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IDENTIFYING THE EFFECTIVE INDEXES ON CUSTOMER SATISFACTION AND THE RELATIONSHIP BETWEEN CUSTOMER SATISFACTION (CASE STUDY: THE GAS COMPANY IN GHAZVIN PROVINCE)

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ABSTRACT

Today’s organizations for their success and because satisfied customer is one of principal component pay attention to the concept of customer and its satisfaction. In this research with study and analysis of different customer satisfaction measurement of different countries and people has been attempted to detect impact customer satisfaction indexes, and with applying “Analytical Hierarchy Process (AHP)” technique the relative importance of any index has been determined, and also with applying “Fuzzy Technique for Order Preference by Similarity to Ideal Solution (FTOPSIS)” method, principal indexes sub criteria has been prioritized, at last with utilizing “Decision Making Trial and Evaluation Laboratory (DEMATEL)” technique has been determined.

KEYWORDS: Customer Satisfaction (Customer), Fuzzy, MADM, AHP, F.TOPSIS, DEMATEL

INTRODUCTION

The world is changing with an amazing speed and thus organizations must adapt themselves with change in order to survive. Therefore, they need to improve their performance to be able to achieve excellence (Foruzande, 2008: 10). Today, role of the customers has been changed from following manufacturers to directing the investors, producers and even researchers and innovators. Many concepts and theories, hence, have been written on the basis of "customer" (Imani, 2008: 8). Governmental management in the past paid attention to events inside the bureaucracy primarily and generally regarded the internal problems of bureaucracy as the principal problem (Alvani, 2012: 204). According to scholars of political and administrative sciences if governments cannot provide material and spiritual needs and satisfaction of citizens, various crises such as public confidence, legitimacy of the system, public participation and convergence crisis are created in the
society and these are led to discontinuity and crisis in the process of development besides reduction of efficiency of the political and administrative system (Kazemi, 2001: 227).

Therefore, performance management of governmental organizations to improve quality of the offered services in order to satisfy the citizens and clients can have a considerable importance and play a strategic role in development of societies, because improving the performance of such organizations increases competitive capability, productivity and responsiveness power of these organizations (Khaki, 2008: 92).

Conducting social researches is regarded as a solution and a reasonable and basic method to eliminate the problems and represent new recommendations in the society. Most organizations and institutions have appealed to results of researches and evaluation of the public opinion to improve their activity and more coordination with the society and have concluded that opinions of people and customers can have a considerable role in enhancement of the level of quality and improvement of the methods as well as their permanent cooperation.

It was tried in this paper to identify the effective indexes on customer satisfaction using multi-criteria decision making models; determine relative importance of the effective indexes and sub-indexes; specify the prioritization and degree of effect of satisfaction indexes on each other to improve performance of the company under study through presenting strategies in order to eliminate the weaknesses and reinforce the strengths.

**Importance and necessity of the survey**

Customer orientation and attracting the clients' satisfaction is one of the primary strategies and priorities of successful organizations in the current world. Organizations which disregard the needs and demands of their customers and prefer the product-oriented approach to customer-oriented approach are omitted from the competition environment.

Nowadays, customer orientation is not just allocated to the private and commercial firms; rather it has enjoyed a special importance and status in governmental organizations since the 1990's in the twentieth century. Given that providing the interests of the public is the major mission and philosophy of governmental management all citizens, therefore, are regarded as customer in governmental organizations (Alvani, 2009: 290-292).

Attracting the clients and citizens' satisfaction increases public trust and loyalty, national unity, public participation and national sovereignty that are considered as principal indexes to measure efficiency and develop the administrative and political system in the modern world (Kazemi, 2001: 266-267). Satisfaction has been defined as attitude or feeling of a customer towards a product or service after using it (Jamal & Naser, 2002: 147).
The Gas Company as a small organization in a macro administrative system entitled the government undertakes the proper management of demand and supply of gas subscribers and protecting the existing resources for the future generations given to the population increase and limited gas resources of the country. Therefore, making mutual relationship with customers in order to make them familiar with services which can be offered by the Gas Company as well as receiving feedback about how to offer services to improve quality will have a considerable effect on realization of the company's purposes. Identifying the effective indexes on customer satisfaction, determining their importance and prioritization and degree of effect of indexes on each other are led to the company's orientation and focus towards that direction and thus success of the company. Therefore, given that no research has been conducted in recent years to identify the effective factors on customer satisfaction in the Gas Company in Ghazvin province, the present paper studied this issue.

**Purpose of the survey**

It was intended in this survey to identify customer satisfaction indexes through studying the measurement models of customer satisfaction in other countries and by other researchers which have academic validity and determine relative importance of each index by means of analytical hierarchy process (AHP). Considering the limitation of resources it is not possible to offer service in all fields. Hence, this company can lead the resources and possibilities towards the most important indexes using the results of this survey to prevent wasting of resources besides customer satisfaction by optimal utilization of resources.

**Implications of the survey**

Implications of this survey are helpful for the following beneficiaries:

1- The Gas Company can use the results of this survey in its planning to increase customer satisfaction.

2- Results of this survey can be a reference for policy-makers of the gas industry and similar companies to improve satisfaction effectively.

3- Students and academic researchers can use this survey as a research resource and conduct other studies in order to complete the results of the present survey.

**Research questions**

The model in this survey is non-parametric due to the applied logic in research methodology, because the applied models have some inconsistency and mathematical basis. Analytical hierarchy process (AHP) and fuzzy technique for order preference by similarity to ideal solution (F.TOPSIS) do not need statistical hypotheses, thus question is used.
The primary question
What are the effective indexes on customer satisfaction in the Gas Company?

Secondary questions
1- What are the effective indexes on customer satisfaction in the Gas Company?
2- What is the relative importance of each index using analytical hierarchy process?

Methodology, statistical population, sampling method and sample size, methods and tools of data analysis

This survey is applied in terms of purpose. The model will be used to measure customer satisfaction in the company under study. In terms of method of data collection the survey is descriptive-field in which the sample under study is referred in person and will be supported using historical study, the World Wide Web, articles and information bank. Moreover, data was collected through an opinion poll from the elites. Thus a questionnaire was compiled to test the model.

The statistical population included twenty three elites of the Gas Company in Ghazvin province and all were gas distribution authorities of various areas and had direct contact with customers (gas subscribers). Therefore, sample volume was not needed and sampling was not conducted due to direct referring to the statistical population and using their opinions for data collection by means of questionnaire. Indexes were prioritized through analytical hierarchy process (AHP) and fuzzy technique for order preference by similarity to ideal solution (F.TOPSIS) given to the indexes and their weighting based on the elites’ opinions. Besides, decision-making trial and evaluation laboratory. EC, MATLAB, TOPSIS and Excel software were applied too. In order to obtain validity of the test, questions were studied through the opinions and guidance of the theoreticians. Then the confirmed questionnaire was given to elites. Calculation and statistical tests were not required regarding reliability, since DEMATEL technique is non-parametric. About AHP technique the inconsistency rate determines consistency of comparisons and shows to what extent the priorities obtained by group members or those of compound tables can be trusted and whether the error has an acceptable amount or not. Limit of the acceptable rate of inconsistency is equal to 0.1.

Research literature

Various processes of formation of customer satisfaction can be classified in different models which depict the relationship between customer satisfaction and its stimulants (Divandari, 2006: 189). Table 1 illustrates models and indexes of customer satisfaction in different countries which have academic validity. In addition, comparison of these models is shown in Table 1.
Variables under study in the framework of a conceptual model and their studying and measuring

Having studied the conducted researches through articles, specialized journals, academic books and websites about customer satisfaction twenty two principal indexes were identified that are identifiable in the Gas Company in Ghazvin province too. The proposed model is displayed in Figure 1.

**Analytical hierarchy process (AHP)**

Analytical hierarchy process is one of the most efficient and comprehensive techniques for decision-making with multiple indexes that was proposed by Thomas L.Saaty in 1980 for the first time. It is widely used in solving managerial, economic and social problems. Formulation of the problem in hierarchical form is possible through this method and also it is possible to consider various qualitative and quantitative indexes in problem solving (Ghodsipour, 2009: 1-5).

**Table 1- Various models of customer satisfaction and introduction of the principal indexes**

<table>
<thead>
<tr>
<th>Row</th>
<th>Models' name</th>
<th>Inventor</th>
<th>The introduced indexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kano model (Maleki, 2009: 28)</td>
<td>Noriaka Kano</td>
<td>Performance, attraction</td>
</tr>
<tr>
<td>2</td>
<td>Swedish customer satisfaction barometer (SCSB) (Kavusi, 2010: 403)</td>
<td>Kleiz Fornell</td>
<td>Customer's perceptions of performance quality, customer expectations, customer complaints, customer loyalty</td>
</tr>
<tr>
<td>3</td>
<td>American customer satisfaction index (ACSI) (Kavusi, 2010: 403)</td>
<td>American Society for Quality- Department of Business, University of Michigan</td>
<td>Customer expectations, perceived value, perceived quality, customer complaints, customer loyalty</td>
</tr>
<tr>
<td>4</td>
<td>European customer satisfaction index (ECSI) (Kavusi, 2010: 422)</td>
<td>European organization for quality (EOQ)- European foundation for quality management (EFQM)</td>
<td>Conception, expectations, perceived quality of hardware, perceived quality of software, perceived value, loyalty</td>
</tr>
<tr>
<td>5</td>
<td>Swiss customer satisfaction (SWICS) (Kavusi, 2010: 428)</td>
<td>Department of marketing and business, University of Basel</td>
<td>Total satisfaction, satisfaction versus expectations, customer relationship, customer loyalty</td>
</tr>
<tr>
<td>6</td>
<td>Norwegian customer satisfaction barometer (NCSB) (Fani, 2009:10)</td>
<td>Johnson et al.</td>
<td>Quality stimulant, perceived price, dealing with complaints, image of the company, affective commitment, calculative commitment, customer loyalty</td>
</tr>
<tr>
<td>7</td>
<td>Turkish national customer satisfaction index (TCSI) (Fani, 2009: 10)</td>
<td>Aydin, 2005: 486-504</td>
<td>Customer expectations, perceived quality, dealing with complaints, confidence, brand, customer loyalty, replacement costs</td>
</tr>
<tr>
<td>8</td>
<td>Malaysia customer satisfaction index (MCSI) (Kavusi, 2010: 431-432)</td>
<td>-------</td>
<td>Perceived quality, perceived value, customer expectations, image of the product or service, loyalty</td>
</tr>
<tr>
<td>9</td>
<td>Iranian customer satisfaction index (ICS) (Fani, 2009: 17)</td>
<td>Fani, A.A</td>
<td>Dealing with complaints, perceived quality, perceived price, confidence, affective commitment, normative commitment, replacement costs, image of the company, customer loyalty</td>
</tr>
<tr>
<td>10</td>
<td>Ten-dimensional service quality (SERVQUAL) (Kavusi, 2010: 106-107)</td>
<td>Parasaruman, Zitammel &amp; Berry</td>
<td>Physical facilities, equipments, tendency to respond, employees' proficiency and skill, politeness, reliability, security, possibility of access, communication, customer recognition</td>
</tr>
</tbody>
</table>
Paired comparisons

A questionnaire was designed in this step that contains matrixes of paired comparisons and how to complete the matrix. Then it was given to the elites to give appropriate scores given to the importance of indexes in row A over indexes of the column B in binary form (paired comparisons) and based on Thomas L. Saati’s scoring table (Table 2).

Table 2- L.Saati’s scoring table

<table>
<thead>
<tr>
<th>Row</th>
<th>Preferences (verbal judgment)</th>
<th>Numerical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Totally preferred or more important</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Very strong preference or importance</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Strong preference or importance</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>A little preferred or a little important</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Similar preference or importance</td>
<td>1</td>
</tr>
</tbody>
</table>

(Ghodsipour, 2009: 14)

Calculation of the inconsistency rate

The acceptable inconsistency rate in AHP method is less than 0.1. If the number of elites (respondents) is more than one person, the inconsistency rate is calculated based on geometric mean of respondents. EC software that is special for this method was used because calculations were lengthy and complex.

Fuzzy technique for order preference by similarity to ideal solution (F.TOPSIS)

This method was proposed by Hwang and Yoon in 1981 to solve a multi-criterion decision-making problem with n criteria and m alternatives. It is on the basis of the concept that the selected alternative must have the least distance with the positive ideal solution and the most distance with negative ideal solution.
Loft Ali Asgarzade (Lotfizade) introduced the concepts of fuzzy sets with ambiguous and unclear boundaries in his famous article in 1965. In other words, each element or member is in a classic set with ambiguous boundaries or is not (Rajaee, 2009: 3).

In the principle of "incomparability" Professor Asgarzade expounded that members of fuzzy sets are not certain and a number from the range (0, 1) is assigned as membership degree of that member in the set to analyze the sets. Performing calculations with fuzzy numbers is time-consuming and complicated due to their special structure. In order to facilitate it, triangular fuzzy numbers \((l, m, u)\) are used that \(l\) and \(u\) are the lower and upper limits and \(m\) is the intermediate value (Rezvani, 2010: 184-185).

Fuzzy Diagram 1- Euclid distances of positive and negative ideal solutions in two-dimensional space (Hwang & Yoon, 1989: 129)

**Formation of decision matrix**

As it was mentioned earlier, a decision matrix is evaluated in this method which contains \(m\) alternatives and \(n\) indexes. Therefore, the decision matrix is as below where

\[ A_{ij} \] is the \(i\)th alternative and \(X_{ij}\) is the obtained number from alternative \(i\) with \(j\)th index. Moreover, the index with positive desirability is the profit index and the one with negative desirability is the cost index. F.TOPSIS model by Chang was used in this survey. If triangular fuzzy numbers are used in the problem, then \(X_{ij} = (a_{ij}, b_{ij}, c_{ij})\). 

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If evaluation of alternatives based on the criteria is performed through taking an opinion from a group with \( k \) members and evaluation of the \( k \)th decision-maker is \( X_{ijk} = (a_{ijk}, b_{ijk}, c_{ijk}) \), alternatives can be considered based on the following relations given to synthetic fuzzy ranking criteria.

\[
\begin{align*}
    a_{ij} &= \text{Min}(a_{ij}) \\
    b_{ij} &= \sum_{k=1}^{k} \frac{b_{ijk}}{k} \\
    a_{ij} &= \text{Max}(c_{ijk})
\end{align*}
\]

**Determining the weight matrix of criteria**

The impact factor of various criteria is as below in this case: \( W_j = [w_1, w_2, \ldots, w_n] \)

If triangular fuzzy numbers are used, each component of \( W_i \) is defined as \( W_{ij} = (W_{ij1}, W_{ij2}, W_{ij3}) \). If weight of the criteria is obtained from the elites group, the following relations can be used to average the group opinions:

\[
\begin{align*}
    a_{ij} &= \text{Max}(w_{jk3}) \\
    b_{ij} &= \frac{\sum_{k=1}^{k} w_{jk2}}{k} \\
    a_{ij} &= \text{Min}(w_{jk1})
\end{align*}
\]

**Normalizing the fuzzy decision matrix**

The linear scale to convert various criteria into a comparable scale was used to normalize the amounts of fuzzy decision matrix. Given that \( X_{ij} \)s are fuzzy, certainly \( r_{ij} \) will be fuzzy too.

Regarding rectangular fuzzy numbers, entries of decision matrix for positive and negative criteria are calculated according to the following relations respectively.

\[
\begin{align*}
    r_{ij} &= \left( \frac{a_{ij}, b_{ij}, c_{ij}}{c_{ij}, c_{ij}, c_{ij}} \right) \\
    c_j^* &= \text{max} c_{ij} \\
    r_{ij} &= \left( \frac{a_{ij}, a_{ij}, a_{ij}}{c_{ij}, b_{ij}, a_{ij}} \right) \\
    a_j^* &= \text{min} c_{ij}
\end{align*}
\]

**Determining the fuzzy decision matrix of vector's weight**

Given to the weight of various criteria, weighted fuzzy decision matrix is obtained through multiplication of the impact factor related to each criterion by the normalized fuzzy matrix as below: \( v_{ij} = r_{ij} \times w_{ij} \) where \( w_{ij} \) indicates importance of the criterion \( c_i \). Therefore, the
weighted fuzzy decision matrix will be as below. If fuzzy numbers are in triangular form, the following are true for the criteria with positive and negative dimension:

\[
v_q = r_q \times w_j = \left( \frac{a_g}{c_y}, \frac{b_g}{c_y}, \frac{c_g}{c_y} \right) \times (w_{j1}, w_{j2}, w_{j3}) = \left( \frac{a_g \times w_{j1}}{c_y}, \frac{b_g \times w_{j2}}{c_y}, \frac{c_g \times w_{j3}}{c_y} \right)
\]

Finding fuzzy ideal solution and fuzzy anti-ideal solution

\[A^+ = (v_1^+, v_2^+, \ldots, v_n^+) \quad A^- = (v_1^-, v_2^-, \ldots, v_n^-)\]

The following constants are proposed to calculate the amounts of fuzzy ideal solution and fuzzy anti-ideal solution.

\[A^+ = (1, 1, 1) \quad A^- = (0, 0, 0)\]

Calculating the distance from fuzzy ideal and anti-ideal solution

Distance of each fuzzy ideal and anti-ideal solution is obtained in this step.

\[s_i^+ = \sum_{j=1}^n d(v_{ij}^+, v_j^+) \quad i = 1, 2, \ldots, m\]

\[s_i^- = \sum_{j=1}^n d(v_{ij}^-, v_j^-) \quad j = 1, 2, \ldots, n\]

If the fuzzy number is triangular, distance of two triangular numbers \((a_1, b_1, c_1)\) and \((a_2, b_2, c_2)\) is obtained as below.

\[d(M_1, M_2) = \sqrt{\frac{1}{3} \left[ (a_1 - a_2)^2 + (b_1 - b_2)^2 + (c_1 - c_2)^2 \right]}\]

Calculation of the similarity index

Similarity index is calculated through the below relation:

\[CC_i = \frac{s_i^-}{s_i^+ + s_i^-}\]
Ranking of alternatives

The alternatives are ranked in this step given to the amount of similarity index so that those which have more similarity index obtain a higher rank.

Decision-making trial and evaluation laboratory (DEMATEL)

This technique was established by Fonetla and Gabus at the end of 1971 mainly to study the complicated world problems. It studies intensity of communications in the form of scoring, investigates feedbacks along with their importance and accepts non-transferable relations.

This technique has nine steps as follows:

1- Determining the constituting factors of the system
2- Determining the factors in vertices of a diagraph and the dominant relations in them
3- Specifying the group decision-making rule for collective agreement of judgment by elites
4- Determining the degree of final relations among factors
5- Showing the final scores of a matrix
6- Multiplying each input of matrix by the inverse of the highest sum of a row in that matrix
7- Calculating sum of an infinite sequence of direct and indirect effects of factors on each other
8- Calculating the possible degree of indirect relations
9- Determining the possible hierarchy or structure of factors (Asgharpour, 2011: 132-139).

Determining the indexes

As it was mentioned fourteen measurement models of customer satisfaction which had academic credit were identified. Among these models, twenty two customer satisfaction indexes were extracted and given to twenty three elites of the Gas Company as a questionnaire and in the form of 22 questions.

In order to determine the significance of customer satisfaction indexes more accurately, their fuzzy and normal weights were calculated given to the scores allocated by elites to specify whether the index which has more normal weight has more fuzzy weight too or not.

Responses to each question were in the form of five alternatives including A) extremely important B) important C) moderate importance D) least important E) much less important.

Because responses were in the form of qualitative numbers (alternatives of extremely important to much less important) a triangular fuzzy number was given to each option to convert qualitative numbers into definite quantitative numbers. The above fuzzy numbers were converted into definite numbers using concepts of fuzzy logic and the formula to convert fuzzy numbers into definite numbers (Minkoswsky formula). Triangular fuzzy
numbers were converted into definite fuzzy numbers through the following formula so that \( \beta \) and \( \alpha \) are high and low limits and \( m \) is the intermediate value.

\[
x = M + \frac{\beta - \alpha}{4}
\]

Having used the five options in Table 3, the elites gave scores to each index. Calculations of total weight, relative weight, normal weight, and total fuzzy weight, relative weight of index and normal fuzzy weight were conducted.

Table 3- Converting triangular fuzzy number into definite numbers

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Qualitative number</th>
<th>Triangular fuzzy number</th>
<th>Definite fuzzy number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Extremely important</td>
<td>(0 ( \approx ) 0.3 ( \approx ) 1)</td>
<td>0.925</td>
</tr>
<tr>
<td>B</td>
<td>Important</td>
<td>(0.25 ( \approx ) 0.25 ( \approx ) 0.75)</td>
<td>0.75</td>
</tr>
<tr>
<td>C</td>
<td>Moderate importance</td>
<td>(0.2 ( \approx ) 0.2 ( \approx ) 0.5)</td>
<td>0.5</td>
</tr>
<tr>
<td>D</td>
<td>Least important</td>
<td>(0.15 ( \approx ) 0.15 ( \approx ) 0.25)</td>
<td>0.25</td>
</tr>
<tr>
<td>E</td>
<td>Much less important</td>
<td>(0 ( \approx ) 0 ( \approx ) 0.3)</td>
<td>0.075</td>
</tr>
</tbody>
</table>

Order of the highest normal weight and normal fuzzy weight of customer satisfaction indexes are illustrated in Table 4. Comparing two columns of normal weight and normal fuzzy weight related to principal indexes of customer satisfaction shows that rank of indexes has not been changed. Indexes were screened due to high number of indexes and to prevent confusion and indexes which had the highest normal weight and normal fuzzy weight were selected. Therefore, the first nine indexes which had the highest weight were selected and being tested.

**Ranking of indexes using AHP method**

The second research question was that "what is the relative importance of each criterion using AHP technique?" First, a model was designed and analyzed in order to respond to the question. This method is based on three principles: creating a classical structure and framework for the problem, establishment of preferences through paired comparisons and establishment of logical compatibility from the measurement.
Figure 1-Customer satisfaction index recommendation model

Table 4- Order of the highest normal weight and fuzzy normal weight of customer satisfaction indexes

<table>
<thead>
<tr>
<th>Rank</th>
<th>Index</th>
<th>Name of the index</th>
<th>Normalized fuzzy weight</th>
<th>Normalized weight</th>
<th>Rank</th>
<th>Index</th>
<th>Name of the index</th>
<th>Normalized fuzzy weight</th>
<th>Normalized weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C18</td>
<td>Politeness</td>
<td>0.0597</td>
<td>0.05921</td>
<td>12</td>
<td>C3</td>
<td>Customer loyalty</td>
<td>0.0463</td>
<td>0.04611</td>
</tr>
<tr>
<td>2</td>
<td>C14</td>
<td>Responsiveness</td>
<td>0.0566</td>
<td>0.05611</td>
<td>13</td>
<td>C16</td>
<td>Sympathy</td>
<td>0.0450</td>
<td>0.04490</td>
</tr>
<tr>
<td>3</td>
<td>C17</td>
<td>Proficiency and skill</td>
<td>0.0561</td>
<td>0.05546</td>
<td>14</td>
<td>C4</td>
<td>Customer perceptions of service quality</td>
<td>0.0450</td>
<td>0.04482</td>
</tr>
<tr>
<td>4</td>
<td>C19</td>
<td>Security</td>
<td>0.0516</td>
<td>0.05053</td>
<td>15</td>
<td>C15</td>
<td>Reliability/ guarantee</td>
<td>0.0437</td>
<td>0.04417</td>
</tr>
<tr>
<td>5</td>
<td>C5</td>
<td>Customer relationship</td>
<td>0.0514</td>
<td>0.05051</td>
<td>16</td>
<td>C6</td>
<td>Perceived value</td>
<td>0.0422</td>
<td>0.04239</td>
</tr>
<tr>
<td>6</td>
<td>C21</td>
<td>Information</td>
<td>0.0509</td>
<td>0.05051</td>
<td>17</td>
<td>C10</td>
<td>Affective commitment</td>
<td>0.0386</td>
<td>0.03921</td>
</tr>
<tr>
<td>7</td>
<td>C9</td>
<td>Tangibility/personal appearance</td>
<td>0.0491</td>
<td>0.04867</td>
<td>18</td>
<td>C11</td>
<td>Calculative commitment</td>
<td>0.0381</td>
<td>0.03915</td>
</tr>
<tr>
<td>8</td>
<td>C2</td>
<td>Dealing with complaints</td>
<td>0.0483</td>
<td>0.04803</td>
<td>19</td>
<td>C7</td>
<td>Image or brand of the supplier firm</td>
<td>0.0373</td>
<td>0.03800</td>
</tr>
<tr>
<td>9</td>
<td>C20</td>
<td>Possibility of access</td>
<td>0.0480</td>
<td>0.04741</td>
<td>20</td>
<td>C12</td>
<td>Perceived price</td>
<td>0.0352</td>
<td>0.03603</td>
</tr>
<tr>
<td>10</td>
<td>C1</td>
<td>Customer expectations</td>
<td>0.0472</td>
<td>0.04679</td>
<td>21</td>
<td>C22</td>
<td>Normative commitment</td>
<td>0.0329</td>
<td>0.03262</td>
</tr>
<tr>
<td>11</td>
<td>C13</td>
<td>Reliability</td>
<td>0.0470</td>
<td>0.04676</td>
<td>22</td>
<td>C8</td>
<td>Customer recognition</td>
<td>0.0298</td>
<td>0.03101</td>
</tr>
</tbody>
</table>

C18>C14>C17>C19>C5>C21>C9>C2>C20>C1>C13>C3>C16>C4>C15>C6>C10>C11>C7>C12>C22>C8
Data collection and calculation of the inconsistency rate

In this step principal indexes, sub-indexes and the three alternatives (three kinds of subscriber) extracted from AHP decision-making tree were given to seven elites in the form of a questionnaire to complete it using paired comparisons matrix and based on L. Saati's scoring table. The inconsistency rate of all matrixes was calculated by means of EC software to separate the compatible and incompatible matrixes. Matrixes whose inconsistency rate is less than 0.1 are judgments of reliable decision-makers.

Data analysis

Compatible corresponding matrixes were mixed in this step based on geometric mean and their calculations and results were obtained using Excel software. The results obtained through AHP technique are displayed in Tables 5 and 6. Moreover, Diagram 3 shows the results obtained from this technique.

Table 5- Prioritization of effective indexes on customer satisfaction in the Gas Company

<table>
<thead>
<tr>
<th>Number of index</th>
<th>Name of index</th>
<th>Priority</th>
<th>Sub-index</th>
<th>wi</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Politeness</td>
<td>1</td>
<td>Proficiency</td>
<td>0.457</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>External adornment</td>
<td>0.253</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Cheerfulness</td>
<td>0.182</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Respect and civility</td>
<td>0.107</td>
</tr>
<tr>
<td>C2</td>
<td>Responsiveness</td>
<td>5</td>
<td>Service offering without wasting the time</td>
<td>0.737</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Enthusiasm for responding to the customer</td>
<td>0.263</td>
</tr>
<tr>
<td>C3</td>
<td>Skill and proficiency</td>
<td>7</td>
<td>Having skills for serving</td>
<td>0.690</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>Having knowledge for serving</td>
<td>0.310</td>
</tr>
<tr>
<td>C4</td>
<td>Communication</td>
<td>9</td>
<td>Nonexistence of doubt</td>
<td>0.629</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>Nonexistence of risk</td>
<td>0.371</td>
</tr>
<tr>
<td>C5</td>
<td>Customer relationship</td>
<td>11</td>
<td>Relationship satisfaction</td>
<td>0.487</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>Easiness of total relation</td>
<td>0.317</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>Tendency to make relation with the supplier</td>
<td>0.196</td>
</tr>
<tr>
<td>C6</td>
<td>Information</td>
<td>14</td>
<td>Rules and regulations</td>
<td>0.465</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>Probable risks</td>
<td>0.278</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
<td>Proper using of services</td>
<td>0.165</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17</td>
<td>Type of services that can be offered</td>
<td>0.093</td>
</tr>
<tr>
<td>C7</td>
<td>Tangibility/personal</td>
<td>18</td>
<td>Appearance of employees</td>
<td>0.455</td>
</tr>
<tr>
<td></td>
<td>appearance</td>
<td>19</td>
<td>Equipments</td>
<td>0.265</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>Physical facilities</td>
<td>0.157</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21</td>
<td>Personal appearance</td>
<td>0.123</td>
</tr>
<tr>
<td>C8</td>
<td>Dealing with complaints</td>
<td>22</td>
<td>Complaints to management</td>
<td>0.746</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
<td>Complaints to the employee</td>
<td>0.254</td>
</tr>
<tr>
<td>C9</td>
<td>Possibility of access</td>
<td>24</td>
<td>Easiness in making relation</td>
<td>0.641</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>Degree of intimacy in making relation</td>
<td>0.359</td>
</tr>
</tbody>
</table>
Table 6- Prioritization of principal indexes of customer satisfaction in the Gas Company

<table>
<thead>
<tr>
<th>Priority</th>
<th>Principal indexes</th>
<th>Wi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Politeness</td>
<td>0.271</td>
</tr>
<tr>
<td>2</td>
<td>Responsiveness</td>
<td>0.204</td>
</tr>
<tr>
<td>3</td>
<td>Skill and proficiency</td>
<td>0.146</td>
</tr>
<tr>
<td>4</td>
<td>Security</td>
<td>0.114</td>
</tr>
<tr>
<td>5</td>
<td>Customer relationship</td>
<td>0.085</td>
</tr>
<tr>
<td>6</td>
<td>Information</td>
<td>0.064</td>
</tr>
<tr>
<td>7</td>
<td>Tangibility/personal appearance</td>
<td>0.048</td>
</tr>
<tr>
<td>8</td>
<td>Dealing with complaints</td>
<td>0.039</td>
</tr>
<tr>
<td>9</td>
<td>Possibility of access</td>
<td>0.029</td>
</tr>
</tbody>
</table>

Findings and results

It was tried in this survey to identify and rank customer satisfaction indexes of the Gas Company and then determined their degree using AHP, DEMATEL and F.TOPSIS techniques. Findings of these techniques are first analyzed and then recommendations will be proposed for future researches. Finally the existing obstacles of this survey will be stated.

Findings of analytical hierarchy process (AHP) technique

The results obtained from this method which are displayed in Table 6 reveal that principal indexes of politeness, responsiveness, skill and proficiency, security, customer relationship, information, tangibility/personal appearance, dealing with complaints and possibility of access are the first to ninth priorities in weight order according to the experts.

Applied Recommendations

Given to results of the survey, some recommendations are presented to increase satisfaction level of customers (subscribers) as below:
1- It is recommended to implement a compiled system to measure subscribers' satisfaction during time periods using the identified indexes in the Gas Company so that the company can be aware of the expectations and demands of subscribers.

2- Employees who are in direct contact with subscribers should have good human and technical skills, public relations, suitable behavior and the required motivations.

3- It is recommended to the company to prepare booklets and hold educational terms to train employees who have a direct relation with customers and help them understand the concepts and the manner of applying highly important indexes.

4- Given to the importance of the role of satisfaction in the organization and in order to enhance it, it is recommended to encourage employees who satisfy customers to provoke competition in other employees besides persuading them.

References

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17. Zakeri Shahsavari, S. (2011). Studying effective factors on satisfaction of regional water customers in Hormozgan province in order to improve the organization. Hormoz Research Center in Hormozgan University