

# Evaluation of Customers' Quality Needs by Means of a Composed Approach: Kano's Refined Model and I-S Model

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## ABSTRACT

In order to maintain profitability and long run competitiveness, organizations do not focus only on new customers. Enterprises and organizations restore their old customers by constant improvement in their products and services through sustainable commercial relations. Kano's Model is widely employed by researchers and industries, but the major defect that exists in Kano's Model is in that it causes an accurately evaluation not to be done on qualitative attitudes. In its refined model, degree of importance for qualitative attitudes is added to Kano's Model and enterprises may acquire more accurate perception from qualitative attitudes from customers' view and for this reason they are able to make more accurate qualitative decisions. By formation of a matrix based on Importance- Satisfaction (I-S) Model, both importance degree and satisfaction level are studied as quality attributes and accordingly organizations may take strategic qualitative measures to maintain customers or new investments. Eventually, they can acquire more useful information for their qualitative decisions by merging Kano's Refined Model with Importance- Satisfaction (I-S) Model and evaluate the quality with several attributes, which are important from customers' view.

**KEYWORDS:** Kano's Customer's Satisfaction Model, Kano's Questionnaire, Kano's Refined Model, Importance- Satisfaction (I-S) Model

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## 1. INTRODUCTION

As the competition has been increased in market and for new customers, satisfaction of customers at high level is necessary in business as a key factor in long run. Satisfied customers are loyal clientele, who make organizations sure that the previous cash flows will be constantly continued in the future as well [1]. According to Reichfeld and Sasser [2], increase in customer's loyalty at 5% level will improve profit of business up to 100%. In fact, satisfied customers buy more products therefore products will be sold further. In general, satisfied customers are sensitive to low prices and they will consume those products that they have already bought.

Fulfillment of customers' needs depends on this point that given products or services of the organization display a specific performance. In this article, we consider these performances and attributes as customers' requirements. These requirements are some needs, which create more satisfaction for customers than other products. If an organization can identify these requirements in its products or services then customers may acquire satisfaction at high level. Thus it is important to know which requirement may create further satisfaction for customer.

Kano's Customer Satisfaction Model [3] determines which attributes of products or services might provide further satisfaction for customers. Similarly, this model determines which need does not create satisfaction when it is purposed but instead it may cause dissatisfaction if it is not presented. But it is crucially important to identify degree of importance of quality attributes which are considered for customers since customers are the only ones who judge about organizational products and services and they evaluate quality by means of some attributes that are important from their viewpoint. Therefore, degree of importance is a significant dimension that is considered by customers when they evaluate qualitative performance. Although Kano's Model have many uses and divided customers' requirements into five classes, but it is inefficient in identifying rate of importance for each of different attributes [4]. In order to resolve this problem, Yang developed Kan's Refined Model [5]. Degree of importance for each quality attribute, which was mentioned by customer, is determined in this model.

Several studies have been carried out to develop Kano's Model in order to improve abilities of this technique more than ever among of them one can refer to Importance- Satisfaction (I-S) Model. By formation of matrix of importance degree and satisfaction level, the quality attribute is analyzed in this model and accordingly the organization can make strategic qualitative measures in order to maintain current customers or to make new investments in manufacturing and serving organizations. This essay is intended to develop a model for merging of Kano's Refined model with Importance- Satisfaction Matrix based on which it makes it possible to evaluate customers' qualitative requirements more accurately so that both the organization can achieve to its goal and customer is satisfied necessarily.

### Kano's Model:

One of the most salient scholars in Total Quality Management (TQM) science, Dr Noriaki Kano [6] has divided customers' requirements and or in other words quality attributes of products into 5 categories. Many studies have been conducted to examine the relationship among mental and physical aspects of quality in order to characterize how real attributes of products or services may affect on customers' satisfaction or dissatisfaction. Physical aspects of quality are focused on physical states or relatively special characteristics while mental aspects are related to customers' objective responses in their satisfaction from products or services [6]. Kano et al. [3] consider two aspects regarding any quality attribute i.e. one is objective aspect that includes mental characteristics and the other one is qualitative aspect that comprises of perception of customers' satisfaction. Diagram- 1 displays Kano's Model. In this model, quality attributes are divided into 5 classes. In the following, we describe 5 attributes and qualitative requirement:

**1- Basic Needs (Must-Be Quality):** Basic requirements are considered as pivotal criteria for a product. If these requirements are not fulfilled the customers will be extremely dissatisfied. Alternatively, if such requirements are fulfilled they are not followed by satisfaction for customer; in fact, customer sees these requirements as prerequisites. For instance, if a restaurant is very clean, parameter of cleanness of restaurant does not create satisfaction in customer. But cleanness is a basic need for customer. If in a restaurant the minimum standards of cleanness are not fulfilled then customer never enters it. Usually customers do not clearly demand for basic needs; namely, customer supposes such attributes have been already considered in the product and in other words these demands are tacit or implicit.

**2- Performance Needs (One- Dimensional Quality):** regarding this requirement, level of customers' satisfaction depends on degree of fulfillment for these needs; namely, perfectly and appropriately fulfillment of these needs shall be followed by customer's satisfaction and vice versa. For example, about the services given by a hotel to its customers, some qualitative requirements and attributes such size and area of rooms in hotel, presence of a refrigerator in each of rooms, beautiful and charming landscape etc are considered as performance needs. Unlike the basic needs, these kinds of requirements are verbal and they are expressed clearly by the customers.

**3- Excitement Need (Attractive Quality):** these needs are key aspects in customer's satisfaction. Fulfillment of these needs will be followed by customer's satisfaction; however, unfulfillment of these requirements will not result in their dissatisfaction. For instance, if some present is given to customers at the end of banquet in a restaurant this may be followed by great satisfaction of customers, but if this gift is not given does not create dissatisfaction. Thus, if these requirements are identified and incorporated in a design, the given product will be substituted rapidly with other similar products and it will result in an appropriate competitive privilege for the given enterprise.

**4- Neutral Needs (Indifference Quality):** Presence or absence of these requirements has no effect on satisfaction or dissatisfaction of customers. For instance, one can refer to manifestation of some attributes of those products or services, which have been rarely or never used by customers. This type of needs is not generally addressed as a need for the customer.

**5- Reverse Needs (Reverse Quality):** Presence of this attribute causes customer's satisfaction and absence of this attribute will be followed by customers' satisfaction. For example, Moon Roof is not pleasant for some drivers in automobiles; in fact, Moon Roof is considered as a reverse quality attribute for customers.

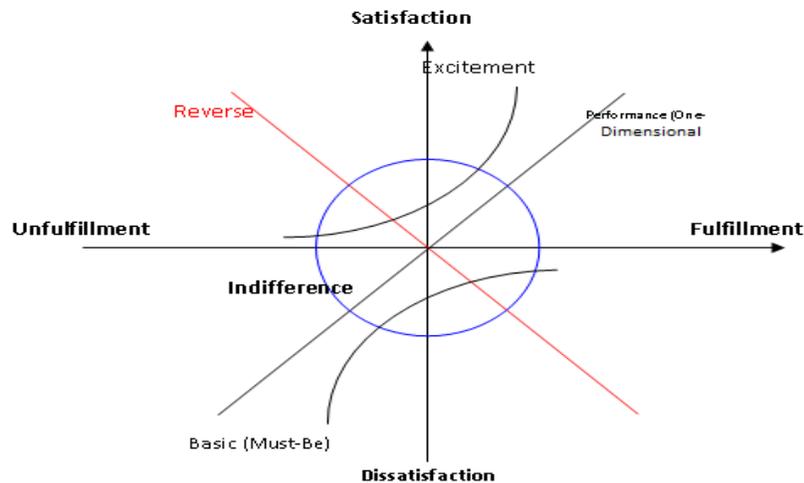


Diagram 1. Kano's Model of quality requirements

Kano's Questionnaire is a classification tool for customers' needs in Kano's Model. Questions in this inventory are designed as double choice questions for each of attributes. In order to perceive and identify customers' qualitative needs, Kano employs a simple technique comprising of two positive and negative questions. First question (positive) concerns to customer's reaction in the case of incorporating an attribute in a product or service. The second question (negative) also denotes reaction of customer if the same attribute is not included in the product or service. Each of needs are placed on one of the groups of basic (Must- Be), performance (One- Dimensional), excitement (Attractive), indifference and reverse classes after classification (2). For instance, in order to identify presence or absence of UV- resistant glass from customers' viewpoint, two following questions are raised:

- What is your opinion about the presence of UV resistant glass? (Positive question)
- What is your opinion about the absence of UV resistant glass? (Negative question)

Customer's response to first question is one the following states, which have been characterized by numbers 1-5 ( 1- I totally agree with it; 2- It is a basic need; 3- No comment; 4- I oppose it but it is tolerable; and 5- I oppose it and it is not tolerable).

One of the five above choices is specified for response to second question. It is very important to raise these questions in order to know voice of customer. Voice of customer is to describe the problem that should be resolved from customer's point of view. If someone is asked that what technical specifications a product or service should have, often many say that they have not perceived it. Customer does not like to know about way of things (Hows) while solving their problem is important for them. One could classify characteristics of product or service by gathering answer of two questions in evaluation table. Table-1 shows how to classify customers' requirements by this questionnaire.

**Table 1.** Evaluation and classification of customers' requirements

Question Performance Case (Positive)	Question Non- performance Case (Negative)				
	I totally agree	It is a basic need	No Comment	I opposed it but its' tolerable	I opposed it but it is not tolerable
1- I totally agree with it	Q	A	A	A	o
2- It is a basic need.	R	I	I	I	M
3- No comment	R	I	I	I	M
4- I oppose it but it is tolerable	R	I	I	I	M
5- I oppose it but it is not tolerable	R	R	R	R	Q

A= Excitement (Attractive); R= Reverse; M= Basic (Must- Be); I= Indifference; O= Performance (One- Dimensional); Q= Questionable

As it observed this table, answers of each question have been written in first row and column in this matrix. Classification type of requirements is extracted from point on which these responses are intersected in the aforesaid matrix.

**Kano's Refined Model:**

Kano's Model is a very helpful device for manufacturing and servicing organizations thereby managers are able to make better decisions for their qualitative strategies. But defect of Kano's Model is in that degree of importance is not considered for quality attribute in this model. Occasionally it is necessary for the organization to consider the criterion with the highest effect on customer's satisfaction if the given product fails to fulfill simultaneously both financial and technical requirements [7]. Usually the impact of each quality attribute on customers' satisfaction is closely related to degree of importance by customers [6]. Kano's Model may be refined with respect to importance of each quality attribute. According to Kano's Refined Model, quality attributes may be divided into further classes. Classification of quality attributes defined according to Kano's Refined Model allows the enterprises to make qualitative decisions more accurately.

**1- Basic Quality Attribute (Must-Be):** This quality attribute is divided into critical and necessary quality attributes: *I) Critical Quality Attribute:* If these attributes are placed at higher level of important from customer's view, such a quality attribute is introduced as critical quality attribute. These attributes are vital for customers and organizations should provide these requirements perfectly for their customers. *II) Necessary Quality Attribute:* If a quality attribute has lower importance, it is considered as a necessary quality attribute. For this kind of attribute, organization may fulfill these requirements at certain level for the lack of customers' satisfaction.

**2- Performance Quality Attribute (One- Dimensional):** Improvement in this quality may increase customers' satisfaction. These needs are divided into classes: *I) High- Value Added Performance Quality Attribute:* These attributes fulfill customers' satisfaction at high level. Thus, these attributes may lead to increase in revenue for the organization. Therefore, organizations should try to provide such attributes for customers. *II) Low- Value Added Performance Quality Attribute:* These attributes are not followed by higher satisfaction for

customers, but organization cannot ignore these attributes. Enterprises may fulfill these attributes at lower level only in order to avoid from dissatisfaction in customers.

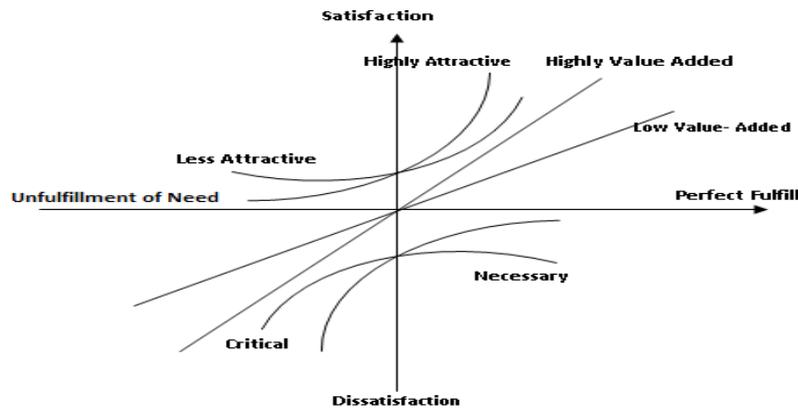
**3- Excitement Quality Attribute (Attractive):** These attributes are presented as a competitive advantage for organizations and they are divided into two categories: *I) Highly Attractive Quality Attribute:* If quality requirements are more important they are introduced as highly attractive quality attribute. These attributes are deemed as good weapons for enterprises in order to attract potential customers. These attributes show strategic attributes of organizations. *II) Less Attractive Quality Attribute:* If qualitative requirements have lower importance, they are purposed as less attractive quality attributes. Since these attributes may less attractive for customers so these qualitative attributes may be omitted if it is required for an organization to lower its costs.

**4- Indifference Quality Attribute:** This quality attribute refers Care- Free Quality Attribute and it is divided into two classes: *I) Potential Quality Attribute:* When an indifference quality attribute has highly importance it is defined as a potential quality attribute. In the future, these attributes may be purposed as an excitement quality attribute. Enterprises may adopt these attributes as a strategic weapon to attract customers in the future. *II) Care- Free Quality Attribute:* If a quality attribute has importance at lower level it is defined ad care- free quality attribute. Customers pay no attention to these attributes, but they are followed by their customers' satisfaction. Table- 3 indicates classification of quality attributes again by repeated definition via Kano's Model.

**Table 2.** Classification of quality attributes in Kano's Refined and Normal Model

Classification of less importance quality attribute In Kano's Refined Model	Classification of highly importance quality attribute In Kano's Refined Model	Classification of quality attributes in Kano's Model
Necessary	Vital (critical)	Basic (Must-Be)
Low value added	Highly value added	Performance (One- Dimensional)
Less attractive	Highly attractive	Excitement (attractive)
Care- Free	Potential	Indifferent

Diagram 2 displays the curves that are used for quality attributes. Vertical axis shows rate of customer's satisfaction and horizontal axis indicates fulfillment of customer's quality attribute. The highest and lowest points on vertical axis of this diagram denote satisfaction limit and dissatisfaction of customers. The point where horizontal and vertical axes are intersected is the place in which customer is at balanced position (normal) in terms of satisfaction and dissatisfaction. Right quadrant on horizontal axis denotes a position where the given quality attribute has been totally fulfilled while the left quadrant on the horizontal axis shows that the product has not been fulfilled with the expected quality attributes and qualitative requirement has never been considered in the given product or service.



**Diagram 2.** Quality attributes in Kano's Refined Model

**Importance - Satisfaction (I-S) Model:**

Generally, directors of organization pay more attention to improvement points than quality elements, which may not create satisfaction in customers. Organizations may consider both quality attribute at the same time and level and the level of their importance. Thus enterprises may acquire valuable information to improve satisfaction level and degree of importance for each quality attribute. This is a very important point for which customers thereby evaluate and consider the quality attributes of the given product or service [8]. If customers' satisfaction is at low level for this important quality attributes, it can affect process of evaluation of product or service totally and it evaluates quality attributes more weakly. Therefore, the first priority for improvement should be accounted for to the quality attributes which are deemed more important by customers as well as those

attributes that create more satisfaction for customers (based on manager's opinion). Above- mentioned topics have led to developing a qualitative model that is known as Importance- Satisfaction Model [9]. This matter has shown in Diagram 3.

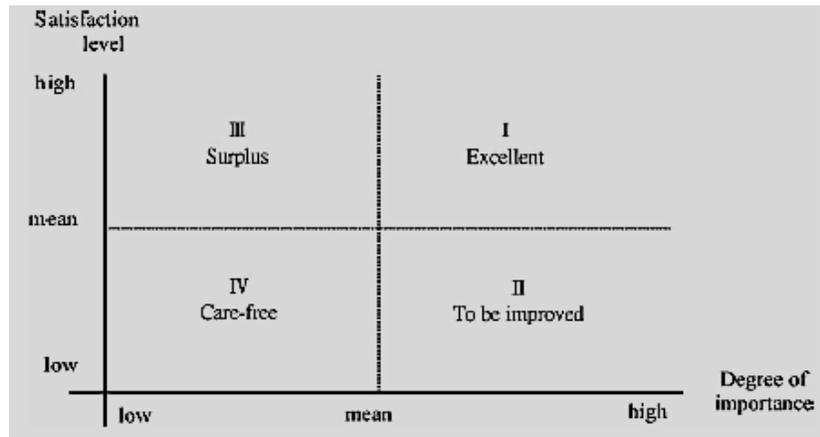


Diagram 3. Importance- Satisfaction Model (I-S)

In this model, horizontal dimension shows degree of importance for any quality needs and vertical dimension indicates satisfaction level in quality attribute. Then importance- satisfaction scale is placed in this coordinates. To divide coordinates table into four quadrants, mean value of importance and satisfaction scales have been used.

**1- Excellent Quadrant (Excellent):** According to customers' view, those quality attributes that are placed in this quadrant are highly important and they are followed by satisfaction at high level. Organization should maintain these attributes and make them to be continued.

**2- To be improved Quadrant:** The quality attributes which are located in this quadrant are some attributes that are highly important but they do not fulfill performance of these needs for customers' expectation. Management of organization should attach much priority for these quality attributes.

**3- Surplus Quadrant:** The listed attributes in this quadrant are not so important but customers are perfectly satisfied with this qualitative need. Organizations may leave away these quality attributes. Similarly, if it requires lowering costs inside an organization, these quality attributes may be omitted (without any noticeable impact on customers' satisfaction).

**4- Care-Free Quadrant:** Quality attributes in this quadrant include the needs with which customers are satisfied at low level but they are not too important for customers. Organizations should not worry for these attributes since these requirements have lower effect on total process of quality evaluation.

Although Importance- Satisfaction Model has a very simple structure but it may provide a lot of useful information about qualitative performance of an enterprise.

### Research Conceptual Model

Kano's Refined Model allows enterprises to make more accurate decisions about qualitative plans. Accordingly, Importance- Satisfaction concepts are merged with Kano's Refined Model so that to purpose a new model. According to Kano's Refined Model, quality attributes are divided into 8 classes and 4 regions (quadrants) have been considered for quality attributes (requirements) based on importance- satisfaction matrix (9). Accordingly, some strategic measures that may be taken to improve quality attributes of the given services are as follows:

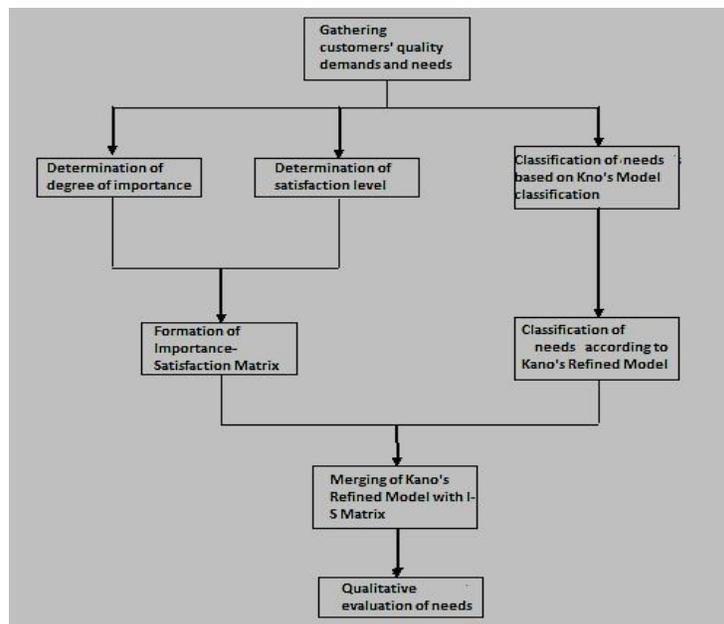
**Excellent Quadrant:** Both degree of importance and satisfaction level are high. With respect to quality attributes, the following cases should be taken into consideration in this region: 1) *Basic Needs (Must-Be Attributes)*: Since these attributes are critical for customers so organization should maintain its high performance in respect of these requirements; 2) *Performance Needs (Highly Value- Added Attributes)*: Maintaining of high performance for these attribute causes high satisfaction in customers; 3) *Excitement Needs (Highly Attractive Attributes)*: Since this type of services is more attractive for customers so its providers should have high performance in order to maintain the competitive position; 4) *Indifference Needs (Potential Attributes)*: By providing these services, there is a potential possibility for these items to be converted into excitement needs over the time.

**To be improved Quadrant:** Degree of importance is at high level in this region, but level of satisfaction is low. With respect to quality attributes, the following cases should be considered in this region: 1) *Basic Needs (Critical Attributes)*: These quality attributes are highly addressed by customers; therefore, some measures should be taken to improve quality and performance of these needs; 2) *Performance Needs (Highly Value- Added*

*Attributes*): Since these needs have some highly value- added for customers, so providers of these needs should improve performance and quality of these attributes; 3) *Excitement Needs (Highly Attractive Attributes)*: In order to attract customers, service providers should take some measures to improve quality of these attributes; 4) *Indifference Needs (Potential Attributes)*: It is better for providers of these services to outsource these services.

**Surplus Quadrant:** Customers' satisfaction level is high for these needs but degree of importance for these needs is low. Therefore, with respect to this type of quality requirements (excerpted from Kano's Model) the following items should be taken into consideration: 1) *Basic Needs (Necessary Attributes)*: Although these needs are not so important for the customers but they are necessary and organization should maintain performance for customers at reasonable level by taking some measures like lowering costs; 2) *Performance Needs (Low Value-Added Attributes)*: Nevertheless, these needs are not so important for the customers but they are necessary and organization should maintain performance for customers at reasonable level by taking some measures like lowering costs; 3) *Excitement Needs (Less Attractive Attributes)*: These requirements weakly act to attract customers and in order to lower costs they should be outsourced; 4) *Indifference Needs (Care- Free Attributes)*: Customers are care- free concerning to these requirements but they are followed by their satisfaction. Thus, organization should take measure for lowering costs in order to improve performance.

**Care- Free Quadrant:** Degree of importance is low for the needs that are placed in this region and at the same time satisfaction level is also low. With respect to type of quality attributes and according to Kano's Refined Model, the following cases should be addressed: 1) *Basic Needs (Necessary Attribute)*: These needs are necessary but not critical. Organizations may take some measures to improve their performance; 2) *Performance Needs (Low Value- Added Attributes)*: Since these requirements may create value- added for customers, enterprises may make some efforts to improve performance for these needs (in the event when there are some highly value- added performance needs the enterprise should consume its time and money for a low valued- added attribute); 3) *Excitement Needs (Less Attractive Attributes)*: Outsourcing may be useful for these needs; 4) *Indifference needs (Care- Free Attributes)*: Organizations may omit these needs or outsource them.



**Diagram 4.** Composed Kano's Refined Model and Importance- Satisfaction Matrix (I-S)

Conceptual model of this study has been derived from merging of Kano's Refined Model and Importance- Satisfaction Matrix (I-S) where Diagram- 4 shows this model. As it observed in this diagram, in design of this model three basic steps have been taken. At first step, voice of customer is perceived and received. At second step, degree of importance and satisfaction level and classes of needs are completed with Kano's Model and Kano's Refined Model. At the third step, Kano's Refined Model and I-S Matrix are merged together and needs are qualitatively evaluated by means of this information output and using I-S Matrix.

## 2. MATERIAL AND METHODS

The current study is aimed at examining customers' needs and identifying degree of importance and their satisfaction level from the requirements of needs identification and classification according to Kano's Refined Model.

This method is conducted by descriptive- surveying technique that explains and reviews its customers' requirements and expectations from L90 automobile in Iran. In surveying part of this study, L90 automobile holders, who have referred to after- sale unit of SAIPA Automotive Company within its guarantee period of this automobile, were elected as statistical population in this investigation. Sampling method of this study is of simple randomized technique. Sample size was calculated by the following formula:

$$n = \frac{N \left( z_{\frac{\alpha}{2}} \right)^2 pq}{(N - 1) \cdot \varepsilon^2 + \left( z_{\frac{\alpha}{2}} \right)^2 pq}$$

where *p* denotes approximation of variable attribute ratio and it is determined by former studies. In this study, *P* value is identified as 0.6 and *q* = 1- *p*. (*P* = 60%; *q* = 40%; *z* = 1.96; 1- *α* = 95%; *N* = 500). With respect to a similar study, *ε* value was considered as 5%. By substitution of the figures in above formula, *n* value will be 212. In order to identify customers' requirements and needs, deep interview and dialogues of focus group were utilized.

Focus group dialogue was done with ten customers and deep interviews were conducted with 20 customers. According to Griffin and Hauser [10], interview should be done with 20-30 customers in order to fulfill 90-95% of customer's possible requirements.

Both techniques of focus group and deep interviews have been adopted to reduce defects of other method. Participants in focus group and deep interviews were asked to: 1- To express the problems and defects of the given automobile; 2- With respect to determined price limit, they were asked to compare this automobile with other cars; and 3- To imply attributes of this automobile that causes the advantage for this car.

Dialogues of focus group and deep interviews lasted for about an hour. Dialogue of focus group and all interviews was recorded by tape recorder. Dialogue of focus group was led by a group of two administrators (raters). Deep interviews were conducted by an interviewer. Participants of focus group and deep interviews were elected randomly and accordingly 16 quality attributes were identified.

Questionnaire is data collection tool in this study. Three questionnaires were administered for this purpose: 1- Questionnaire of importance of quality attributes; 2- Questionnaire of satisfaction of quality attributes; 3- Questionnaire of classification of quality attributes according to Kano's Model.

Five Scale LIKERT Spectrum was used to evaluate two first questionnaires and customers in one spectrum were polled about these attributes by scale ranged from 1 to 5. Number "1" denotes very low importance (satisfaction) while "5" suggests very high importance (satisfaction) in these needs based on customers' opinion.

The next step was distribution of Kano's questionnaire among customers in order to identify excitement, basic, performance, and indifference needs. To determine validity of this study, corporative experts' comments have been used and after exertion of the needed adjustments on questionnaires it was assured that the mentioned questions had the ability and potential for measurement of content and the given attributes in this investigation. In order to achieve reliability for this questionnaire within manual study, the questionnaire was distributed among experts and managers where the results came from Cronbach Alpha Coefficient (*α* = 0.901) showed that this tool had reasonable reliability for this study.

**Data Analysis:**

*1) Descriptive Findings:*

According to Table 3, average age for case study was 35. The youngest respondent was 20 as the minimum value of distribution and the oldest participant was 63 as the maximum rate of distribution among all respondents. 147 participants (70%) were males and 65 (30%) of respondents were females where more than 50% of respondents had BA degree and higher.

**Table 3.** Research Descriptive Findings

Education			Age		
	Frequency	Frequency Percentage		Frequency	Frequency Percentage
Below diploma	25	12%	20-30	82	38%
Diploma	35	16%	30-40	73	34%
Associate's degree	42	20%	40-50	37	17%
Bachelor's degree	67	31%	50 & older	20	11%
Master's degree and higher	43	21%			
Total	212	100	Total	212	100
Occupation			Income		
	Frequency	Frequency Percentage	(×1000Rls.)	Frequency	Frequency Percentage
Public	71	33%	Less than 5'000	23	11%
Free Job	93	44%	5'000-7'000	38	18%
Student	28	13%	7'000-10'000	49	23%
Householder	20	10%	10'000-20'000	75	35%
			Higher than 20'000	27	13%
Total	212	100	Total	212	100

### 3. RESULTS AND DISCUSSION

#### II) Inferential Findings:

1- *Classification of parameters with respect to Kano's Model:* As it mentioned, pairwise questionnaire was drawn up to classify parameters based on Kano's Model including performance (positive) and non-performance (negative) questions and frequencies of response relating to evaluations of Kano's Model Questionnaire are placed in one of basic, performance, excitement and indifference classes. Table 4 indicates the order of frequency of responses.

Table 4 shows that 3 requests (Nos. 3, 11, and 16) and quality requirement are included in basic needs so this signifies that if these needs are not fulfilled this may create serious dissatisfaction for users of this automobile. In above table, 5 requests are performance type so this shows that if these requests are fulfilled they cause satisfaction and unfulfillment of these needs (No. 1, 4, 5, 9, and 13) lead to dissatisfaction. Meanwhile, 5 requests are of excitement type (Nos. 2, 6, 7, 8, and 15) so that their unfulfillment does not lead to dissatisfaction but fulfillment of these needs may cause extreme satisfaction. Requests No 10, 12, and 14 are mentioned as indifference needs so this indicates that customer neither satisfies nor dissatisfies with these needs.

**Table 4.** Analysis results on Kano's Model

Row	Questions of Questionnaire	O	A	M	I
1	Please improve rear- view weakness in this automobile.	105	25	75	3
2	Installation of sun- roof for automobile	12	135	25	35
3	Please correct wiper function.	64	10	124	7
4	Installation of jumper box beside driver's seat	97	35	62	4
5	Please design automobile seats according to ergonomic principles	95	43	62	7
6	Please make external appearance of automobile more attractive.	63	94	19	15
7	Revision of audio system	25	88	17	74
8	Installation of digital thermometer	11	127	18	54
9	Observance of ergonomic principles in dashboard design	98	25	73	10
10	The existing sensor for car parking	21	71	15	95
11	Please increase quantity of automobile spare parts.	39	19	141	4
12	Please place switch equipments of electric mirror on driver's side	35	62	24	83
13	Please use two-way rear gear light	107	12	72	17
14	Please improve design of middle consol.	12	54	33	105
15	Please reduce car height.	55	95	12	43
16	Please adjust switch of car oil tank to open from inside.	65	33	101	5

**Table 5.** Identifying degree of importance and satisfaction level out of quality attributes

Row	Questions of Questionnaire	Degree of Importance	Satisfaction Level	Classification According to I-S Model
1	Please improve rear- view weakness in this automobile	4.32	2.94	To be improved
2	Installation of sun- roof for automobile	3.49	3.47	Surplus
3	Please correct wiper function	4.42	3.74	To be improved
4	Installation of jumper box beside driver's seat	4.25	3.02	To be improved
5	Please design automobile seats according to ergonomic principles	4.30	3.15	To be improved
6	Please make external appearance of automobile more attractive.	4.12	3.07	To be improved
7	Revision of audio system	3.79	3.42	Surplus
8	Installation of digital thermometer	3.25	3.42	Care- Free
9	Observance of ergonomic principles in dashboard design	4.07	3.43	To be improved
10	The existing sensor for car parking	3.45	3.89	Surplus
11	Please increase quantity of automobile spare parts.	4.78	2.72	To be improved
12	Please place switch equipments of electric mirror on driver's side	3.22	4.06	Surplus
13	Please use two-way rear gear light	3.94	3.82	Excellent
14	Please improve design of middle consol.	3.21	3.78	Surplus
15	Please reduce car height	3.42	3.84	Surplus
16	Please adjust switch of car oil tank to open from inside	4.54	3.10	To be improved

2- *Identifying degree of importance and satisfaction level out of quality attributes:* With respect to distributed questionnaire regarding identifying degree of importance and satisfaction level (LIKERT Scales 1-5),

mean value of any quality attribute has been considered as importance (satisfaction) parameter; given that importance and satisfaction parameter that intersected with each quality attribute, they were classified according to I-S Model.

3- *Merging Kano's Refined Model with I-S Matrix:*

To compose these two models in each other, some quality attributes with higher degree of importance among 16 quality attributes were evaluated as quality attributes with high degree of importance and the attributes with lower degree of importance were assessed with less important degree. Accordingly, 9 attributes with high degree of importance and 7 attributes with low importance were identified as a result their classification was done according to Kano's Refined Model.

**Table 6.** Merging of Kano's Refined Model and Importance- Satisfaction Matrix (I-M)

Row	Questions of Questionnaire	Degree of Importance	Satisfaction Level	Classification based on Kano's Model	Classification based on Kano's Refined Model	Classification based on I-S Model
1	Please improve rear- view weakness in this automobile.	4.32	2.94	Performance	Higher value-Added	To be improved
2	Installation of sun- roof for automobile	3.49	3.47	Excitement	Higher Attractive	Surplus
3	Please correct wiper function.	4.42	3.20	Basic (Must-Be)	Necessary	To be improved
4	Installation of jumper box beside driver's seat	4.25	3.02	Performance	Highly Value-Added	To be improved
5	Please design automobile seats according to ergonomic principles	4.30	3.15	Performance	Highly Value-Added	To be improved
6	Please make external appearance of automobile more attractive.	4.12	3.07	Excitement	Highly Attractive	To be improved
7	Revision of audio system	3.79	3.42	Excitement	Highly Attractive	Surplus
8	Installation of digital thermometer	3.25	3.39	Excitement	Less Attractive	Care- Free
9	Observance of ergonomic principles in dashboard design	4.07	3.38	Performance	Low Value-Added	To be improved
10	The existing sensor for car parking	3.45	3.89	Indifference	Care- Free	Surplus
11	Please increase quantity of automobile spare parts.	4.78	2.72	Basic (Must-Be)	Critical (One-dimensional)	To be improved
12	Please place switch equipments of electric mirror on driver's side	3.22	4.06	Indifference	Care- Free	Surplus
13	Please use two-way rear gear light	3.94	3.82	Performance	Highly Value-Added	Excellent
14	Please improve design of middle consol.	3.21	3.78	Indifference	Care- Free	Surplus
15	Please reduce car height.	3.42	3.84	Excitement	Less Attractive	Surplus
16	Please adjust switch of car oil tank to open from inside.	4.54	3.10	Basic (Must-Be)	Critical (One-Dimensional)	To be improved
<b>Mean</b>		<b>3.91</b>	<b>3.40</b>			

**4. CONCLUSION AND RECOMMENDATION**

Kano's Model is a very helpful tool for industries so that they are able to make better decisions for their quality strategies by means of analysis on important quality attributes. But the main defect of Kano's Model is in that degree of importance is not considered for quality attributes. Customers only judge about products and services of the organization and evaluate quality by some attributes that are important for them. Thus, degree of importance is deemed as a significant dimension when customer intends to evaluate quality performance considered by them. Accordingly, the given study merges importance concepts with Kano's Refined Model in order to develop a new model. According to Kano's Refined Model, quality attributes may be divided into more classes and decisions could be made based on these new classifications [11].

**Results of this study can be divided into three classes:**

*1) Results derived from classification based on Kano's Model and Kano's Refined Model:* As it observed in Table -7, 9 attributes are placed above mean where they are located in high importance class that they

are often performance and excitement needs so according to Kano's Refined Model they are placed in this class as highly value-added and highly attractive attributes. Of 9 attributes higher than mean value, 2 attributes belong to basic needs that are defined as critical attribute according to Kano's Refined Model [11]. Regarding less important attributes (six attributes in the table that were lower than mean), one of them is performance attribute, which is placed in low value-added according to Kano's Refined Model and 3 are excitement attributes that are located in less-attractive class in Kano's Refined Model. Similarly, one basic (Must-Be) attribute with low degree of importance has been identified in this study, which is included in necessary needs according to Kano's Refined Model. Also 3 indifference attributes were identified in case study, which all included in care-free needs.

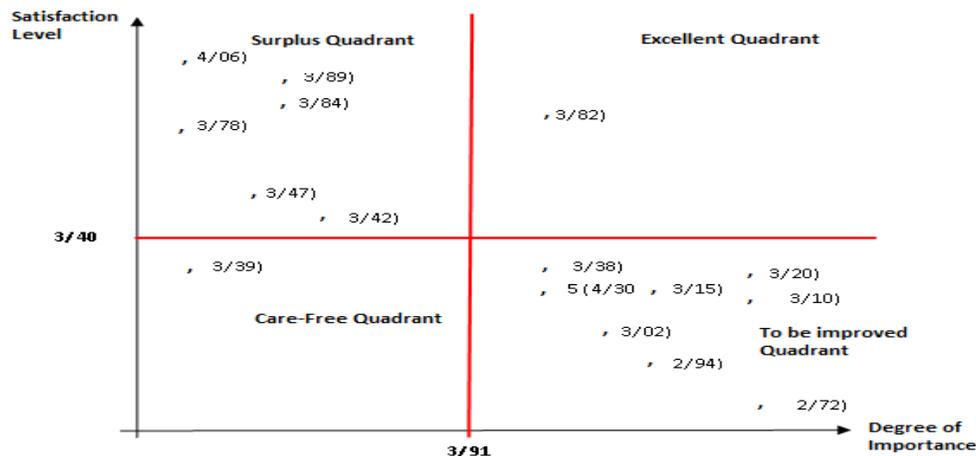
**Table 7.** Classification of quality attributes in Kano's Refined Model and Unrefined Model

Classification based on Kano's Model	Basic (Must-Be)		Performance (One-Dimensional)		Excitement (Attractive)		Indifference (Care-Free)	
Classification based on Kano's Refined Model	Critical	Necessary	Highly Value-Added	Low Value-Added	Highly Attractive	Less Attractive	Potential	Care-Free
Quantity of Identified Attributes	2	1	4	1	2	3	0	3

One can recognize the main difference among refined model and Kano's model in this study. Concerning to attribute No 3, i.e. performance of wiper should be corrected; this attributes is included in basic needs based on Kano's model; namely, it is one of the attributes which do not cause feeling of satisfaction but lack of this attribute may lead to dissatisfaction and the enterprise should highly pay attention to these needs; however, according to Kano's Refined Model since these attributes were included in necessary needs so organization may adjust its performance to certain level only for customers' dissatisfaction.

Similarly, regarding attribute No. 9 (observance of ergonomic principles in dashboard design), organization should consume a lot of time, energy, and money for amendment of this performance (according to Kano's model) but with respect to this fact that this need is placed in low value-added class (less importance), the enterprise may determine its strategy based on placement of this need in classification of Kano's Refined Model.

**II) Results obtained from classification according to I-S Model:** As it seen in Diagram 5, 1 need (No. 13) was placed in excellent quadrant and organization should modify this performance based on this need. Most of needs were located in To-be-improved quadrant where the organization should pay much more attention to them for which this region has the highest importance from customer's viewpoint; however, their satisfaction about these needs is at low level. In surplus quadrant, there are 6 attributes where strategy of organization is reduction strategy in this regard and also in Care-Free quadrant there is one quality attribute (No. 8) so that organization should pay least attention to them since they are followed by the least level of satisfaction as well [12].



**Diagram 5.** Classification according to I-S Model

**III) Results of merging Kano's Refined Model and I-S Model:** We may examine the results of merging these two models separately in two tables: (High importance. Low importance)

*iii-1- Needs with high importance:*

There is one need with high importance in Excellent Quadrant; approximately 70% of needs with high importance are placed in To-be-improved Quadrant among of which half of them is performance that requires

much attention paid by organization; there are 2 type of needs in Surplus Quadrant where both of them are of excitement type (highly attractive) and by addressing these two types of needs, organization may allocate remarkable percent from market share to itself.

*iii-2- Needs with low importance:*

Table 8 shows that 7 types of needs with low importance were identified among of which 60% are surplus needs. Similarly, in Kano’s refined classification, most of them were placed in Care-Free (indifference) needs.

**Table 8.** Merging of Kano’s Refined Model with Importance- Satisfaction Model (needs with high importance)

I-S Model Classification Kano’s Refined Model Classification	I-S Model Classification				
	Excellent	To be improved	Surplus	Care-Free	Total
Critical	0	2	0	0	2
Highly Value- added	1	3	0	0	4
Highly Attractive	0	1	2	0	3
Potential	0	0	0	0	0
<b>Total</b>	1	6	2	0	9

**Table-9:** Merging of Kano’s Refined Model with Importance- Satisfaction Model (needs with low importance)

I-S Model Classification Kano’s Refined Model Classification	I-S Model Classification				
	Excellent	To be improved	Surplus	Care-Free	Total
Critical	0	1	0	0	1
Highly Value- added	0	1	0	0	1
Highly Attractive	0	0	1	1	2
Potential	0	0	3	0	3
<b>Total</b>	0	2	4	1	7

**Recommendation**

Studies show that there is a direct relationship among fulfillment of customer’s satisfaction and corporative financial and competitive superior status since one of the main bases for achieving accountability to market promptly for producers is to perceive and fulfill customer’s satisfaction and dissatisfaction of customer threatens revenues up to 8.5% [13, 14].

Generally with respect to study results, it can be implied that quality level of the given product has caused creation of relative satisfaction in customers in this respect. If the enterprise uses these results for making decisions for development and improvement of product, it will be able to create more satisfaction in customers and improve product quality level and also acquire further satisfaction in customers. In this part, the following strategies are purposed:

- 1- It is recommended to organization to pay attention to needs that were placed in To- be- improved region (particularly needs with high degree of importance that were included in these classifications).
- 2- Since some change may exert in customers’ tastes and expectations over the time, it is suggested implementing identification process and awareness from customers’ needs all the times.
- 3- In this study, customers’ requirements were only collected and analyzed only about one of corporative product while this model can be also used in other products.
- 4- With respect to this point that compared to Kano’s Model, in Kano’s Refined Model more accurate investigation is done, it is recommended to organization to prioritize its plans based on this classification and at the same time organization may implement its strategic plans accordingly.

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