

## The Analysis Satisfaction of Water Services Using Kano Model in PDAM Tirtawening Bandung West Region

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**Abstract:** The quality of services provided by the company is the most important yardstick for measuring customer satisfaction. PDAM Tirtawening Bandung City West area is one of the local state-owned units engaged in the distribution of clean water. The study was conducted using a model of Kano to categorize how well the attributes of the service are able to meet customers satisfaction. The results from this study indicate that there are three categories of Kano that Must be, one dimensional and indifferent on the attributes of service and are dominated by mustbe category. These attributes indicate the wishes of the customer service PDAM tirtawening Bandung City West region has been met but the levels of satisfaction of these attributes are still low is seen in 13 attributes are below the value of 0.5 of the range of 0-1 and only an attribute is above 0.5. It is an indicator that the attribute-value customer satisfaction PDAM tirtawening Bandung City West region attributes must be enhanced by improving service of these attributes.

**Key words:** Consumer desire, Kano Model, customer satisfaction, quality of services, clean water

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### INTRODUCTION

The role of water is essential to people's lives paced city complex to meet one of the basic needs of society, so that, all the activity's residents can walk safely, comfortably, smooth and healthy. In order to achieve the needs of the city, the course should provide the infrastructure that supports the main needs of urban life, namely, covering water supply lines, sewerage, waste disposal or waste treatment. PDAM Tirtawening Bandung is one business unit belongs to the region engaged in the distribution of clean water. PDAM Tirtawening strove to provide services that meet the needs of clean water for the survival of people in Bandung. The type of service in PDAM Bandung Tirtawening such customer service, engineering services, water supplies network, sewage network, service tanks and bottled drinking water services. PDAM Tirtawening Bandung is one business unit belongs to the region engaged in the distribution of clean water. PDAM Tirtawening strove to provide services that meet the needs of clean water for the survival of people in Bandung. The type of service in PDAM Tirtawening Bandung such, customer service, engineering services, water supplies network, sewage network, service tanks and bottled drinking water services.

Research in PDAM Tirtawening Bandung done for the West region, because the West offices have been moved and separated from the central service office then it need to know the desire and customer satisfaction to service existing Bandung West Region office services to minimize customer dissatisfaction.

In an effort to meet the wishes of customers, the service office the West should identify the attributes of services that can affect customer satisfaction based on interviews and observations, in order to know the desires of a diverse customer and service attributes that should be prioritized to improve customer satisfaction of service and continuously can constantly make improvements to the viability of the company.

The model used for this study is Kano *et al.* (1984) and Kano (1993), a method that aims to categorize the attributes of a product/service based on how well the products/services capable of satisfying the customer, this research gave the title of "The Analysis Satisfaction Of Water Services Using Kano Model In PDAM Tirtawening Bandung West Region."

### Literature review

**Kano Model:** Dr. Noriaki Kano of Tokyo Rico University developed a method of Kano *et al.* (1984). The Kano is a method that aims to categorize the attributes of a product or service based on how well the attributes capable of satisfying customer needed (Wijaya, 2011; Intan, 2016; Luekveerawattana, 2016; Visser, 2016; Kuo and Chen, 2015). Ignorance of the categories of service attributes can lead to negative consequences to the company.

Providers of products or services are not aware that it was different consumer desires. It should be noted also that the categories of customers will not be fixed throughout the life. In the method of Kano, the category of a product can be distinguished.

**Must-be or basic needs or threshold:** Customers are not satisfied if the performance of the attribute in question is low. However, customer satisfaction will not rise much above neutral despite the high performance of these attributes.

**One-dimensional or performance needs or linear:** The level of customer satisfaction is linearly related to the performance attributes so that the high-performance attributes that will lead to high customer satisfaction as well.

**Attractive or excitement needs or delighters:** The level of customer satisfaction will increase greatly with rising performance attributes. However, the decline in performance attributes will not cause a decrease in the level of satisfaction.

Reverse when the level of customer satisfaction is inversely proportional to the results of performance attributes, questionable result if the level of customer satisfaction cannot be defined (there is a contradiction in the answers to the customer) or Indifferent if the customer satisfaction level has no effect on the results of performance attributes.

Customer categories above will change in accordance with the time. Having regard to the Kano Model requires companies to create products/innovative services to attract customers attention over the must-be and one dimensional. The strategy to be the adopted company is producing products/services that have attractive quality. This strategy requires the company pay attention to how to create an attractive quality into the process of developing new product/service.

### Research steps using Kano Model:

**Step 1:** Perform observations and interviews with customer taps and then identify the wishes of the customer.

**Step 2 (make Kano questionnaire):** Questionnaires In making that calculation using the Kano Model, the nature of the questionnaire is anyone question has two parts, namely functional and dysfunctional.

- I like it that way
- It must be that way
- I am neutral
- I can live with it that way
- I dislike it that way

In making questions that have been tested beforehand validity and reliability. The fifth variable in Kano including likert scale, because it has a gradient from very positive to very negative. For each variable is given

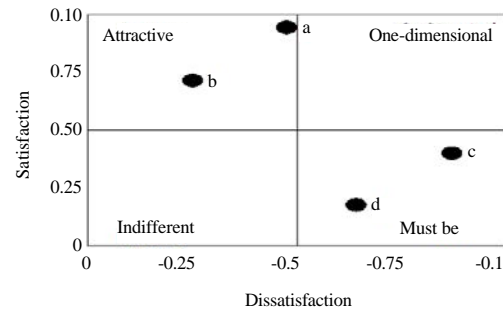


Fig. 1: Positioning attributes

Table 1: Kano model evaluation

	Dysfunctional (negative) question				
	Like	Must be	Netral	Live with	Dislike
<b>Functional (Positif) question</b>					
Like	Q	A	A	A	O
Must be	R	I	I	I	M
Netral	R	I	I	I	M
Live with	R	I	I	I	M
Dislike	R	R	R	R	Q

A: Attractive; R: Reverse; M: Must-be; Q: Questionable; O: One Dimensional; I: Indifferent

a score in data processing but follow the steps according to the Kano model evaluation table by using Kano in Table 1.

**Step 3:** Processing the results of questionnaire answers by using tabulation of surveys to process the results evaluation table answer, Kano.

**Step 4:** Analyze the results from the process. Steps were taken by positioning each attribute query. In charging Kano evaluation tables are a pair of questions that is functional and dysfunctional question, an example of charging in the evaluation table is as follows: if the column functional questions, question respondents gave answers 1. Like and column Dysfunctional questions, question respondents gave answers 3. Neutral, then add the category A, M, O, I, R, Q on the answers of 100 respondents in each service attribute. Then determine grade to look at each attribute which categories are more numerous then used grade (Fig. 1).

After that evaluation of response processing Table 2 is a attractive positioning attributes into a scatter diagram to fit the model of Kano to position the attributes required an average of satisfaction and dissatisfaction of each attribute with the equation is:

### Extent of satisfaction:

$$SI = \frac{A+O}{A+O+M+I}$$

Table 2: Tabulation of survey

Atribute	A	M	O	I	Q	R	Total	Grade
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Tabel 3: Customer satisfaction index

Atribut	Functional (F)	Disfunctional (D)	Skor (FX D)
1			
2			
Score total	Total (I) = (y)		Total (S) = (T)

#### Extent of dissatisfaction:

$$DI = \frac{O+M}{(A+O+M+I) (-1)}$$

**Customer satisfaction index:** Customer Satisfaction Index (CSI) is a quantitative analysis of the form of the percentage of satisfied customers in a customer satisfaction survey. CSI is required to determine the level of overall customer satisfaction by observing the degree of importance of the attributes-attributes for the product or service. Overall CSI calculation is illustrated in Table 3. The value of average on columns Satisfaction (SI) is summed to obtain Y and also the product of (SI) with (DI) in the Scoring column (S) are summed and obtained T. CSI obtained from the calculation  $(T/5Y) \times 100\%$ . A score of 5 (on 5Y) is the value used is based on a Likert scale there is five scale measurement.

## MATERIALS AND METHODS

**Research model:** Initial data collection to establish a questionnaire was conducted with interviews with PDAM Tirtawening and distributing questionnaires to consumers. Questionnaires were distributed to consumers who there is an office in Tirtawening PDAM Bandung West region, a total of 100 respondents.

Data retrieved data from interviews with service PDAM Tirtawening West region as well as data derived from consumers who came to PDAM office. The

Table 4: Service attributes

Dimension	Attribute	Item questionnaire
Tangible	Place or room services clean and safe	1
	Place for payment of bills easily accessible	2
	Provided chairs, tables and media information can be read	3
Reliability	Demand for new connection requests quickly responded	4
	The procedure for installing new connections easily and quickly	5
	Charge for new connections or repair is appropriate	6
	Officers conduct periodic checks on the appliance	7
Responsiveness	Service personnel Ready and alert to serving consumers	8
	The officer noted ready to serve consumer questions	9
Assurance	Good water quality for customer	10
	Water continuously for 24 hours	11
Emphaty	Broken tools will be repaired or replaced	12
	The officer could explain and convey information clearly	13
	Officers listen and record customer complaints and can communicate well	14

sampling technique used is the technique of random sampling using sample techniques deliberate manner in which this technique is used when selecting the sample members committed against persons or objects that happen to be there or encountered. To make the questionnaire used 14 attributes of the five dimensions of service, it be shown in Table 4.

The questionnaire will be distributed has a special shape. This form is adapted to the method introduced by Kano where each question contains the same components of the answer choices. Every question asked twice to respondents where the first question is positive and the second negative (opposite).

Table 5: Questionnaire of kano

Dimension/functional	Scale					Dimension/dysfunctional	Scale				
	L	M	N	LD	D		L	M	N	LD	D
<b>Tangible</b>											
Place or room service clean and save						There is no place or room services clean and safe					
Place for payment of bills easily accessible						There is no place for payment of bills easily accessible					
Provided chairs, tables and media information can be used						No provided chairs, tables and media information can be read					
<b>Reliability</b>											
Demand for new connection requests quickly responded						Demand for new connection requests quickly no responded					
The procedure for installing new connection easily and quickly						The procedure for installing new connection no easily and quickly					
Charge for new connection requests or repair is appropriate						Charge for new connection requests or repair is no is appropriate					
Officers conduct periodic checks on the appliance						Officers conduct not periodic checks on the appliance					
<b>Responsiveness</b>											
Service personnel ready and alert to serving consumers						Service personnel not ready and alert to serving consumers					
The officer noted ready to serve consumer questions						The officer not noted ready to serve consumer questions					
<b>Assurance</b>											
Good water quality for customer						No good water quality for customer					
Water continuously for 24 h						Water not continuously for 24 h					
Broken tools will be repaired or replaced						Broken tools will be not repaired or replaced					
<b>Emphaty</b>											
The officer could explain and convey information clearly						The officer could not explain and convey information clearly					
Officers listen and record customer complaints and can communicate well						Officers listen and record customer complaints and can not communicate well					

**For example:**

- Positive; What if facility of A is available?
- Negative; What if facility of A is not available?

Two answers to the question of positive and negative is then combined in the evaluation table so the service attributes can be classified (Table 5).

**RESULTS AND DISCUSSION**

**Data analysis:** Data collection phase of observation and interviews with relevant parties both with companies and with consumers and are also distributing questionnaires to PDAM customers. Sample research includes a number of respondents to the equation, Slovin. To measure and analyze customer satisfaction used method of Kano in 5 steps (Table 6-7).

**Step 1:** Identification of the customer's wishe.

**Step 2:** Make Kano questionnaire and after the quesonares filled out then carried out an evaluation of Kano.

**Step 3:** Entering into the Survey Tabulation of results of the questionnaire. Then calculate the value of extents Satisfaction dan extent of dissatisfaction.

**Step 4:** Positioning the attribute.

Table 6: Tabulation of survey

Atribut	A	M	O	I	Q	R	Total	Grade
1	21	35	39	5	-	-	100	O
2	19	43	16	22	-	-	100	M
3	20	45	19	16	-	-	100	M
4	18	33	8	41	-	-	100	I
5	17	39	6	38	-	-	100	M
6	20	43	27	10	-	-	100	M
7	24	32	9	35	-	-	100	I
8	12	42	12	34	-	-	100	M
9	13	44	15	28	-	-	100	M
10	19	37	20	24	-	-	100	M
11	20	36	18	26	-	-	100	M
12	22	31	19	28	-	-	100	M
13	15	44	27	14	-	-	100	M
14	8	57	26	9	-	-	100	M

Table 7: The value extent of satisfactionand dissatisfaction

Atribut	A	M	O	I	O	R	Total	SI	DI
1	21	35	39	5	-	-	100	0.60	-0.74
2	19	43	16	22	-	-	100	0.35	-0.59
3	20	45	19	16	-	-	100	0.39	-0.64
4	18	33	8	41	-	-	100	0.26	-0.41
5	17	39	6	38	-	-	100	0.23	-0.45
6	20	43	27	10	-	-	100	0.47	-0.70
7	24	32	9	35	-	-	100	0.33	-0.41
8	12	42	12	34	-	-	100	0.24	-0.54
9	13	44	15	28	-	-	100	0.28	-0.59
10	19	37	20	24	-	-	100	0.39	-0.57
11	20	36	18	26	-	-	100	0.38	-0.54
12	22	31	19	28	-	-	100	0.41	-0.50
13	15	44	27	14	-	-	100	0.42	-0.71
14	8	57	26	9	-	-	100	0.34	-0.81

**Step 5:** Classify attributes into category's Kano. The minus sign with the value of DI (from the range-1 -0) states

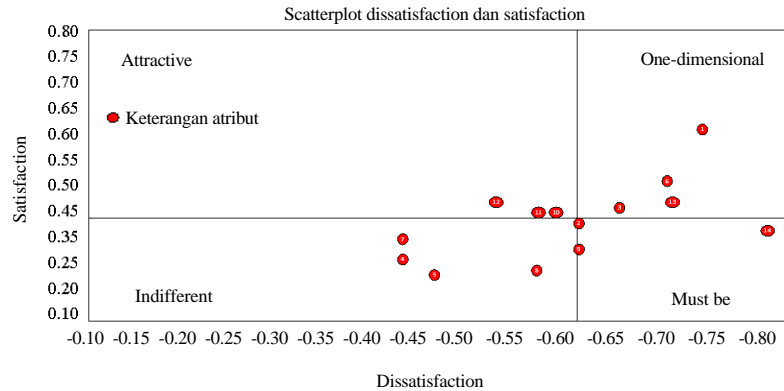


Fig. 2: Positioning attributes

Table 8: Customer satisfaction index

Atribut	Functional (F)	Disfunctional (D)	Skor (FXD)
1	4.53	4.73	21.4269
2	4.25	4.43	18.8275
3	4.31	4.36	19.9122
4	4.12	4.35	17.9220
5	4.05	4.36	17.6580
6	4.35	4.69	20.4015
7	4.25	4.35	18.4875
8	4.07	4.47	18.1929
9	4.15	4.52	18.7580
10	4.31	4.53	19.5243
11	4.30	4.50	19.3500
12	4.23	4.48	18.9504
13	4.30	4.70	20.2100
14	4.21	4.81	20.2501
Total	55.22		269.8713

that these criteria have a negative impact on customer satisfaction if not met for the value of SI, if the value of the calculation approach (from the range of 0-1) it can be said these attributes have influence high towards increasing customer satisfaction. Having obtained the second coefficient value for each attribute, the next step is to set each attribute into quadrants canoe with the following conditions:

- Category must be has a high dissatisfaction coefficient and the coefficient of low satisfaction
- Category one-dimensional high value on the coefficient of satisfaction and dissatisfaction
- Attractive categories have a high coefficient of satisfaction and dissatisfaction coefficient values were low
- Category Indifferent had low values on the coefficient of satisfaction and dissatisfaction

Then calculating CSI the maximum value of CSI is 100%. CSI value of 50% or lower indicates fewer good service attributes CSI value of 80% or higher indicates customers are satisfied with the service attributes. CSI scores obtained by the 97.74% indicated that overall

customer satisfaction with the service attribute PDAM Tirtawening taps as shown in Table 8 and Fig. 2:

$$CSI = \frac{\text{Total score} \times 100}{\sum F \times \text{Score scale}}$$

$$CSI = \frac{269.87}{55.22 \times 5} \times 100 = 97.74$$

Although, the value of CSI obtained 97.74% shows that overall customer satisfaction with the service attribute PDAM Tirtawening. However, there is one class O (One-Dimensional) for the first attribute which means that if this category has been met with customer satisfaction will increase and if not met then the satisfaction decreases. There are two class I (Indifferent) for the fourth attributes and seventh attribute which means that this category has an impact on customer satisfaction. There are 11 classes M (Must-Be) namely for the attributes 2, 3, 5, 6, 8, 9, 10, 11, 12, 13 and 14 which means that this category is the basic requirement for the customer if not met then satisfaction will increase and if not met, then the satisfaction decreases.

## CONCLUSION

Based on the results of data collection and processing attributes desired service customers are classified into the following five dimensions: the attribute of service on the Tangible dimension (direct evidence) that meets the customer with highest satisfaction level value is an attribute one place or room service clean and comfortable, attribute two spot payment of water bills easily accessible, attributes three available chairs, tables and media that can be read waiting room. This shows that the service attributes met customer needs but the level of satisfaction is low and needs to be improved so that customers feel satisfied.

Attribute servicing at dimensions of reliability there are four attributes that service to new connections quickly responded, the procedure for installing new connections easy and fast, convenient loading on new connections and repair the damage, the officer checks. Periodically on the meter and pipe tools. It indicates that the service attributes fulfilled the wishes of customers but the level of satisfaction is low and needs to be improved so that customers feel satisfied.

Attribute servicing at dimensions responsiveness there are two attributes that are ready and alert service personnel serving consumers the registrar of water meter is willing to respond to consumer questions. In this dimension indicates that the customer wishes have been fulfilled but the level of satisfaction is low and needs to be improved in order customer feel satisfied.

Attributes servicing at dimensions assurance, there are three service attributes is the quality of water supplied water well water running 24 h a day. The water meter is damaged beyond repair or replaced. At these dimensions, the customer wishes fulfilled but the level of satisfaction is low and needs to be improved so that customers feel satisfied.

Attribute servicing at dimensions empathy there are two service attributes that officers can explain and communicate information clearly, the officers here and record customer complaints and communicate well. At this attribute customer's wishes have been fulfilled but the value at the satisfaction level is still low and needs to be improved so that customers feel satisfied.

### **RECOMMENDATIONS**

And to solve the problem the company must do the company must pass a real improvement and provide guidance as well as providing training on care workers in order to provide the best service for customers. The company must immediately improve services so that customer satisfaction is maintained. Companies should constantly carry out regular monitoring of customer

satisfaction, so that can know the variables that customers want because of the desire and the perception of customers are growing.

The company must know that must be a category, one dimensional and attractive for service attributes can be felt significantly by customers because of ignorance about the category of service attributes can be negative impacts in the company's service provider, if the provider of services does not realize that the consumer desires vary and these customers are dynamic categories. Specifically, attractive attributes will be a one dimensional category and eventually became must be category.

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