	4.7267	4.2867
D1	4.0867	3.8933
D2	4.7267	4.1067
D3	4.6333	4.2533
D4	4.4000	4.3133
D5	4.8200	4.3667
E1	4.5667	4.1867
E2	3.8800	3.5333
E3	3.2133	3.1067



Performance

Figure 5: Cartesian Diagram

From Cartesian diagram, grouping each attribute in each quadrant is shown in Table 6.

Table 6. Grouping attribute to Cartesian Diagram

Quadrant	Code	Attribute
Quadrant I	A1	Academic calendar availability
	A3	Teacher have a good capability
	A4	Teachers teach subjects according to educational
	A6	Availability of the agenda book
	B1	Classrooms are clean and comfortable
	B9	Cleanliness school environment
	C1	Teachers respond to questions and complaints of parents well
	C2	Teachers are willing to talk to parents about child's problem
	D2	The use of teaching methods
	D3	Availability of textbooks
	D4	The number of students in one class
	D5	Education about manners, responsibility and honesty
	E1	Communication between teachers and parents
Quadrant II	B3	A completely of library
	B6	Cleanliness of toilets
	B7	Computer laboratory
Quadrant III	B2	Facilities and modern teaching equipment
	B4	Sports facilities
	B5	Availability of student activity
	B8	Completed and updated school's website
	B11	Parking area
	B12	School location is easy to access
	D1	Number of teacher
	E2	Regular meetings between teachers and parents
	E3	Parent organization
Quadrant IV	A2	Academic calendar implemented as planned
	A5	Teaching are always conducted as scheduled
	B10	Teachers and staff dressed

To categorize service quality attribute by KANO Model is based on answers to questions functional and dysfunctional each attribute. According to KANO evaluation table 3, sum of KANO category for every attribute can be seen on table 7.

Table 7. Sum of KANO Category

Code	Attribute	Sum of KANO Category					
		O	A	M	I	R	Q
A1	Academic calendar availability	81	35	7	15	0	0
A2	Academic calendar implemented as planned	65	36	14	21	1	1
A3	Teacher have a good capability	112	13	9	4	0	0
A4	Teachers teach subjects according to educational background	65	44	9	19	0	1
A5	Teaching are always conducted as scheduled	104	12	17	5	0	0
A6	Availability of the agenda book	99	19	7	13	0	0
B1	Classrooms are clean and comfortable	115	9	8	5	0	1
B2	Facilities and modern teaching equipment	42	55	6	35	0	0
B3	A completely of library	44	68	5	21	0	0
B4	Sports facilities	46	50	6	36	0	0
B5	Availability of student activity	27	74	3	34	0	0
B6	Cleanliness of toilets	123	7	7	1	0	0
B7	Computer laboratory	70	45	8	15	0	0
B8	Completed and updated school's website	53	42	7	36	0	0
B9	Cleanliness school environment	117	11	7	3	0	0
B10	Teachers and staff dressed	76	37	12	13	0	0
B11	Parking area	49	48	11	30	0	0
B12	School location is easy to access	74	36	10	18	0	0
C1	Teachers respond to questions and complaints of parents well	96	26	8	8	0	0
C2	Teachers are willing to talk to parents about child's problem	96	17	16	9	0	0
D1	Number of teacher	70	41	10	17	0	0
D2	The use of teaching methods	104	24	8	2	0	0
D3	Availability of textbooks	96	30	7	5	0	0
D4	The number of students in one class	75	33	5	24	1	0
D5	Education about manners, responsibility and honesty	123	9	4	2	0	0
E1	Communication between teachers and parents	101	15	16	6	0	0
E2	Regular meetings between teachers and parents	39	26	23	49	1	0
E3	Parent organization	15	28	2	89	4	0

Based on the results in Table 7, the determination of KANO categories for each attribute using Blauth's formula can be seen on table 8.

Table 8. KANO Category

Code	Attribute	KANO Category
A1	Academic calendar availability	O
A2	Academic calendar implemented as planned	O
A3	Teacher have a good capability	O
A4	Teachers teach subjects according to educational background	O
A5	Teaching are always conducted as scheduled	O
A6	Availability of the agenda book	O
B1	Classrooms are clean and comfortable	O
B2	Facilities and modern teaching equipment	A
B3	A completely of library	A
B4	Sports facilities	A
B5	Availability of student activity	A
B6	Cleanliness of toilets	O
B7	Computer laboratory	O
B8	Completed and updated school's website	O
B9	Cleanliness school environment	O
B10	Teachers and staff dressed	O
B11	Parking area	O
B12	School location is easy to access	O
C1	Teachers respond to questions and complaints of parents well	O

C2	Teachers are willing to talk to parents about child's problem	O
D1	Number of teacher	O
D2	The use of teaching methods	O
D3	Availability of textbooks	O
D4	The number of students in one class	O
D5	Education about manners, responsibility and honesty	O
E1	Communication between teachers and parents	O
E2	Regular meetings between teachers and parents	O
E3	Parent organization	I

From the results of respondents' answers to the level of importance and performance of each service attribute as can be seen in Table 5, it can be seen that the average rate of importance of all attributes greater than the performance. However, to give priority to improve attribute can be seen from the Cartesian diagram in Figure 5. Attributes that need serious attention to be improved are the attributes that in quadrant II that is completeness of library, Cleanliness of toilets and computer laboratory, because these attributes are considered bad perform but it is important for parents. This causes the parents disappointed. From the categorization of KANO model in Table 8, most of the attributes as category O (One Dimensional) means the rate of satisfaction is linear-related with performance that mean if performance attributes high will result in higher satisfaction parents. In other words, if we want to increase the satisfaction of the parents is by increasing the performance its attribute.

5. CONCLUSION

According to Gap Analysis we can conclude that in general there is gap between expectation and satisfaction of service in elementary school. The attribute that should be improved immediately are completeness of library, cleanliness of toilets and computer laboratory. Based on KANO analysis, 23 attribute are as One-Dimensional, 4 as Attractive and 1 as Indifferent.

REFERENCES

- [1] Kano, N., Seraku, K., Takahashi, F. and Tsuji, S., "Attractive Quality and Must-Be Quality," *The Journal of Japanese Society for Quality Control*, Vol. 41, No. 2, 1984, pp. 39-48.
- [2] K. Matzler and H. H. Hinterhuber, "How to Make Product Development Projects More Successful by Integrating Kano's Model of Customer Satisfaction into Quality Function Deployment," *Technovation*, Vol. 8, No. 1, 1998, pp. 25-38. doi:10.1016/S0166-4972(97)00072-2
- [3] Yang and C. Chow, "The Refined Kano's Model and Its Application," *Total Quality Management and Business Excellence*, Vol. 16, No. 10, 2005, pp. 1127-1137. doi:10.1080/14783360500235850
- [4] Qingliang Meng, Nongji Zhou, Jian Tian, Yijia Chen, Fen Zhou, "Analysis of Logistics Service Attributes Based on Quantitative Kano Model: A Case Study of Express Delivering Industries in China," *Journal of Service Science and Management*, 2011, 4, 42-51. doi:10.4236/jssm.2011.41007
- [5] J. Fullera and K. Matzlerb, "Virtual Product Experience and Customer Participation-A Chance for Customer-Centred, Really New Products," *Technovation*, Vol. 27, No. 6-7, 2007, pp. 378-387. doi:10.1016/j.technovation.2006.09.005
- [6] C. C. Chen and M. C. Chuang, "Integrating the Kano Model into a Robust Design Approach to Enhance Customer Satisfaction with Product Design," *International Journal of Production Economics*, Vol. 114, No. 2, 2008, pp. 667-681. doi:10.1016/j.ijpe.2008.02.015
- [7] Y. Li, J. Tang, X. Luo, J. Xu, "An Integrated Method of Rough Set, Kano's Model and AHP for Rating Customer Requirements' Final Importance," *Expert Systems with Applications*, Vol. 36, No. 3, 2009, pp. 7045-7053. doi:10.1016/j.eswa.2008.08.036
- [8] T. Gerson, "Integrating the Kano Model and QFD for Designing New Products," *Total Quality Management*, Vol. 18, No. 6, 2007, pp. 599-612. doi:10.1080/14783360701349351
- [9] Y. C. Lee, Liang-Chyau Sheu and Yuan-Gan Tsou, "Quality Function Deployment Implementation Based on Fuzzy Kano Model: An Application in PLM System," *Computers & Industrial Engineering*, Vol. 55, No. 1, 2008, pp. 48-63. doi:10.1016/j.cie.2007.11.014
- [10] Li. H. Chen and W. C. Ko, "A Fuzzy Nonlinear Model for Quality Function Deployment Considering Kano's Concept," *Mathematical and Computer Modelling*, Vol. 48, No. 3, 2008, pp. 581-593. doi:10.1016/j.mcm.2007.06.02
- [11] Mean-Shen Liu, "Using the Refined Kano's Model to Measure University Education Quality: The Case Study on the Department of Food and Beverage Management in Southern Taiwan," *The Business Review*, Cambridge * Vol. 11, Num. 1, 2008, pp.111 -117
- [12] Ya-Ching Yeh, "Evaluating administrative service quality of elementary schools: a case study of remote rural area in Taiwan," *African Journal of Business Management* vol.5(14), 2011, pp.5966-5973
- [13] HAERYIP SIHOMBING, YUHAZRI, M.Y., YAHAYA, S.H., MYIA YUZRINA, Z.A. and AINUL AZNIZA5, A.Z." REVISITED THE IMPORTANCE AND PERFORMANCE ANALYSIS (IPA) AND KANO MODEL FOR CUSTOMER SATISFACTION MEASUREMENT," *GLOBAL ENGINEERS & TECHNOLOGISTS REVIEW*, pp 22-29, 2012
- [14] Parasuraman, A., Zeithaml, A.V. and Berry, L.L., SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality, *Journal of Retailing*, Vol. 64, 1988, pp. 12-40.

- [15] Gronroos, C., "A service quality model and its marketing implications", European Journal of Marketing, Vol. 18 No. 4, 1984, pp. 36-44.
- [16] Parasuraman, A., Zeithaml, V.A. and Berry, L.L., "A conceptual model of service quality and its implications for future research", Journal of Marketing, Vol. 49 No. 3, 1985, pp. 41-50.
- [17] Haryip Siltombing, YUHAZRI, M.Y., YAHAYA, SJI., MYIA YUZRINA, Z.A. and AINUL AZNIZA, A.Z., "Revisited The Importance and Performance Analysis (IPA) and KANO Model for Customer Satisfaction Measurement", Global Engineers & Technologist Review, Vol.2 No.1, 2012, pp. 22-39.
- [18] Parul Gupta, SRIVASTAVA, R.K., "ANALYSIS OF CUSTOMER SATISFACTION OF THE HOTEL INDUSTRY IN INDIA USING KANO MODEL & QFD", INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE & MANAGEMENT, Vol. 2, Issue 1, 2012, pp.74 - 81.
- [19] Matzler, K. and Hinterhuber, H.H., "How to make product development projects more successful by integrating Kano's model of customer satisfaction into quality function deployment", Technovation, Vol. 18, No. 1, 1998, pp. 25-38.

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