**How to Cite**:
Santhoshkumar, F., Jeyarajasekar, T., & Kumar, S. A. S. (2022). Kano's model for customer satisfaction analysis of a hospital. *International Journal of Health Sciences*, *6*(S1), 11081–11089. https://doi.org/10.53730/ijhs.v6nS1.7654

# Kano's model for customer satisfaction analysis of a hospital

**Santhoshkumar. F ***
Research Scholar, Department of Management Studies, College, Pondicherry University, Karaikal Campus
*Corresponding author

**Prof. Dr. T. Jeyarajasekar**
Principal, College of Hospital Administration, Dr.Somervell Memorial C.S.I, Medical, Karakonam, Thiruvananthapuram – 695 504

**Dr. S. A. Senthil Kumar**
Professor & Head in the Department of Management Studies, Pondicherry University, Karaikal Campus

***Abstract*---**The Kano model is a hypothesis for service improvement and consumer satisfaction created during the 1980s by Professor Noriaki Kano, a student of Kaoru Ishikawa. The improvement of the Kano model emerged from a logical study exploring the differing meanings of product/service value and their importance. From this study came the acknowledgment of two important parts of value—objective (actual satisfaction or consistence with particulars) and subjective (end-client fulfilment) — just as, their relations. Next five wide characterizations of value components were characterized that mirrored the client experience: 1) Attractive Quality Elements: Elements that when fulfilled provide satisfaction but are OK for the customer when not fulfilled; 2) One-Dimensional Quality Elements: Elements that result in satisfaction when fulfilled and dissatisfaction when not fulfilled; 3) Must-Be Quality Elements: Elements that are absolutely expected but result in dissatisfaction when not fulfilled. During the study, the first three classifications were seen to be the most common scenarios but the below were also found to be possible. 1) Indifferent Quality Elements: Attributes that neither satisfaction in fulfilment or disappointment, whether or not they are satisfied. 2) Reverse Quality Elements: Attributes bring about disappointment when satisfied and fulfilment when not satisfied.

***Keywords*---** Kano model, Quality, product/service.

**Introduction**

Learning patient needs and their perception is the basic need to achieve their satisfaction (Shen et al., 2000). A trouble emerges from the various suspicions about linearity of relationship between quality and consumer satisfaction. Conventional techniques accept a straight relationship which can be clarified as: the more the service level expands, the more consumer satisfaction is accomplished (Busacca, et al 2005; Huiskonen et al, 1998). Notwithstanding, an expanding number of analysts under the initiative of Kano et al. (Kano et al, 1984) negate the possibility of a straight and symmetric relationship and mention that at times this relationship may likewise show a non-direct relations. In this way, Kano arranged the help quality attributes as per their consequences on consumer satisfaction. Such a methodology gives a fundamental manual for vital and strategic choices made by organizations to accomplish consumer satisfaction (Huiskonen, 1198).

By the patient's opinion using the application of Kano's model the hospital quality attributes are classified into four classifications - "Attractive", "One dimensional", "Must be" and "Indifferent" is the target of this research (Kano et al, 1984). When 'customer satisfaction coefficient' of Matzler and Hinterhuber (Matzler, and Hinterhuber, 1998) is applied in the healthcare systems will be additionally measured to develop consumer satisfaction framework to assess satisfied and unfilled expectations.

As a quality device, Kano model helps in arranging and targeting customer requirements. It explains the stochastic connection between the 'service attributes' and 'patient satisfaction' (Kano et al, 1984). These service attributes are divided as follow (Figure.1):

(1) *Must_Be* attributes - Dissatisfaction when the attributes are not fulfilled;
(2) *One_dimensional* - Satisfied due to linear increment when these attributes are better fulfilled;
(3) *Attractive* attributes – Excited when the service attributes are usually unexpected by the customers.
(4) *Indifferent* attributes – Dislike by the customers.

Based upon the patient needs the hospital service attributes are classified and identified by applying Kano's model.

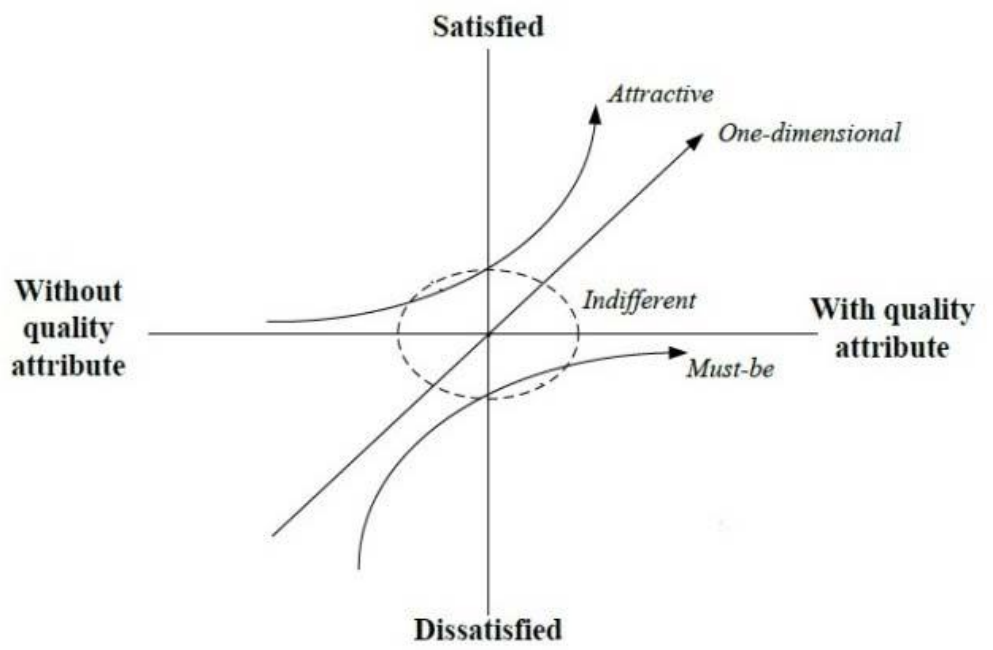


Figure.1 'Quality attributes' and 'customer satisfaction' curves of 'Kano model'
Source: N. Kano et al., "Attractive quality and must-be quality"

**Research Methodology**

Pandian Hospital is a hundred bedded cardiac hospital in Madurai situated in Tamilnadu, India is the study unit for this analysis. This empirical study is having the primary objectives of sorting the quality attributes of Pandian hospital and build patient satisfaction matrix using Kano model.

Pandian Hospital's Outpatient is the universe of the study and 200 samples were selected from this universe. Data were collected by using a questionnaire. The questionnaire consists of 25 attributes and each attribute is having two simple questions. Questions for feature present attributes are asked in a positive way and the questions for feature absent attributes are asked in a negative way. Outpatients were asked to respond with one of the following: 'Like It' / 'Expect It' / 'Don't Care' / 'Live With' / 'Dislike It' (Matzler et al, 1998).

For testing the content validity scale, managing director and administrator of Pandian hospital were interviewed independently. Fifteen (samples) outpatients were used for pre-testing of the scale.

Table 1
Quality Attributes for Pandian Hospital

| No. | Attributes |
|---|---|
| Tangibles | |
| TA1 | Equipment Utilisation. |
| TA2 | State of art Physical facilities. |

| | |
|---|---|
| TA3 | Employee's appearance (Uniform). |
| TA4 | Visual representation of service. |
| TA5 | Clean and safety environment of the hospital. |
| Reliability | |
| RL1 | Service at time. |
| RL2 | Prompt delivery of service. |
| RL3 | Accurate records. |
| RL4 | Right services at beginning |
| Responsive | |
| RE1 | Helping patients. |
| RE2 | Responding patient call. |
| RE3 | Involvement in patient problem solving. |
| RE4 | Compassionate ways in solving patient problems. |
| RE5 | Telling patients about services. |
| RE6 | Prompt performance of all services. |
| Assurance | |
| AS1 | Safety aspects of Patient-Employee interaction. |
| AS2 | Knowledge to clarify patient's queries. |
| AS3 | Employee's politeness. |
| AS4 | Employer support for Employees. |
| AS5 | Instilling confidence. |
| Empathy | |
| EM1 | Personal heed of the patients. |
| EM2 | Handling with patients in caring manner. |
| EM3 | 24X7 service delivery. |
| EM4 | Comfortable visiting hours. |
| EM5 | Understanding customer requirement |

Source: Primary Data

The questionnaire is circulated with 200 outpatients, and the answers for each positive and negative question are plotted in the following Kano's evaluation table (Berger et al, 1993). The opinion of the patients towards the service attributes are shown in Table II. (Xu et al, 2009; Lin et al, 2010). If the patient answers for an attribute, for example, "Don't Care" for the functional aspect and "Live With" for the for the dysfunctional aspect then the result of the combination for that question is "IT", pointing that particular attribute is reverse (against) to the customer needs.

Table 2
Presence and Absence of feature for quality attributes

| | | Dysfunctional | | | | |
|---|---|---|---|---|---|---|
| | | Like It | Expect It | Don't Care | Live With | Dislike It |
| Functional | Like It | QE | AE | AE | AE | OD |
| | Expect It | RE | IT | IT | IT | ME |
| | Don't Care | RE | IT | IT | IT | ME |
| | Live With | RE | IT | IT | IT | ME |
| | Dislike It | RE | RE | RE | RE | QE |

Note: QE, AE, RE, IT, OD, and ME denote “Questionable”, “Attractive”, “Reverse”, “Indifferent”, “One-dimensional”, and “Must-be” quality attributes.
Source: “Thoughts on Graphical and Continuous Analysis”, William DuMouchel

To find out the correlation between the service attribute and patient satisfaction the customer satisfaction coefficients as shown below is applied. “Better” and “Worse” values that calculated, in numbers, how patient’s ‘satisfaction or dissatisfaction’ would change by the ‘presence/absence’ of a feature (Mike Timko, 1993). Better to understand how strongly a service factors may affect patient fulfilment or, in the case of its dissatisfaction, patient unfilled needs. The ‘satisfaction coefficient’ (CC) value ranges from zero to one. When SC is nearly one, it is interpreting as the attribute’s service quality is having great influence on patient satisfaction. Vice versa, if the dissatisfaction coefficient (DC) value is nearly to one, patient dissatisfaction is influencing with the respective quality attribute. When the value is 0 the quality of the attribute has the less correlation with satisfaction (Matzler, and Hinterhuber, 1998). It means that the particular attribute is not influenced by the patient’s satisfaction or their dissatisfaction.

$$CC = \frac{AE+OD}{AE+OD+ME+IT}$$

$$DC \quad \frac{OD+ME}{AE+OD+ME+IT}$$

**Data analysis**

Response we got from respondents about the service quality attributes were analyzed through frequency analysis. In service attribute, among ME, OD, AE and IT which is having the maximum frequency is termed as identifier (Table 3). Cronbach’s coefficient is used to test the consistency of the questionnaire. The coefficient value is 0.812 and that is more than the standard value of 0.7 (Forsman, 1996). So the questionnaire used for this study is having high reliability and acceptable for analysis. The CC and DC values of Pandian Hospital are exhibited in Table 3.

Table 3
Attribute values of Pandian Hospital based on KANO’s model

| Attribute | ME | OD | AE | IT | Class | CC | DC |
|---|---|---|---|---|---|---|---|
| TA1 | 9.25% | 20.75% | 17.70% | 52.30% | IT | 0.38 | 0.3 |
| TA2 | 14.30% | 15.70% | 29.25% | 40.75% | IT | 0.45 | 0.3 |
| TA3 | 18.50% | 25.50% | 17.70% | 38.30% | IT | 0.43 | 0.44 |
| TA4 | 10.30% | 28.30% | 9.50% | 51.90% | IT | 0.38 | 0.39 |
| TA5 | 9.75% | 46.25% | 24.00% | 20.00% | OD | 0.71 | 0.56 |
| RL1 | 5.25% | 55.00% | 20.00% | 19.75% | OD | 0.75 | 0.6 |
| RL2 | 13.00% | 35.00% | 31.25% | 20.75% | OD | 0.66 | 0.48 |
| RL3 | 37.50% | 27.25% | 25.00% | 10.25% | ME | 0.52 | 0.65 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RL4 | 10.75% | 47.00% | 34.00% | 8.25% | OD | 0.81 | 0.58 |
| RE1 | 8.50% | 21.00% | 15.50% | 55.00% | IT | 0.37 | 0.30 |
| RE2 | 10.25% | 22.00% | 39.00% | 28.75% | AE | 0.61 | 0.32 |
| RE3 | 22.00% | 25.00% | 20.75% | 32.25% | IT | 0.46 | 0.47 |
| RE4 | 20.00% | 14.00% | 26.00% | 40.00% | IT | 0.40 | 0.37 |
| RE5 | 21.75% | 25.00% | 33.25% | 20.00% | AE | 0.58 | 0.47 |
| RE6 | 20.50% | 24.75% | 42.00% | 12.75% | AE | 0.67 | 0.45 |
| AS1 | 13.75% | 29.25% | 11.00% | 46.00% | IT | 0.40 | 0.43 |
| AS2 | 19.00% | 24.25% | 40.75% | 16.00% | AE | 0.65 | 0.43 |
| AS3 | 16.00% | 53.75% | 16.25% | 14.00% | OD | 0.7 | 0.7 |
| AS4 | 13.00% | 21.25% | 21.00% | 44.75% | IT | 0.42 | 0.34 |
| AS5 | 26.00% | 20.50% | 20.75% | 32.75% | IT | 0.41 | 0.47 |
| EM1 | 17.75% | 43.25% | 22.25% | 16.75% | OD | 0.66 | 0.61 |
| EM2 | 15.00% | 21.00% | 24.25% | 39.75% | IT | 0.45 | 0.36 |
| EM3 | 14.00% | 14.50% | 61.00% | 10.50% | AE | 0.76 | 0.29 |
| EM4 | 23.25% | 11.00% | 45.75% | 20.00% | AE | 0.57 | 0.34 |
| EM5 | 23.50% | 25.00% | 22.50% | 29.00% | IT | 0.48 | 0.49 |

Source: Primary data

**Result Intrepretation**

Based on the Table.3, the patient satisfaction and their preference of Pandian Hospital are discussed below.

***OPD services requirement for Pandian Hospital***

According to the Table.3, Out of 25 attributes RE 2, RE 5, RE 6, AS 2, EM 3, and EM 4 are classified as "*attractive*". These factors unveil that they are express and satisfying the patient prerequisites prompts more than satisfaction. On the off chance that it will be negative, notwithstanding, there is no variation in satisfaction level. Patients have a personal information on these attributes may be the purpose behind that. Patient can in any case discover other elective answers for satisfy their prerequisites without these attributes.

Twelve (TA1, TA2, TA3, TA4, RE1, RE3, RE4, AS1, AS4, AS5, EM2, and EM5) are classified as "*indifferent.* The advantages and focal points of these factors are not effectively seen by clients, and in this manner these attributes won't make any influence in customer satisfaction or dissatisfaction.

Six service quality attributes (TA5, RL1, RL2, RL4, AS3, and EM1) have been categorized as "*onedimensional*". Be that as it may, there is only one service factor is classified as "must-be". This result is similar to other investigations. None of the 19 service factors had a spot in "must-be" of Pawitra and Tan's research (Pawitra, and Tan, 2003). Additionally, Chen and Su expressed that none of the 29 factors could be in this "must-be" class (Chen, and Su, 2013). In any case, offering patients "must-be" or perceived service factors won't be sufficient for 'patient satisfaction' in the present contemporary world (Shen, Tan, and Xie, 2000).

***Customer Satisfaction Matrix***

In light of the idea of CC, a patient satisfaction framework can be created quantitatively to exhibit the need of implementing these attributes of the hospital. This framework matrix portrayed in Figure.2, is included four quadrants with a X-axis, addressing the patient satisfaction, and a Y-axis, addressing the degree of dissatisfaction.

The mean value of the CC and DC divide the matrix into four quadrants. Factors situated in the quadrant I need effective policies and these policies implemented in the first stage to improve patient satisfaction. Policies for the factors in the quadrant III, in actuality, could be suspended because of their low effect on consumer fulfilment and dissatisfaction. Thinking about the productivity in resource allocation, top management can choose whether they might want to put resources into the factors situated in quadrant II and IV, since these policies can just improve either consumer fulfilment or patient's dissatisfaction and don't have a lot of impact upon the outcome.

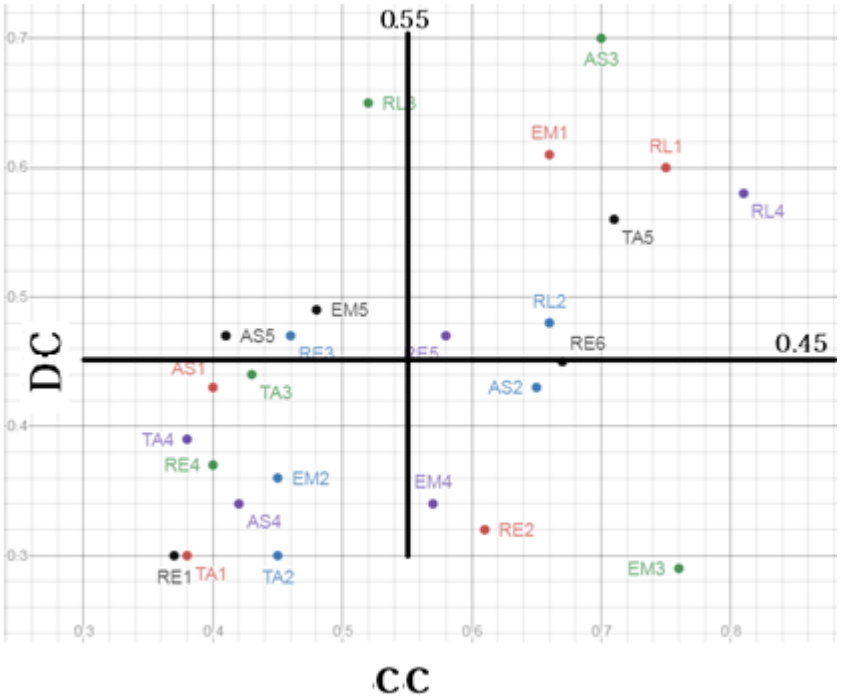


Figure. 2 Patient satisfaction Matrix
Source: Primary data

Figure.2 explains that the importance will be given to the factors of “TA5 Clean and safety environment of the hospital”, “RL1 Service at time”, “RL2 Prompt delivery of Service”, “RL4 Right services at beginning”, “RE5 Telling patients about services”, “RE6 Prompt performance of all services”, “AS3 Employee’s politeness”, and “EM1 Personal heed of patients” for advancement and betterment.

## Conclusion

This research endeavours to apply a Kano two-dimensional quality model to categorize conceivable healthcare attributes and embrace the patient satisfaction coefficient to quantitatively assess the satisfaction and the policies of proficient healthcare providers and patients.

The effects of the Kano model and patient satisfaction framework show that 10 quality factors have got preference to imply. This will make more elevated level of consumer loyalty. In this way, Pandian hospital has to target in these factors which have the best impact on consumer loyalty.

This is the initial move towards an effective execution of these attributes by finding out about the market requirements and patient's adequacy. The research result further demonstrates that the proposed approach could be a helpful device to develop a communication framework for reducing the gap among healthcare providers and patients.

## References


1. Berger, Blauth, C. Bolster, G. Burchill, W. DuMouchel, F. Pouliot, R.Richter, A. Rubinoff, D. Shen, M. Timko, and D. Walden, “Kano’smethods for understanding customerdefined quality”, The Center for Quality Management Journal, Vol. 2, No. 4, pp. 3-36, 1993.
2. J. Huiskonen, and T. Pirttila, ‘Sharpening logistics customer service strategy planning by applying Kano’s quality element classification’, International Journal of ProductionEconomics, Vol. 56-57, pp. 253-60, 1998.
3. K. Matzler, and H.H. Hinterhuber, “How to make product development projects more successful by integrating Kano’s model of customer satisfaction into quality functiondeployment”, Technovation, Vol. 18, No. 1, pp. 25-38, 1998.
4. Mike Timko, “An Experiment in Continuous Analysis” on “Kano’s Methods for Understanding Customer-defined Quality”, Center for Quality of Management Journal, Fall 1993
5. N. Kano, K. Seraku, F. Takahaski, and S. Tsuji, “Attractive quality and must-be quality”, Hinshitsu (Quality, The Journal of The Japanese Society for Quality Control), Vol. 14, No. 2, pp. 39-48, 1984.
6. Kumar, S. (2022). A quest for sustainium (sustainability Premium): review of sustainable bonds. Academy of Accounting and Financial Studies Journal, Vol. 26, no.2, pp. 1-18
7. Allugunti, V.R. (2019). Diabetes Kaggle Dataset Adequacy Scrutiny using Factor Exploration and Correlation. International Journal of Recent Technology and Engineering, Volume-8, Issue-1S4, pp 1105-1110.
8. Viswanatha KKRC, Reddy A, Elango N M (2019). Diabetes Kaggle Dataset Adequacy Scrutiny using Factor Exploration and Correlation, *International Journal of Recent Technology and Engineering (IJRTE)* Vol. 8.
9. Q. Xu, R. J. Jiao, X. Yang, M. Helander, H. M. Khalid, and A. Opperud, “An analytical Kano model for customer need analysis”, Design Studies, Vol. 30, No. 1, pp. 87-110, 2009.

10. R.W. Forsman, "Why is the laboratory an afterthought for managed care organizations", Clinical Chemisty, Vol. 42, No. 5, pp. 813-16, 1996.
11. S. P. Lin, C. L. Yang, Y. H. Chan, and C. Sheu, “Refining Kano's quality attributes–satisfaction' model: A moderated regression approach”, International Journal of Production Economics, Vol. 126, No. 2, pp. 255-263, 2010.
12. T.A. Pawitra, and K.C. Tan, “Tourist satisfaction in Singapore- a perspective from Indonesian tourists”, Managing Service Quality, Vol.13, No. 5, pp. 339-411, 2003
13. William DuMouchel, “Thoughts on Graphical and Continuous Analysis” on “Kano’s Methods for Understanding Customer-defined Quality”, Center for Quality of Management Journal, Fall 1993
14. X.X. Shen, K.C. Tan, and M. Xie, ‘An integrated approach to innovative product development using Kano’s model and QFD’, European Journal of Innovation Management,Vol. 3, No. 2, pp. 91-9, 2000.
15. Y.H. Chen, and C.T. Su, “A Kano-CKM model for customer knowledge discovery”, Total Quality Management, Vol. 17, No. 5, pp. 589-608, 2006.