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THE USE OF THE ANALYTIC HIERARCHY PROCESS (AHP) AND THE KANO MODEL IN IMPROVING PRODUCT QUALITY / AN APPLIED STUDY IN THE GENERAL COMPANY FOR BATTERY INDUSTRIES - IRAQ

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A B S T R A C T

The purpose of the research is the possibility of applying the Analytic Hierarchy Process (AHP) and the Kano model in determining the customer's requirements for the product of the General Company for Batteries Industry / Iraq in order to improve the quality of the product. The General Company for Batteries Industry / Iraq produces all types of car batteries. Data was collected by designing two forms the first questionnaire on the Analytic Hierarchy Process (AHP) and the second related to the Kano model. The questionnaires were distributed to all (80) distributors of the General Company for Batteries Industry / Iraq. The results concluded that the customer's requirements that were determined based on the Analytic Hierarchy Process included (efficiency, battery life, Amperometry, price, Maintenance of Car Batteries AGM, resistance to weather conditions/ease of obtaining the product). While the Kano model classified (efficiency, battery life) requirements as Must – Be Attributes, (Amperometry, ease of obtaining the product) requirements as One-Dimensional Attributes, (price, Maintenance of Car Batteries AGM) requirements as Indifferent Attributes, and (resistance to weather conditions) Attractive Attributes are requirements. The General Company for Batteries Industry / Iraq should provide the battery product that meets the customer's requirements for the purpose of being able to compete and increase its market share.

1. INTRODUCTION

All industries pay attention to customer requirements in order to provide products with specifications that meet those requirements. The company's fulfillment of customer requirements achieves customer satisfaction and loyalty. Companies producing goods and services must realize that achieving customer satisfaction helps them survive and continue in a competitive environment. All companies seek to achieve customer loyalty by fulfilling his requirements and then achieving customer delight by providing products that exceed customer expectations for the product. The General Company for Batteries Industry / Iraq was interested in providing car batteries according to specifications that meet the needs and requirements of the customer in order to achieve customer loyalty and delight. This study seeks to apply the Analytic Hierarchy Process (AHP) to determine the customer's requirements for the battery product and classify the requirements into (Must - Be Attributes, One-Dimensional Attributes, Attractive Attributes) according to the Kano model in order to

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focus on the requirements that are of great importance from the point of view of The customer, which generates a sense of satisfaction and happiness for them.

Analytic Hierarchy Process (AHP) is a multi-criteria decision-making tool that has been used in all applications related to decision-making (Vaidya & Kumar, 20006). Analytic Hierarchy Process (AHP) is a measurement theory using Binary comparisons and relies on expert judgments to derive priority metrics (Saaty, 2008). Mahmood (2016) indicated in his study on the development of Anbar Governorate / Iraq to the possibility of applying the Analytic Hierarchy Process (AHP) as a planning method for evaluation in the development of cities. Harputlugil (2018) in a study conducted in the Department of Architecture / Çankaya University indicated the effectiveness of the application of the Analytic Hierarchy Process (AHP) in conducting a comparison between students' projects on the basis of a specific standard. While (Petruni et al., 2019) indicated in a research they conducted in the field of the automotive sector that the Analytic Hierarchy Process (AHP) is a way to assist safety managers and risk assessors in the process of selecting HRA (Human Reliability Analysis) technology. Dar et al.(2021) indicated in a study conducted in Kashmir Valley, NW-Himalayas, the possibility of using the Analytic Hierarchy Process (AHP) method and GIS to identify potential groundwater areas by integrating remote sensing data with data from other sources.

The Kano model is a useful approach for integrating the voice of the customer into subsequent product development processes (Sharif & Tamaki, 2011). Chen & Chuang (2008) in a research on mobile design experience delivery indicated that the use of the Kano model helps to distinguish between multiple criteria that affect customer satisfaction. Both (Chen & Chuang, 2008) in a research on providing the mobile phone design experience indicated that the use of the Kano model helps to distinguish between the multiple criteria that affect customer satisfaction, as the Kano model is used to better understand the relationship between performance standards and customer satisfaction. Madzík (2018) indicated the possibility of effective application of the Kano model to classify after-sales service requirements in the automotive industry. Dace et al.(2020) indicated the possibility of using the Kano model as an effective tool for convergence towards environmental quality and sustainability by indicating direction from the perspective of social and behavioral choice. Barrios et al.(2021) in a study conducted in the health care sector in Peru indicated the effectiveness of the Cano model in assessing the quality of health services in two public-private partnership health services hospitals. As 31 traits were identified that were evaluated by patients, it turned out that 27 traits are one-dimensional-type attribute, 3 traits were classified as obligatory, and 1 trait was classified as inverse.

This study revealed the possibility of applying the hierarchical analysis method to determine the customer's requirements for the car batteries produced by the General Company for Batteries Industry in Iraq and their acceptability to customers. The study presented the possibility of classifying customer requirements for car batteries based on the Kano model. If rated (efficiency, battery life) requirements as Must – Be Attributes, (Amperometry, ease of obtaining the product) requirements as One-Dimensional Attributes, (price, Maintenance of Car Batteries AGM) requirements as Indifferent Attributes, and (resistance to weather conditions) Attractive Attributes are requirements

2. ANALYTIC HIERARCHY PROCESS (AHP)

Multiple Criteria Decision Making (MCDM) is a decision support tool for problems that have multiple and conflicting objectives. The Analysis Hierarchical Process (AHP) is one of the most common methods in (MCDM) techniques (Badi&Abdulshahed, 2019). In 1977, the hierarchical analysis process was introduced by the scientist (Thomas Saaty) (Saaty, 1980). Analysis Hierarchical Process is one of the processes that help decision makers to make complex decisions with multiple criteria, and these decisions may be the most correct among the decisions that can be taken (Mahmood, 2016). Analysis Hierarchical is a mathematical process that interacts with a person's input and preferences in order to make a decision as it is one of the methods in the multi-criteria decision-making process (Nizar et al., 2022). Hierarchical Analysis offers a good and low cost method in sensitivity analysis (Mahmood, 2016).Vila & Barbara (1995) indicated the ability of Hierarchical Analysis to combine quantitative and non-quantitative aspects. While (Abuwatfa, 2014) indicated the ability of Hierarchical Analysis to combine the total and partial method, as it uses the total method in building the pyramid by looking in an integrated manner at all the elements, and uses the partial method through comparisons. According to (Mardani et al., 2016), AHP is based on the following four main components:

- **Defining the problem and the type of information required**: The problem should be known, diagnosed, and the necessary information about the problem to be solved should be identified (Kareem, 2016).
- **Structuring the problem in the form of a hierarchy**: the first level includes the decision problem, the second level includes a set of measurement criteria, and the third level includes the alternatives to be compared.
- **Perform Binary comparisons between all criteria at each level within the hierarchy**: A binary comparison matrix is designed for the main criteria. The Binary comparisons matrix indicates the importance of each criterion to the other. And specify (the watchmaker) a set of values to design the Binary comparisons matrix, as shown in the table (1)

Table 1. Saaty's Scale

Importance	Definition	explanation
1	Equal Importance	Two activities contribute equally to the objective
2	Weak or slight	
3	Moderate importance	Experience and judgement slightly favour
4	Moderate plus	
5	Strong importance	Experience and judgement strongly favour
6	Strong plus	
7	Very strong or demonstrated importance	An activity is favoured very strongly over another; its dominance demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favouring one activity over another

The binary comparisons matrix can be represented by:

$$A=\begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{pmatrix} \quad (1)$$

A: Matrix comparisons binary

- **Calculating the relative weights of the criteria**: The relative weights are calculated by dividing each element in the binary matrix by the sum of the elements (values) of the column to which the element or cell belongs. Then we extract the relative weight of each requirement through the arithmetic mean for each row of the new matrix, as shown below:

$$\begin{pmatrix} a_{11}/\mu1 & a_{12}/\mu2 & \dots & a_{1n}/\mu1 \\ a_{21}/\mu1 & a_{22}/\mu2 & \dots & a_{2n}/\mu2 \\ \vdots & \vdots & & \vdots \\ a_{n1}/\mu1 & a_{12}/\mu2 & \dots & a_{1n}/\mu n \end{pmatrix} = \begin{pmatrix} w1 \\ w2 \\ \vdots \\ wi \end{pmatrix} \quad (2)$$

wi: Relative weight of standards
μn: the sum of column n in the binary matrix
$A * wi = nw$(3)
$nw / wi = \lambda$(4)
CI=$\frac{\lambda_{max}-n}{n-1}$(5)
CR=$\frac{CI}{RI}$(6)
λ_{max}: the largest eigenvector value of each alternative.
n :The number of criteria used in the binary comparison
CI: consistency index
RI: random consistency index(table.2)
CR: consistency ratio

Table 2. Random Index (RI) for different values of n

n	RI	*n*	RI
1	0	6	1.24
2	0	7	1.32
3	0.58	8	1.41
4	0.9	9	1.45
5	1.12	10	1.49

Kolios et al., 2016

3. KANO MODEL

The Kano model is a theory for developing goods and services and improving customer satisfaction. It was developed by the Japanese scientist (Kano) as one of the models that illustrates customer satisfaction and explains the different situations that affect customer satisfaction (Barwari & Bashwa, 2011). The purpose of the (Kano) model is to assess customer satisfaction about the specific characteristics of products and the organization's belief that the standards of its products can be distinguished by recognizing the significant impact on customer satisfaction. Noriaki Kano pointed out the need to study what is known as the customer's voice (VOC), according to the belief that the customer has invisible needs (hidden needs) (Gupta & Srivastava, 2011). The objective of the Kano model is to achieve a better understanding of how customer satisfaction develops, to evaluate and perceive quality attributes, and to consider which attributes are most important to customers in order to improve them, as well as to show the extent of the difference in customer satisfaction (Paraschivescu & Cotîrlet, 2012). The scientist (Kano) criticized the prevailing thinking in the past, which included "that the relationship between fulfilling the customer's requirements and customer satisfaction is one-dimensional and linear, that is, the higher the level of meeting the customer's requirements, the greater his satisfaction and vice versa". Kano explained that achieving customer satisfaction is achieved by adding two attributes, the (must be) and (attractive) attributes, as these attributes are non-linear, in addition to the linear relationship above, all of which are used to measure and identify the different needs of customers and classify them (Shahin et al., 2013).

3.1. Classification of customer requirements

Customer satisfaction is the most important consideration in developing or designing any good or service because it is essential to the success of any business. Therefore, retaining satisfied existing customers can bring potential customers and increase the final returns, which is the ultimate goal (Dace & Timma, 2020). The scientist (Kano) distinguishes in his model between three main types of product requirements that affect customer satisfaction, which are (Al-Jaf, 2016) (Sauerwein et al., 1996):

- **Basic Requirements (Must–Be):** Characteristics that must be available in the product. If these characteristics are not met, the customer will be completely dissatisfied. Also, if the required characteristics are met, this will not increase customer satisfaction. These requirements are self-evident, implicit, clear, and not special.

- **Performance requirements (One–Dimensional):** These requirements are explicitly requested by customers and are characterized as (expressed, technical, specific, and measurable). They can be easily identified and expected to be met. The level of customer satisfaction is proportional to the extent to which these requirements are met, so if those needs are fulfilled, they will be satisfied, and if they are not met, they will be dissatisfied.
- **Sensational requirements (Attractive):** Represent the standards of the goods or service that have the greatest impact on customer satisfaction on a particular product or service, and are characterized as (not expressed, attract the customer, cause delight, designed for the customer). These requirements are often not requested by the customer and are not expected because he does not think about their existence because they represent new capabilities, innovations and creations that would cause excitement to customers and are seen as superior value and always exceed customer expectations.

Figure (1) refers to the Kano customer satisfaction model. The Kano model classifies quality attributes based on the degree of conformity of the good/service (horizontal axis) and the degree of customer satisfaction (vertical axis).

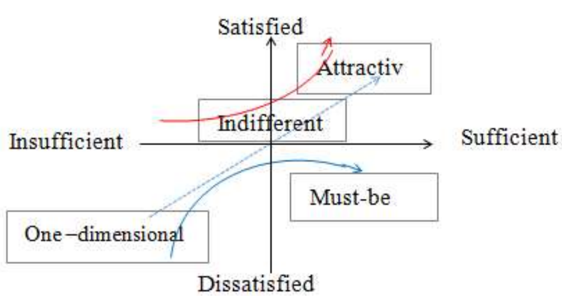

Figure1. Kano Model. (Barrioset et al., 2021)

The Kano model classifies quality attributes into (Madzik et al, 2019):

- **Must – Be Attributes:** represent the elements of quality expected by customers and fulfillment is mandatory, but leads to dissatisfaction when not met (Barrios et al., 2021).
- **One- Dimensional Attributes**: represent the quality elements that lead to satisfaction when they are met and dissatisfaction when they are not met (Barrios et al., 2021).
- **Attractive Attributes**: represent the elements of quality that, when met, provide joy to the customer. Also, the lack of attractive Attributes does not make the customer feel dissatisfied (He et al., 2015).
- **Indifferent Attributes:** These are quality elements that do not lead to customer satisfaction regardless of whether they are met or not (Madzik et al, 2019).
- **Reverse Attributes**: The presence of these characteristics in the goods /service leads to customer dissatisfaction. The absence of Reverse Attributes leads to customer satisfaction because it is the exact opposite of one-dimensional quality attributes (He et al., 2015).
- **Questionable Attributes**: These results appear due to the lack of understanding or misinterpretation of the answers to the questions of the Kano questionnaire as a result of the occurrence of contradiction and doubt in the customers' answers (Madzik et al, 2019).

4. RESULTS

The purpose of this research is to determine the customer's requirements for the product of The General Company for Batteries Industry / Iraq. the General Company for Batteries Industry / Iraq suffers from The loss of customers due to the presence of competing products, so this research seeks to reveal the integration between the Analytic Hierarchy Process (AHP) and the Kano model in determining customer requirements for car batteries. Knowing the customer's requirements for car batteries contributes to improving product quality and increasing competitiveness. Figure (2) refers to the procedural model of the research, as the application of the Analytic Hierarchy Process (AHP) reveals the acceptability of the customer's requirements. To collect information for the Analytic Hierarchy Process (AHP), a questionnaire was designed according to the Saaty scale. While the Kano model classifies the specific customer requirements using a Analytic Hierarchy Process (AHP) into one-dimensional attributes, must-be attributes, and attractive attributes.

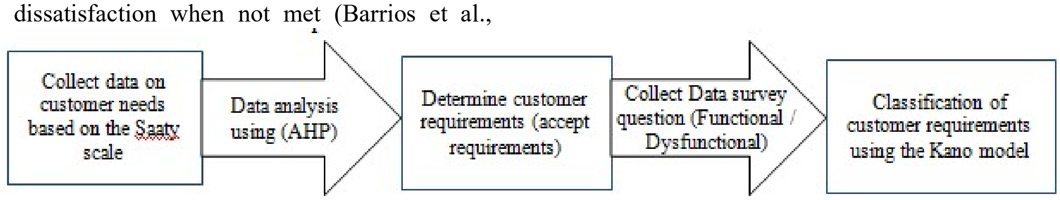

Figure2. Procedural Model for the Research

.Standards are customer requirements. The goal is to achieve the standards, which are the requirements of The General Company For Batteries Industry / Iraq. To judge the acceptability of customer requirements, which include (efficiency, battery life, Amperometry, price, Maintenance of Car Batteries AGM, resistance to weather conditions, and ease of obtaining the product), the Analytic Hierarchy Process was used.

Distributors of The General Company For Batteries Industry / Iraq expressed their opinions on the standards (efficiency, battery life, Amperometry, price, Maintenance of Car Batteries AGM, resistance to weather conditions, and ease of obtaining the product). The relative weights of the criteria were determined according to Saaty's scale (relative importance), which consists of (1 - 9), since (1) corresponds to "Equal Importance", while (9) corresponds to "Extreme importance". Table (3) indicates the relative weights of the standards according to the opinions of the distributors. The highest mean was obtained by the requirement (efficiency) with a value of (8). While the requirement (ease of obtaining the product) got the lowest mean, as its value amounted to (4).

Table 3. the relative weights of the customer's requirements

Standards (customer requirements)	Code	mean
Efficiency	X_1	8
battery life	X_2	7
Amperometry	X_3	7
Price	X_4	5
Maintenance of Car Batteries AGM	X_5	6
resistance to weather conditions	X_6	6
ease of obtaining the product	X_7	4

Table (4) shows the Binary comparisons between the customer's requirements with each other. By relying on the relative weights of the customer's requirements, the importance of each requirement was compared with the other requirements within a single matrix. While the comparison of the alternative with itself is equal to (1), we see that all the diagonal elements in the matrix are equal to (1).

Table 4. Binary comparisons of customer's requirements

	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1	8/7	8/7	8/5	8/6	8/6	8/4
X_2	7/8	1	7/7	7/5	7/6	7/6	7/4
X_3	7/8	7/7	1	7/5	7/6	7/6	7/4
X_4	5/8	5/7	5/7	1	5/6	5/6	5/4
X_5	6/8	6/7	6/7	6/5	1	6/6	6/4
X_6	6/8	6/7	6/7	6/5	6/6	1	6/4
X_7	4/8	4/7	4/7	4/5	4/6	4/6	**1**

Table (5) indicates the calibration matrix of the customer's requirements. A calibration matrix is necessary to find the relative importance of a customer's requirements. To create the calibration matrix, the values of each column of the binary comparisons matrix were collected, and then the division process was performed for each element or cell in the matrix by the sum of the value of the column to which the element belongs. After completing all the elements of the matrix. The relative importance of each requirement is found by finding the rate for each row of the new matrix.

Table 5.Calibration matrix

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	W_i
X_1	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186
X_2	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163
X_3	0.163	0.163	0.163	0.163	0.163	0.163	0.163	0.163
X_4	0.116	0.116	0.116	0.116	0.116	0.116	0.116	0.116
X_5	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140
X_6	0.140	0.140	0.140	0.140	0.140	0.140	0.140	0.140
X_7	0.093	0.093	0.093	0.093	0.093	0.093	0.093	0.093

$$\mathbf{W}= \begin{bmatrix} W_1 \\ W_2 \\ W_3 \\ W_4 \\ W_5 \\ W_6 \\ W_7 \end{bmatrix} = \begin{bmatrix} 0.186 \\ 0.163 \\ 0.163 \\ 0.116 \\ 0.140 \\ 0.140 \\ 0.093 \end{bmatrix}$$

$$\boldsymbol{AW}= \begin{bmatrix} 8/4 & 8/6 & 8/6 & 8/5 & 8/7 & 8/7 & \mathbf{1} \\ 7/4 & 7/6 & 7/6 & 7/5 & 7/7 & 1 & 7/8 \\ 7/4 & 7/6 & 7/6 & 7/5 & 1 & 7/7 & 7/8 \\ 5/4 & 5/6 & 5/6 & 1 & 5/7 & 5/7 & 5/8 \\ 6/4 & 6/6 & 1 & 6/5 & 6/7 & 6/7 & 6/8 \\ 6/4 & 1 & 6/6 & 6/5 & 6/7 & 6/7 & 6/8 \\ \mathbf{1} & 4/6 & 4/6 & 4/5 & 4/7 & 4/7 & 4/8 \end{bmatrix} \begin{bmatrix} 0.186 \\ 0.163 \\ 0.163 \\ 0.116 \\ 0.140 \\ 0.140 \\ 0.093 \end{bmatrix} = \begin{bmatrix} 1.301 \\ 1.140 \\ 1.140 \\ 0.814 \\ 0.977 \\ 0.977 \\ 0.651 \end{bmatrix}$$

$$\lambda= \begin{bmatrix} \lambda_{11} \\ \lambda_{21} \\ \lambda_{31} \\ \lambda_{41} \\ \lambda_{51} \\ \lambda_{61} \\ \lambda_{71} \end{bmatrix} = \begin{bmatrix} 1.301/0.186 \\ 1.140/0.163 \\ 1.140/0.163 \\ 0.814/0.116 \\ 0.977/0.140 \\ 0.977/0.140 \\ 0.651/0.093 \end{bmatrix} = \begin{bmatrix} 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \end{bmatrix}$$

$\lambda_{max} = \lambda_1 + \lambda_2 + \lambda_3 + \lambda_4 + \lambda_5 + \lambda_6 + \lambda_7 / 7 = 7$

Finding the Consistency Ratio (CR) requires determining the random consistency index (RI) and the value of consistency index (CI). Random consistency index (RI) is determined by (n). (n) is equal to (7), then the value of (RI) is (1.32) (Table 2). The consistency index (CI) was calculated through the following equation:

$$CI=\frac{\lambda max-n}{n-1} = \frac{7-7}{6} = 0$$

$$CR= \frac{CI}{RI} = \frac{0}{1.32} = 0$$

The Consistency Ratio (CR) amounted to (0), which is less than (10%), which indicates the stability of the judgments and that the customer's requirements are acceptable and correct.

Customer requirements accepted according to the Analytic Hierarchy Process (AHP) included (efficiency, battery life, Amperometry, price, Maintenance of Car Batteries AGM, resistance to weather conditions, and ease of obtaining the product). The Kano Model is used to classify and analyze customer requirements.To classify customer requirements for car batteries, data was collected from distributors of the General Company for Batteries Industry / Iraq, amounting to (80) distributors. The data is generated by asking a functional question and a dysfunctional question (the product is related to car batteries). Through the customers' response, we can classify the customer's requirements according to the classification of the Kano model, as shown in the Figure (3).

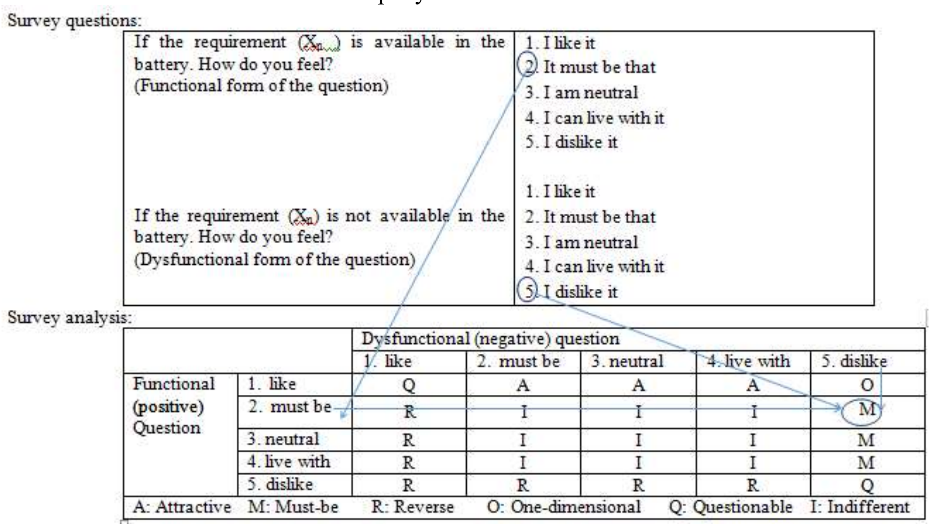

Figure 3. Survey questions and Survey analysis

Table (6) indicates the percentage of frequencies of the distributors' answers to the General Company for Batteries Industry / Iraq on the functional questions (satisfaction). As the requirements (battery life, Amperometry, price, Maintenance of Car Batteries AGM, resistance to weather conditions, and ease of obtaining the product) obtained the desire of distributors for the presence of these features in the batteries and in percentages, respectively (38.8%, 80%, 31.3% , 37.5%, 70%, 68.8%). Whereas (efficiency) was a feature that must be available in batteries, with a percentage of (60%).

Table 6.Frequency of customer response (functional questions)

	Frequency%					Sum
	1	2	3	4	5	
X_1	21.3	60	18.7	0.0	0.0	100
X_2	38.8	36.2	12.5	12.5	0.0	100
X_3	80	12.5	7.5	0.0	0.0	100
X_4	31.3	25	25	12.5	6.2	100
X_5	37.5	30	25.7	6.8	0.0	100
X_6	70	6.3	12.5	2.5	8.7	100
X_7	68.8	18.8	5	5	2.5	100

Table (7) indicates the percentage of frequencies of distributors' responses to the General Company for Batteries Industry / Iraq on dysfunctional questions. As the requirements (efficiency, battery life, Amperometry, price, and and ease of obtaining the product) obtained the customer's unwillingness to delete these requirements from the batteries in percentages, respectively (87.5%, 68.8%, 88.8%, 42.5%, 68.8%). While the requirements (Maintenance of Car Batteries AGM, resistance to weather conditions) got neutral and percentages, respectively (33.7%, 37.5%).

Table 7.Frequency of customer response (dysfunctional questions)

	Frequency%					Sum
	1	2	3	4	5	
X_1	3.7	0.0	6.3	2.5	87.5	100
X_2	1.2	0.0	18.7	11.3	68.8	100
X_3	1.2	0.0	10	0.0	88.8	100
X_4	3.8	17.5	20	16.3	42.5	100
X_5	0.0	7.5	33.7	27.5	31.3	100
X_6	0.0	12.5	37.5	20	30	100
X_7	1.2	1.2	20	8.8	68.8	100

Table (8) indicates the classification of customer requirements according to the Kano model of batteries. It classified (efficiency, battery life) requirements as Must – Be Attributes, (Amperometry, ease of obtaining the product) requirements as One-Dimensional Attributes, (price, Maintenance of Car Batteries AGM) requirements as Indifferent Attributes and (resistance to weather conditions) Attractive Attributes are requirements.

Table 8. Classification of customer requirements according to the Kano model

customer requirements	**Frequency**						sum	**Classification according to the Kano model**
	A	O	M	I	R	Q		
Efficiency	7	10	60	0	3	0		Must – Be Attributes
battery life	17	14	41	7	0	1		Must – Be Attributes
Amperometry	8	55	16	0	0	1		One-Dimensional Attributes
Price	10	15	20	30	3	2		Indifferent Attributes
Maintenance of Car Batteries AGM	15	15	10	40	0	0		Indifferent Attributes
resistance to weather conditions	46	10	10	7	3	4		Attractive Attributes
ease of obtaining the product	15	40	15	8	2	0		One-Dimensional Attributes

4. CONCLUSION

The General Company for Batteries Industry / Iraq has no knowledge of the customer's requirements and manufactures batteries according to the technical specifications previously specified by the company's top management without caring about the customer's requirements. The existence of a gap between the customer's requirements and the technical specifications of the batteries was the reason for the loss of customers and the inability to compete. The results of the analytical hierarchy process revealed the acceptable of customer requirements including (efficiency, battery life, Amperometry, price, Maintenance of Car Batteries AGM, resistance to weather conditions, and ease of obtaining the product). Fulfilling the customer's requirements requires the General Company for Batteries Industry / Iraq to identify and understand those requirements. Efficiency and battery life must-be given high attention as they are basic requirements for batteries. Amperometry and ease of obtaining the product are one-dimensional requirements according to the classification of the Kano model. The General Company for Batteries Industry / Iraq should pay more attention to the battery's resistance to weather conditions, as it is an attractive requirement for the customer in Iraq, since the weather in Iraq is very hot and dry in summer and very cold and dry in winter. This study aims to apply the integration between the analytical hierarchy process and the Kano model in identifying and classifying customer requirements. The researcher made a recommendation to the General Company for Battery Industry / Iraq to adopt the customer's requirements that were reached in this study in the battery design processes.

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