An Exploration of Patient Satisfaction Attributes Using the Kano Model

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Poor quality of care severely impacts patients' quality of life and safety while increasing healthcare costs and patient dissatisfaction. An improved focus on patient needs and satisfaction enables healthcare providers not only to improve the quality, but also empowers them to provide medical care that is safe, effective, patient-centered, timely, efficient, and equitable.[1,2,3,4] In recent years, the application of quality methodologies and tools to improve healthcare processes has begun to expand at an exponential rate. Prior research suggests that healthcare providers could benefit greatly from quality improvement activities focused on patient satisfaction as well as reducing waste and costs while enhancing patient safety and healthcare quality.[5,6,7,8,9]

Two of the goals for healthcare systems are to improve the value provided to patients and increase their satisfaction. Satisfied patients actively engage in monitoring their healthcare outcomes, complete treatment regimens, and tend to be more compliant, which, in turn, reduces avoidable hospital readmissions, and associated costs.[10,11] It, therefore, is important for healthcare systems to evaluate patient satisfaction. The Kano Model is a quality methodology that enables comprehensive insight into the needs through data visualization by identifying the features/attributes of a product/service that have a high impact on patient satisfaction. It makes it possible for healthcare providers to identify, classify, and prioritize complex patient needs as well as establish sustainable quality improvements.[12] The purpose of this article is to illustrate how the Kano Model can be deployed to identify a diverse range of patient needs and convey the benefits of using it for the continuous improvement of the healthcare sector. This case study was conducted

Figure 1: The Kano Model
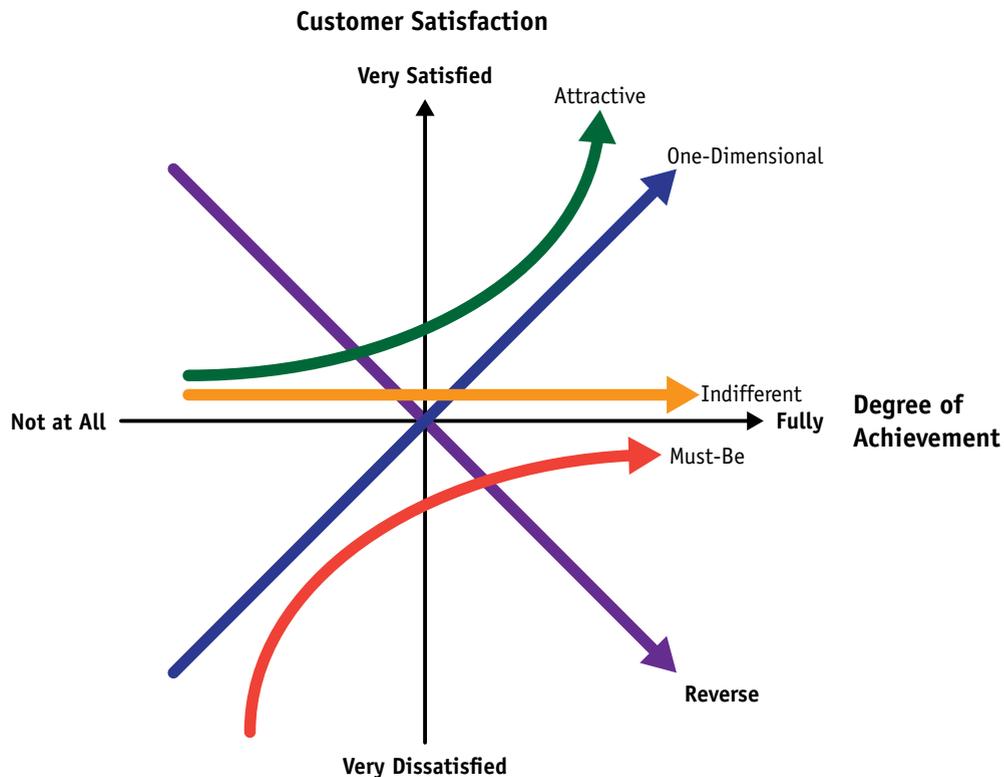
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The Kano Model

Today, organizations maintain ongoing efforts to understand changing customers' perceptions of quality and satisfaction. Traditionally, a one-dimensional model for quality was assumed, suggesting that the degree of customer satisfaction was proportional to the functional performance of a product/service;[13,14] however, researchers later observed that the linearity between customer satisfaction and product/service quality was inaccurate.

The Kano Model was based on the work of Herzberg's two-factor theory, which was developed to understand employees' motivation in the workplace and presumes that the factors (motivators) that cause job satisfaction are different from those (hygiene factors) that cause job dissatisfaction.[15] Noriaki Kano and his colleagues at the Tokyo Rika University in Japan formulated the theory of attractive quality to understand how customers perceive and evaluate product or service quality.

The Kano Model shown in Figure 1[16] offers a theoretical and operative methodology for understanding customer needs and perceptions by providing a visual representation of the relationship between the functional performance of quality attributes and degree of satisfaction they achieve.[17,18,19] It classifies product/service quality attributes into one of the five categories, as follows:

- Must-be (M)—attributes that lead to customer dissatisfaction when the product/service is less functional than customers expect but have no effect on satisfaction when they are fully functional.

- Attractive (A)—attributes that lead to extreme satisfaction when they are present, but are unnoticed when they are absent (so they do not generate dissatisfaction).

- One-dimensional (O)—attributes that have a proportional impact on satisfaction.

- Reverse (R)—these attributes create dissatisfaction when they are present and increase satisfaction when they are absent.

- Indifferent (I)—attributes that do not affect satisfaction or dissatisfaction regardless of their presence or absence.

The Kano Model has been effective not only in eliciting patients' service quality expectations but also in understanding the differences in expectations of patients of different nationalities and cultures.[20] It is important for healthcare providers to include patients in their treatment decisions and explore multiple patient roles such as supplier, product, participant, recipient, and co-designer because these perspectives can give insights into varying patient expectations due to increased patient awareness.[12,21,22]

Methodology

The main objective for this project was to identify patient needs that impact SHS patients' satisfaction and to disseminate the study findings to healthcare providers and department managers. Preliminary information on healthcare statistics for SHS was obtained as a baseline for the 2015 and 2016 school years (sample size of 6,114 distinct undergraduate and graduate school patients with 10,718 appointments). The majority of the services were associated with acute problems, orthopedic care, and injections. An analysis of the baseline data indicated that improvements should focus on wait times in both the exam and waiting rooms. The sample consisted of both U. S. citizens and international students. These findings were used to develop the detailed Kano survey.

The Hospital Consumer Assessment of Healthcare Providers and Systems survey, existing Kano studies from the healthcare sector, and prior SHS satisfaction surveys were explored to identify the questions that would be used to describe service quality features. The Kano survey included demographic questions for gathering specific information about the participants and paired (functional and dysfunctional) questions about the quality features. Note that the Kano survey approach uses paired sets of questions that investigate a single service quality attribute from both the functional and dysfunctional perspective. The functional form of a question investigates how a patient would feel if that attribute were present, and the dysfunctional form explores how a patient would feel if that attribute were absent. Randomization of the order of the questions was used to avoid biased results.

The survey consisted of 42 randomized questions on 21 service quality attributes, six demographic questions, and an additional comments section. The following criteria were used to vet the volunteer survey participants:

- Participants had to be 18 years or older.
- They had to be enrolled at the university at the time the survey was administered.
- They had to have used the services offered by SHS during the enrollment period.

The responses were collected between April and May 2017. The Kano survey examined attributes, such as availability of qualified medical staff, inclusion in the decision-making process, staff friendliness, privacy of the rooms, provision of adequate information on the illness, and the required treatment. The response categories for the Kano questionnaire used the standardized scale shown below, where:

Table 1: Student Demographics

Age	Percent of Total Responses	Gender	Percent of Total Responses	Student	Percent of Total Responses	Health Status	Percent of Total Responses	Number of Visits in Past 12 Months	Percent of Total Responses
18–20	6	Female	39	U. S. citizen	64	Poor	1	0	11
21–23	46	Male	60	International	36	Fair	11	1	21
24–26	24	Prefer not to answer	1			Good	33	2	31
27–29	13					Very good	36	3	16
30 and older	11					Excellent	19	4 or more	20

Table 2: Kano Evaluation Table

Customer Requirements		Dysfunctional Form				
		1. I like it that way	2. It must be that way	3. I am neutral	4. I can live with it that way	5. I dislike it that way
Functional Form	1. I like it that way	Q	A	A	A	O
	2. It must be that way	R	I	I	I	M
	3. I am neutral	R	I	I	I	M
	4. I can live with it that way	R	I	I	I	M
	5. I dislike it that way	R	R	R	R	Q

- A "1" rating represented the perspective, "I like it that way."
- A "2" indicated that the respondent felt the attribute "must be that way."
- A neutral response was equated with a "3" rating.
- A "4" rating was defined as "I can live with it that way."
- A "5" conveyed the perspective, "I dislike it that way."

To obtain the complete set of survey questions and detailed data findings, please contact the authors for additional information (see their email addresses in the biographies at the end of this article).

Results and Statistical Approach

A total of 138 responses was received, and 68 of those responses were excluded due to incomplete survey completion, which made it impossible to correctly analyze those participants' results. Ultimately, a total of 70 completed and anonymous responses were analyzed. After the Kano survey questions were evaluated, the demographic questions' answers were used to identify differences in response patterns across the diverse sample. Table 1 summarizes the demographic results.

The process of analyzing Kano survey data is substantially different than what is used for standard surveys. Each pair of responses (functional and dysfunctional) are compared, and the results of those calculations were tabulated for each attribute, as presented in Table 2.[18] The calculation results are sorted into one of the five categories of perceived quality that were described earlier in this article. Sometimes the responses to the survey questions are not understood by the respondents, and those are not included in any of the five categories.

Once the categorical assignment of the paired questions is completed, several overarching calculations are conducted to improve the interpretation and application of the results.

- *Category strength*—estimated value of the feature, based on its highest-ranked category, which indicates the solidity of the category ranking.
- *Total strength*—estimated value of the feature, based on Attractive (A), One-Dimensional (O), and Must-Be (M) categories, which indicates the overall value of the feature.
- *"Better"*—estimated ability of the feature to create satisfaction, based on the Attractive (A) and One-Dimensional (O) categories, which indicates the potential of the feature to create high value and measures the extent of satisfaction.
- *"Worse"*—estimated value of the feature to create dissatisfaction if it is not included, based on the One-Dimensional (O) and Must-Be (M) categories, which indicates the risk of not including the feature and measures the extent of dissatisfaction.

The 21 service quality attributes that were evaluated in the Kano survey are listed below:

1. Availability of appropriately qualified medical staff within 10 minutes of the check-in process.
2. Inclusion in the decision-making process by the medical staff.
3. Provision of after-hours care by SHS.
4. Patient-friendly design of the SHS facility.
5. Personal privacy of the rooms (consultation, examination rooms, etc.).

Table 3: Evaluation of the Attributes Using the Kano Model

Attribute	Category Totals						Final Category	Category Strength (%)	Total Strength (%)	Better (%)	Worse (%)
	Q	M	O	A	I	R					
1	0	5	18	37	10	0	A	27.1	85.7	78.6	32.9
2	1	14	23	13	17	2	O	8.6	71.4	53.7	55.2
3	1	5	23	27	12	2	A	5.7	78.6	74.6	41.8
4	1	12	35	12	10	0	O	32.9	84.3	68.1	68.1
5	0	12	27	7	24	0	O	4.3	65.7	48.6	55.7
6	1	14	19	18	15	3	O	1.4	72.9	56.1	50
7	0	10	35	16	8	1	O	27.1	87.1	73.9	65.2
8	0	12	26	16	15	1	O	14.3	77.1	60.9	55.1
9	1	19	29	12	8	1	O	14.3	85.7	60.3	70.6
10	1	22	35	2	8	2	O	18.6	84.3	55.2	85.1
11	0	21	33	6	10	0	O	17.1	85.7	55.7	77.1
12	2	9	28	15	15	1	O	18.6	74.3	64.2	55.2
13	1	7	13	8	38	3	I	35.7	40	31.8	30.3
14	1	9	10	13	34	3	I	30	45.7	34.8	28.8
15	1	23	38	2	6	0	O	21.4	90	58	88.4
16	0	15	28	10	16	1	O	17.1	75.7	55.1	62.3
17	1	10	40	11	8	0	O	41.4	87.1	73.9	72.5
18	0	28	35	1	6	0	O	10	91.4	51.4	90
19	1	4	13	19	32	1	I	18.6	51.4	47.1	25
20	0	13	46	5	6	0	O	47.1	91.4	72.9	84.3
21	1	20	40	4	4	1	O	28.6	91.4	64.7	88.2

6. Provision of written communication of treatment delivery by the medical staff.

7. Patient check-in process being easy.

8. Information of staff delays if any occurred during the visit.

9. Provision of correct care on the first examination by the medical staff.

10. Good communication among SHS personnel to assure effective treatment.

11. Provision of clear instructions about follow-up care by SHS personnel.

12. Sympathetic and reassuring behavior of the medical staff.

13. Accommodation of religious restrictions by the SHS personnel when conducting medical care.

14. Accommodation of cultural restrictions by the SHS personnel when conducting medical care.

15. Provision of adequate information about illness and treatments by the medical staff.

16. Provision of complete information regarding the prescribed medications by the SHS personnel.

17. Friendly behavior of the SHS personnel.

18. Medical staff being appropriately qualified to provide care.

19. The SHS personnel inquiring about satisfaction when the care is provided.

20. Medical staff understanding needs and requirements.

21. Feeling confident about the care provided by the medical staff.

The survey respondents categorized 16 service quality attributes as being one-dimensional, three attributes as indifferent, and two as attractive. None of the service quality attributes were categorized as must-be. The students considered the availability

Figure 2: Attributes on the Better-Worse Plot
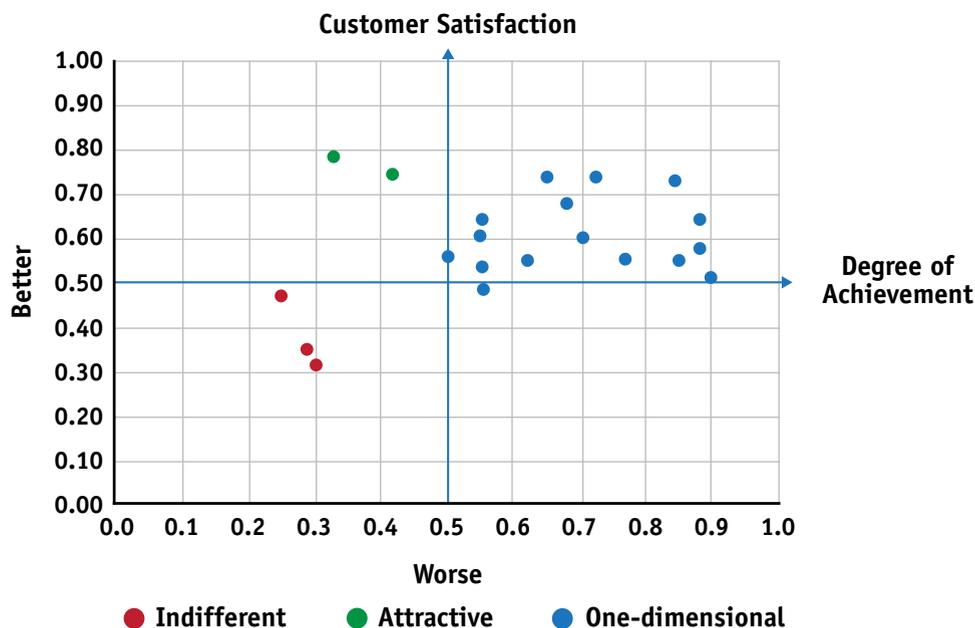
of appropriately qualified medical staff within 10 minutes of the check-in process and provision of after-hours care as attractive quality attributes (see Table 3).

The service quality attributes are presented graphically using the "worse" and "better" values on the X- and Y-axes, respectively. The attributes are represented as points on the graphs. The "better" and "worse" values lie between 0 and 1. A "better" value that is closer to 1 indicates that satisfaction can be improved for the associated attribute if it is provided properly. A large absolute value for "worse" that is closer to 1 indicates that providing that attribute only will prevent dissatisfaction. The values which are close to "0" suggest that the attribute has very little effect on satisfaction or dissatisfaction. Longitudinal and location-oriented analyses can be used to transform the attribute points into lines that make the Kano Model clearer. Such analyses also demonstrate how the values change through time and how locality affects customers' perceptions of quality. Figure 2 presents the attributes on the better-worse plot.

Cronbach's Alpha, a measure of the internal consistency of survey questions was used to determine if the survey findings were reliable. This statistic is expressed as a number between 0 and 1, and a value

of 0.7 is generally considered to be an acceptable reliability co-efficient.[23,24,25] This Kano questionnaire showed strong internal consistency with a Cronbach's α value of 0.91.

The Chi-Square Goodness of Fit Test was used to determine if the tabulated responses represented statistically significant differences. Only when there are statistically significant differences among the Kano category responses can conclusions be made regarding their mean satisfaction to the survey participants.[26] The patients' responses also were evaluated using the Fishers exact value (p) from the X^2 test of independence, which is a statistical significance test used in cases where there are cells with an expected frequency of less than five and with small sample sizes,[27,28] as occurred in this study. This test was utilized to compare the Kano category responses of all the attributes based on their demographic categories. Furthermore, three different measures of effect were used to develop quantitative indexes of the relationships among variables; these calculations are not sensitive to sample sizes.[29,30,31,32]

Here is a summary of those analyses.

- *Gender*—The responses indicated that gender was a statistically significant predictor of respondents' views of the SHS facility being patient-friendly;

however, both male and female patients had similar views regarding their confidence about the care provided by the medical staff, medical staff providing complete information of the prescribed medications, and medical staff being appropriately qualified to provide care. A moderate strength of association was observed for the patient-friendly design of the facility, good communication among the medical staff, and accommodating religious restrictions when providing medical care.

- *Age*—There was no similarity in the Kano category responses regarding the friendliness of the SHS personnel, but there were similarities for the availability of an easy patient check-in process. The attribute's inclusion in the decision-making process indicated a moderate strength of association.

- *Self-reported health status*—There were no similarities with respect to the SHS personnel accommodating cultural restrictions when providing medical care and staff keeping patients informed about the delays during their visit. There was a similarity regarding the provision of complete information for medication prescribed by the SHS personnel. The health status was a statistically significant factor for respondents'

ratings of friendliness of medical staff. Attributes such as privacy of the rooms, provision of written communication of the treatment delivery by medical staff, and accommodating cultural restrictions when providing medical care also showed a moderate strength of association with health status.

- *Residency status*—No similarity was found for the staff keeping patients informed about the delays during their visit, the design of the SHS facility being patient friendly and provision of the after-hours care by the SHS. The Kano category responses for all other attributes exhibited similarity. The provision of after-hours care, patient-friendly design of the facility, and provision of information about the delays during the visit had a moderate strength of association.

Conclusions and Future Research

Quality attributes with strong and moderate levels of association with respect to demographic factors were considered to warrant quality improvement efforts. The Kano survey data will be used by the healthcare providers to improve the service quality of the SHS. There were no must-be quality attributes identified; therefore, the focus will be placed on one-dimensional and attractive attributes to enhance patient satisfaction and gain

patient loyalty. All attributes that exhibited strong association with demographic factors should be considered for improving the design of SHS.

The systematic methodology to identify healthcare needs utilized in this study not only provides information on how to deploy the Kano Model for a specific healthcare service to identify the patient needs, but also on how to validate the reliability of the Kano survey results. In order to improve, SHS should monitor changing patient needs over time and incorporate advancements in healthcare technologies using longitudinal and locational analyses.

The main contribution of this study was the clear implementation of the Kano Model to elicit diverse patient needs associated with the healthcare service and drive its improvement. This study provided information on how to eliminate the gaps identified in earlier research, of generically applying the Kano Model to the entire healthcare system, and using a predetermined service quality scale. Its approach can be applied to other healthcare organizations to identify associated patient needs effectively. It is essential for healthcare providers to apply the Kano Model systematically to understand complex patient needs in order to provide quality patient-oriented services.

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