2019 IEEE 6th International Conference on Industrial Engineering and Applications

An Application of the Kano Model for Assessing Customer Satisfaction of Hospital Service Quality

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***Abstract*—Customer satisfaction is considered as a main concern and prerequisite for competitiveness in today's global market. Traditional approach views customer satisfaction has a linear relationship with quality attributes. That is, when one certain quality attribute is present then the customers are satisfied; and vice versa. However, the relationship is not that simple; there are some quality attributes that customer satisfaction can be significantly improved with only a small improvement in performance, while for some others, customer satisfaction can only be improved a little even when the performance has been greatly improved. The Kano model had a different approach that views the relationship between customer satisfaction and quality attributes as a two-dimensional term (two-way model). This study aims to assess customer satisfaction using the Kano model. A case study was conducted in a hospital by employing four dimensions comprises twenty attributes. By applying the Kano model, it is expected to provide a strategy for every attribute of service quality in order to pursue customer satisfaction.**

Keywords-customer satisfaction; hospital; service quality; the Kano model

I. INTRODUCTION

In today's highly competitive market, companies are demanded not only to attract new customers, but also to retain existing customers in order to pursue customer loyalty. Several studies have exhibited that customer retention and high loyalty led to an increased intention of future purchase [1], and that customer loyalty is dependent on the customer's perception of the products' quality [2], [3]. Therefore, with the aim to satisfy their customers, companies have to pursue their quality in products.

Several quality management systems, as well as standards (see for example total quality management [4], [5]; and quality management system [6]) have been implemented to attain customer satisfaction [7] in the past two decades. At that time, customer satisfaction has been perceived in one-dimensional terms, i.e., the greater the fulfillment of desired quality attributes, the higher customer would be satisfied; or in other words, the relationship between customer satisfaction and quality attributes are treated as linear. However, there are some quality attributes that fulfill customer expectation to some extent without necessarily implying a higher level of customer satisfaction [8]. Consequently, by using the traditional way to pursue customer satisfaction, it is possible that the customer will not be satisfied with a certain quality attribute, or maybe the customer satisfaction target will be over-fulfilled [9].

A two-way model on quality (called the Kano model) then proposed by [10] to manage the dilemma. The two-way quality was initially used in the development of the manufactured product quality in a survey conducted on TV or decorative clocks. The results showed that users' conception of quality is not one-dimensional but two-dimensional. In this model, quality attributes are classified into five categories, i.e., attractive quality attribute, one-dimensional, must-be, indifferent, and reverse quality attribute (see Section 2 for the detail). Several studies confirmed that the Kano model can help businesses to understand the quality attributes that could satisfy customers and position customers of different segments according to the quality attributes [8], [11].

In this research, we attempted to apply the Kano model to assess customer satisfaction of hospital service quality. As a service provider, the hospital is very crucial to human's health and human's life. With the increase of public awareness of the importance of health care services, it is essential for the community to meet the demand for health care services to support an optimal health system. The customers, i.e., the patients expect the medical staff to give respect, empathy, and attention to them [12]. The directors of the hospitals thus are demanded to understand thoroughly of the ways to achieve customer (or patient) satisfaction that could lead the hospitals more successful [13].

A case study was conducted in "Hospital X" in Indonesia. As a developing country, Indonesia still has a lot of problems related to health care. According to the health system performance index, Indonesia ranks 92 out of 191 countries [14]. Moreover, Indonesia has only 0.3 doctors and 0.6 hospital beds for every 1,000 people [15]. As a comparison in South East Asia countries, Malaysia has 1.3 and 1.9, while Singapore has 2 and 2.1 for the number of doctors and hospital beds for every 1,000 people respectively. There is also a disparity distribution of facilities among provinces and regions. Occasionally, the patients' family members have an issue of health care access, fees, and careless medical personnel. Even the most basic

978-1-7281-0851-3/19/$31.00 ©2019 IEEE

treatments are prohibitively expensive for ordinary people. Training is often hampered by poor facilities, and also medical research is limited as teaching physicians also maintain private practices to serve urban needs and supplement meager salaries [16]. Those aforementioned problems have motivated us to evaluate the hospital service quality to give such an insight for pursuing customer satisfaction.

II. Research Methods

A. Hospital Service Quality Dimensions

There are four dimensions for assessing customer satisfaction of hospital service quality that have been used in this study, namely, human resources, process, infrastructure, and policy [17]–[19]. Those four dimensions comprise six criteria and further are divided into twenty attributes.

The first dimension is human resources (HR) or people. It refers to such an organization that is supported by both medical and non-medical personnel who not only are professional but also have a friendly character. Thus, this dimension consists of two criteria, i.e., professionalism (PR) that discusses the professional side; and empathy (EM) that signifies the friendly character side. The first criterion (PR) is about the technical expertise, competence, amount of training and experience, and also innovations of the medical and non-medical personnel [20]–[23]. It composes of four attributes, i.e., (i) skill (PR1), as the competence of health workers; (ii) experience (PR2), which is the accumulation come into existence step by step; (iii) innovation (PR3) as developing the personnel and hospital services by training and using new technologies; and (iv) physically accessible (PR4), as medical personnel is easily encountered by patients in consultation or other medical treatments. The second criterion (EM) consists of three attributes. The first is caring (EM1) which demonstrates individualized customer service and attention to the patients as well as focus on understanding patients' needs [24]. Manner (EM2) is defined as the attitude of health workers and their abilities to inspire trust and confidence. The last is communication (EM3), which is a transfer of information between health workers and customers, the degree of interaction, and the level of two-way communication.

The second dimension is process (P). It indicates that the organization should have a high response level and be reliable to deliver the promised services. This dimension consists of two criteria, i.e., responsiveness (RS) and reliability (RL). The first criterion of the second dimension is responsiveness (RS), which means a willingness to help customers and provide prompt service accurately and consistently. It comprises four attributes, i.e., (i) timeliness (RS1), (ii) completeness (RS2), (iii) willingness (RS3), and (iv) automatic (RS4). The first (RS1) is the ability to provide operations and the promised service on time. It also refers to the factors involved in arranging to receive medical services, such as appointment waiting lists, waiting time, the ease of changing appointments and hours of operation [20], [21]. Hospitals must also provide prompt service without an appointment in case of emergency. The second (RS2) is the availability of all kind of services at the hospital. Next (RS3) is helping the patients willingly whenever help is needed, listening to the patients' complaints and developing solutions for the needs of customers [21], [25]. The last (RS4) is to provide an automated process by utilizing a system. The second criterion of the second dimension is reliability (RL). It is defined as the ability to perform the promised service dependably and accurately. Accuracy presents information about service in a clear and concise way that the service should be directly concerned with human health. Information accuracy also includes the currency of information presented the hospital like the accuracy of diagnosing of disease, the accuracy of the cost of operations, etc. The image also makes the hospital reliable. The more the hospital creates a good vision to the public, the more credible it will be. Therefore, this criterion has two attributes, i.e., (i) accuracy (RL1), which is providing an accuracy and consistency of the given information and (ii) image (RL2), which is creating a good image for the public.

The third dimension is infrastructure (I), means that the facility should have adequate building and equipment. This dimension only has one criterion, i.e., tangible (TA). It comprises three attributes, namely, (i) building layout (TA1), as the aesthetics and the convenience; (ii) equipment (TA2), which is availability of equipment in the hospital to provide a satisfactory service; and (iii) hygiene (TA3) as hygiene of the hospital and personnel.

The last dimension is policy (PL) that refers to providing assurance for all of the promised services. It is akin to the previous dimension that only has one criterion, i.e., assurance (AS). This refers to knowledge and courtesy of personnel and their ability to inspire trust and confidence. It consists of four attributes, i.e., cost (AS1), which is favorable cost of service to patient; (ii) courtesy (AS2), as courtesy of personnel and their ability to inspire trust and confidence; (iii) compensation (AS3) as providing guarantees to the patients in case of problems; and (iv) standard (AS4), as comply with applicable standards for personnel, processes, and infrastructure that are used (e.g., implementing ISO or hospital accreditation criteria from the Ministry of Health). Those four dimensions were then used to assess customer satisfaction of hospital service quality by employing the Kano model which will be described in the following subsection.

B. The Kano Model

The Kano model that was proposed by [10] is a set of ideas and techniques that help to determine customers' satisfaction with product features. Although it is initially proposed for physical products or goods, however, it has been further developed in the service area, see for example [26]–[29]. In this research, the Kano model was applied in the service area, i.e., to assess the customer satisfaction of hospital service quality.

The model is a two-dimensional state space that maps customer satisfaction and functionality (or service dimension's performance). The vertical axis shows customer satisfaction (also called delight or excitement). It goes from total satisfaction (or delighted) to total dissatisfaction (or

frustrated). The horizontal axis, on the other hand, displays the service performance (also called sophistication and implementation). It represents how much of a given feature the customer gets, or how well the implementation of the service being offered. It goes from no functionality at all (or insufficient amount of the quality) on the left-hand side to best possible implementation (or sufficient amount) on the right-hand side.

The qualities are then classified into five categories. The first is attractive (A) quality (also called exciters or delighters). It means when it presents, the customers will be satisfied; while it does not present, they would still accept without being dissatisfied. The second category is one-dimensional (O) quality. It means when it does present, the customers will be satisfied anyway, yet it depends on the level of the quality: the higher the quality, the higher the level of satisfaction; vice versa. Because of this proportional relation, this attribute is usually called linear. The third category is must-be (M) quality. It means when it does not present, the customers will be dissatisfied since the quality of the attribute is a necessity. In other words, the service providers need to have this attribute, but that will not make the customers more satisfied: they just will not be dissatisfied. The fourth category is indifferent (I) quality. It means that the customers will be indifferent, apathetic when it presents. They do not really care much about this attribute: which the presence (or absence) does not make a real difference in customer's reaction to the service being offered. The last category is reverse (R) quality. It means when it does present, the customer will be dissatisfied; vice versa.

In order to determine the classification of each category of quality attribute, the Kano model employs a structured questionnaire consisting of pairs of functional and dysfunctional questions regarding each quality attribute. Functional questions denote situations in which the questioned attribute is provided sufficiently. Conversely, dysfunctional questions propose conditions that the determined attribute is insufficient. In a traditional Kano questionnaire, respondents have to choose only one of the following options: (1) I dislike it; (2) I accept it; (3) I am neutral; (4) I expect it; and (5) I like it. Those answers are then combined to get one of the previously described categories. Given fact that the respondents are asked from both sides of the same thing, the researcher would be able to tell if someone has not fully understood the questions. This condition might happen when there are "conflicting" responses, such as "I like it" and "I like it" on both sides: it is called questionable (Q), see Table I.

TABLE I. KANO EVALUATION TABLE

		Dysfunctional				
		Dislike	***Live with***	***Do not care***	***Expect it***	***Like it***
Functional	***Dislike***	Q	A	A	A	O
	Live with	R	I	I	I	M
	Do not care	R	I	I	I	M
	Expect it	R	I	I	I	M
	Like it	R	R	R	R	Q

Note: A: Attractive, I: Indifferent, M: Must-be, O: One-dimensional, Q: Questionable, R: Reverse.

C. Customer Satisfaction Index

At the next stage, the customer satisfaction index (CSI) is investigated. The CSI states whether satisfaction can be increased by providing quality attributes, or whether fulfilling quality attributes only prevents the customer from being dissatisfied. A satisfaction increment index (SII) identifies whether the improvement of a specific attribute enhances customer satisfaction [30]. An SII close to 0 is an indication of a quality attribute with the weak positive effect on customer satisfaction; in contrast, an SII close to 1 is an indication of a quality attribute with the relatively strong positive effect on customer satisfaction. In addition, low SII of a quality attribute is not an indication of dissatisfaction. On the other hand, dissatisfaction decrement index (DDI) identifies whether customer satisfaction will be decreased if a certain quality attribute is not provided sufficiently. A DDI close to 0 is an indication of a quality attribute with low effect on customer satisfaction. However, a DDI close to 1 means that the provision of the quality attribute can decrease customer dissatisfaction. Furthermore, a low DDI can dissatisfy customers [30]. SII and DDI can be calculated as follows:

$$SII = (A + O) / (A + O + M + I); \quad (1)$$

$$DDI = – (O + M) / (A + O + M + I). \quad (2)$$

III. RESULT

The objective of this research is to assess the customer satisfaction of hospital service quality using the Kano model and CSI. The object of the research is Hospital X, a public hospital which is located in Semarang, a capital city of Central Java Province, Indonesia. The survey to accomplish the objective of the study composes of three parts. The first section aims to collect demographic data of the respondents. The second and third sections utilize the four dimensions, six criteria, and twenty attributes above-mentioned. The second section is for functional part and the third is for dysfunctional part.

The respondents of this survey were required to be over 16 years old and have been experienced in being treated in Hospital X. The potential participants were first approached and asked if they agreed to participate in the survey. As stated previously, the respondents have to answer the questions by only one of the following options: (1) I dislike it; (2) I accept it; (3) I am neutral; (4) I expect it; and (5) I like it. One hundred and fifty-eight respondents have participated in this survey. They consist of students, employees, entrepreneurs, housewives, etc., indicates plenty of diversity for the purpose of the research. The profile of the respondents is shown in Table II.

TABLE II. PROFILE OF THE RESPONDENTS

Variables		Percentage
Gender	Male	50
	Female	50
Age	16-19	13.92
	20-23	33.54
	24-27	13.29
	> 27	39.24
Employment status	Employees	26.58
	Entrepreneur	10.76
	Housewife	10.76
	Student	44.30
	Freelance	1.90
	Others	5.70
Frequency of being patient	< 1 month	65.19
	1-4 months	14.56
	5-8 months	6.33
	9-12 months	0
	> 1 year	13.92
Frequency of visiting hospital	< 1 month	53.80
	1-4 months	14.56
	5-8 months	4.43
	9-12 months	5.06
	> 1 year	22.15

TABLE III. CRONBACH'S ALPHA FOR EACH DIMENSION

Dimensions	Cronbach's Alpha	
	Functional	*Dysfunctional*
Human resource	0.853	0.882
Process	0.816	0.886
Infrastructure	0.692	0.800
Policy	0.791	0.813

TABLE IV. QUALITY ATTRIBUTE'S CATEGORY

Dimensions	Attributes	Category
Human resource	PR1	O
	PR2	I
	PR3	O
	PR4	O
	EM1	I
	EM2	I
	EM3	I
Process	RS1	I
	RS2	O
	RS3	I
	RS4	I
	RL1	O
	RL2	O
Infrastructure	TA1	O
	TA2	O
	TA3	O
Policy	AS1	I
	AS2	O
	AS3	I
	AS4	O

The reliability test with Cronbach's alpha [31] was conducted to verify if the respondents' answers for any questions tend to relate one and another. The results are shown in Table III. Note that all of the dimensions have the value of Cronbach's alpha more than 0.6, indicated that the questionnaire being utilized is reliable [32].

TABLE V. CUSTOMER SATISFACTION INDEX

Dimensions	Attributes	SII
Human resource	PR1	0.53
	PR2	0.42
	PR3	0.56*
	PR4	0.57*
	EM1	0.46
	EM2	0.46
	EM3	0.51
Process	RS1	0.44
	RS2	0.54
	RS3	0.44
	RS4	0.38
	RL1	0.54
	RL2	0.64*
Infrastructure	TA1	0.55*
	TA2	0.56*
	TA3	0.55*
Policy	AS1	0.37
	AS2	0.51
	AS3	0.40
	AS4	0.50

*top six quality attributes

TABLE VI. CUSTOMER DISSATISFACTION INDEX

Dimensions	Attributes	DDI
Human resource	PR1	-0.47
	PR2	-0.49
	PR3	-0.53
	PR4	-0.55*
	EM1	-0.44
	EM2	-0.46
	EM3	-0.47
Process	RS1	-0.44
	RS2	-0.53
	RS3	-0.49
	RS4	-0.39
	RL1	-0.52
	RL2	-0.63*
Infrastructure	TA1	-0.54*
	TA2	-0.53*
	TA3	-0.56*
Policy	AS1	-0.39
	AS2	-0.57
	AS3	-0.44
	AS4	-0.58*

*top six quality attributes

The result of categorizing the quality attributes is shown in Table IV. Among the twenty service quality attributes, eleven of them are one-dimensional quality attributes (O) and nine of them are indifferent quality attributes (I).

Finally, customer satisfaction index results and customer dissatisfaction index result are shown in Table V and Table VI. Note that the top six quality attributes for each category are identified by the asterisk. In Table V, quality attribute of creating a good image for public (RL2) has the highest value in customer satisfaction index, i.e., 0.64. It means that increasing this attribute would give the greatest impact on customer satisfaction. The quality attribute of physically accessible medical personnel (PR4) has the second highest value, i.e., 0.57, while PR3, i.e., developing the personnel and hospital services by training and using new technologies has the third highest value: 0.56. The least value of customer

satisfaction index is AS1, i.e., favorable cost of service to patient. In Table VI, RL2 is the lowest score in customer dissatisfaction index, i.e., -0.63. The second least score is AS4, i.e., complying with the applicable standards for personnel, processes, and infrastructure (e.g., implementing ISO or hospital accreditation criteria from the Ministry of Health). The third least customer dissatisfaction index score is hygiene of the hospital and personnel (TA3) with the score of -0.56. If those quality attributes are well improved, it is expected that customer dissatisfaction could be minimized.

Through the above method, we can find the increase in satisfaction and decrease in dissatisfaction in the analysis of improvement on certain quality attributes and use the results as a reference for future service improvements. If the important issues can be weighted, it is beneficial to the improvement of service quality.

IV. CONCLUSION

This study employed the Kano model to evaluate customer satisfaction of the hospital service quality. A case study has been performed in Hospital X, located in Indonesia. This study then aims to be able to figure out the quality attributes that could be improved to increase customer satisfaction. The results showed that there are eleven one-dimensional quality attributes (O) and nine indifferent quality attributes (I). The study also revealed what quality attributes that should be prioritized most to get the maximized value of customer satisfaction through the SII and what quality attributes that should be prioritized most to get the minimized value of customer satisfaction through DDI. The method that has been performed can be beneficial for directors of the hospitals to analyze elements of a certain quality. Through such method, we can use the results as a reference in the improvement of hospital service quality in the future.

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