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Identifying and analyzing the driving affecting factors on customer relationship management

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ABSTRACT

The purpose of writing the current paper is to identify and classify the driving affecting factors on customer relationship management. For measuring customer relationship management, we utilized 6 dimensions includes: knowledge management, technology, top management, personnel, service customizing and system integration. 2 questionnaires for identify and rank factors were designed and after proving their validity and reliability distributed participants. The results of applying Chi Square and Friedman tests show all dimension have positive and meaningful influence on customer relationship management. Finally by applying fuzzy TOPSIS technique, the sub criteria of customer relationship management were ranked in which "Reviewing and changing customers' activities and other ones to achieve more customer orientation", "Putting comprehensive information to customers about organizational services" and "Leading executive customer oriented plans by top managers" were selected as the most important sub criteria.

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Introduction

Development of industrial marketing and service marketing led to a new approach which focused for a long term and close relations with customers. Therefore transaction-based marketing which emphasis only on the selling of the product shifted to interactive marketing which focus on the establishment of sustainable and long term relations with customers. So the notion of relationship marketing into the literature was introduced in 1983 which is attracting, maintaining and increasing relations with customers (Aali et al, 2012).

Customer Relationship Management has an old background as trading history. In recent years mass production and mass marketing decreased production expenses and marketing as it was not possible to have direct relationship with the customers one by one. After the of Information technology arrival, it was possible for all organizations to practice the art of Customer Relationship Management again. Customer Relationship Management is one of the best business trading and information solution systems to help organizing and better understanding of the customer needs and desires (Bahrami & Beiki, 2011).

Modern organizations show their goods and services which are defined by their customers. Customer relationship management is a new technique through technical methods for sale, marketing, provision chain or services, and CRM systems are the systems about all development of organizations and customers' attitudes about organizations (Galbreath & Rogers, 1999).

In Iranian companies which Tehran province Gas Company is one of them, the customer' needs and desires are not absolutely met and the special services supply to some special customers. In the current paper we are trying to survey and analyze the driving affecting factors on customer relationship management.

Literature review

Customer relationship management

In today's complex world, customers played important role in success of failure of every organizations. Their satisfaction and loyalty lead to high sale and profitability (Heidari et al, 2012; Ghalandari, 2012). Customer satisfaction is a vital marketing concept which illustrates satisfying the needs and desires of the customers are crucial for success of every organization (Han & Ryu, 2006; Spreng et al, 1996). One of the most important methods to achieve more customer satisfaction is customer relationship management.

CRM is one of the important concepts for all organizations which have direct or indirect relationships with their customers. The objective of every organization is to offer services and products to customers in minimal time and with the highest quality. Customers' satisfaction and permanency is more valuable for organizations than attraction of new customers. Nowadays organizations offer productions and services which are defined by all customers. A customer relationship management is something beyond traditional operational automation through technical methods for sale, marketing, provision chain or services, and also a customer relationship management system is higher than mere quality of services or customer services. Being comprehensively acquainted with customers' desires and wants and having a 360° viewpoint (complete) about them, organizations are able to offer their productions or services in higher quality and strengthen their relationship with customers more than before (Sheikhi et al, 2012).

Customer management, customer information system, customer value management, customer supporting and occasionally customer-based or customer-related management are other names of customer relationship management which

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have been identified as customer relationship management (Thompson, 2002).

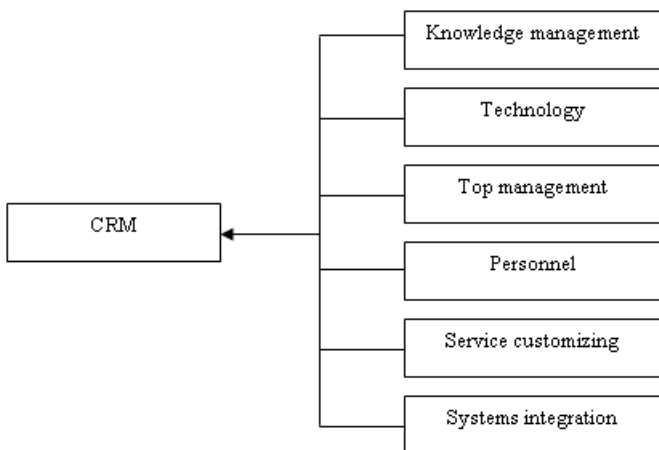
Customer relationship management is one of the most important concepts in business strategy, market management and information technology categories. It is also base on multi functional philosophy which need to business integration. So successful implementation of customer relationship management is absolutely difficult function (Piccoli et al, 2003).

Shapiro (1985) believes that CRM includes distributing customers' information all over the organization, formulating some strategies, meeting market needs generally and commitment to related plans all around the organization (Shapiro, 1985).

Of course customer relationship management is not just technology, marketing, sale or services, but it is a strategy which empowered by technology. When organizations implement CRM system, the strategy includes marketing, sale, servicing, databases, technology and external factors (employees, cultural and environmental factors). The decision to implement CRM strategy should be done in a comprehensive framework and all employees, activities, business processes and even all systems and databases all over the companies. In deed there should be a general plan to identify who is responsible to do which work. It makes organizations to achieve their goals and more powerful relations (Reynolds, 2002).

Conceptual framework of research and hypotheses

The model below is derived of Vazifedust et al (2012) research. He proposed 13 models of customer relationship management. In the current paper according to Tehran Gas Company need and after a meeting with the managers, 5 factors were selected includes: knowledge management, technology, top management, personnel, service customizing and system integration.



Conceptual framework of research

So 5 hypotheses were designed for the current study.

1. Knowledge management has positive and meaningful influence on customer relationship management.
2. Technology has positive and meaningful influence on customer relationship management.
3. Top management has positive and meaningful influence on customer relationship management.
4. "Personnel" has positive and meaningful influence on customer relationship management.
5. Service customizing has positive and meaningful influence on customer relationship management.
6. Systems integration has positive and meaningful influence on customer relationship management.

Research Methodology

The study is in a society involving 112 people from chairmen of Tehran Gas Company. For gathering data, liberty method and questionnaire were used. Two questionnaires included 21 questions about customer relationship management were designed. The first one was by likert 5 point scale and the other one in 7point scale in Chen (2000) format.

For assessing questionnaire validity we asked for experts' opinions and to confirm its reliability Cronbach's alpha method has been applied. For reliability Cronbach's alpha technique was utilized.

The reliability of each variable and questionnaire as a whole are shown in table 1:

Table 1: The Cronbach's alpha for questionnaire

Number	Variables	Cronbach's Alpha
1	Questionnaire as a whole	0.81
2	Knowledge management	0.73
3	Technology	0.79
4	Top management	0.85
5	Personnel	0.78
6	Service customizing	0.88
7	Systems integration	0.82

As table 1 shows all ones are more than 0.7, so the reliability was proved. As the questions in both questionnaires are the same, reliability of one of them is treated sufficient.

Fuzzy TOPSIS technique

Decision making is finding process of the best option among all of them. Almost all of decision making questions are faced to some problems because of high numbers of criteria (Saeedi et al, 2012; b). Therefore for most of them, decision makers want to achieve more than one goal for choosing how to execute activities (Zeleny, 1982).

In traditional multi criteria decision making, the criteria weights were completely identified; but because of ambiguity and uncertainty in decision maker's findings, certainly data explanation is inappropriate. As human judgments are almost ambiguous, so it is not true to apply traditional decision making techniques for the category of decision makings. In recent years for removal of these problems, decision makers utilize fuzzy set for their evaluations (Chen and Hwang, 1992).

The process of using fuzzy TOPSIS technique is (Kalantari et al, 2012; Saeedi et al, 2012; a):

Step 1: calculating weights vector $w \sim j$

Step 2: normalizing the calculated matrix:

$$R^0 = [r_{ij}^0]_{m \times n}$$

$B \subseteq \{1, \dots, n\}$ is related to benefit-based indices and

$C \subseteq \{1, \dots, n\}$ is related to cost-based indices.

$$r_{ij}^0 = \left(\frac{a_{ij}}{d_j^*}, \frac{b_{ij}}{d_j^*}, \frac{c_{ij}}{d_j^*}, \frac{d_{ij}}{d_j^*} \right), \quad j \in B$$

$$r_{ij}^0 = \left(\frac{a_j^-}{d_{ij}^-}, \frac{a_j^-}{c_{ij}^-}, \frac{a_j^-}{b_{ij}^-}, \frac{a_j^-}{a_{ij}^-} \right), \quad j \in C$$

Step 3: so normalized weighted matrix is calculated as formula 4:

$$V^{\%} = [v_{ij}^{\%}]_{m \times n}, \quad i = 1, 2, \dots, m, \quad j = 1, 2, \dots, n$$

$$v_{ij}^{\%} = \mu_{ij}^{\%} \otimes w_j^{\%}$$

Step 4: determining the fuzzy positive ideal solution \tilde{v}_j^*

(FPIS) and fuzzy negative ideal solution \tilde{v}_j^- (FNIS) (formulas 5, 6):

$$\tilde{v}_j^- = \begin{cases} \min_{i=1, \dots, m} \tilde{v}_{ij} & ; j \in B \\ \max_{i=1, \dots, m} \tilde{v}_{ij} & ; j \in C \end{cases}$$

$$\tilde{v}_j^* = \begin{cases} \max_{i=1, \dots, m} \tilde{v}_{ij} & ; j \in B \\ \min_{i=1, \dots, m} \tilde{v}_{ij} & ; j \in C \end{cases}$$

$$FNIS = \{\tilde{v}_j^- \mid j = 1, \dots, n\}$$

$$FPIS = \{\tilde{v}_j^* \mid j = 1, \dots, n\}$$

Step 5: calculating the alternatives from positive and negative ideal by applying formulas 7 and 8:

$$d_i^* = \sum_{j=1}^n d(\tilde{v}_{ij}, \tilde{v}_j^*), i = 1, \dots, m$$

$$d_i^- = \sum_{j=1}^n d(\tilde{v}_{ij}, \tilde{v}_j^-), i = 1, \dots, m$$

Step 6: Calculating the relative closeness to the ideal solution:

$$Cc_i = \frac{d_i^-}{d_i^- + d_i^+}$$

In real-word situation, because of incomplete or non-obtainable information, the data (attributes) are often not so deterministic, there for they usually are fuzzy /imprecise. So, we try to extend TOPSIS for fuzzy data to categorize the driving factors affecting on intellectual capital. Linguistic variables for the important weight of each criterion are shown in table 5:

Data analyzing

Chi Square test

First of all to identify the relationship between “knowledge management”, “technology”, “top management”, “personnel”, “service customizing” and “system integration” with customer relationship management in Tehran Gas Company, Chi Square test was applied:

Table 2: The results of applying Chi Square test

Variables	Value	Sig	Results
Knowledge management	9.529	0.015	Positive relationship
Technology	10.527	0.019	Positive relationship
Top management	8.553	0.041	Positive relationship
Personnel	12.017	0.034	Positive relationship
Service customizing	6.711	0.025	Positive relationship
Systems integration	9.672	0.027	Positive relationship

As table 2 shows there are positive and meaningful relationship between customer relationship management and its dimension.

Friedman test

To survey the influence of “knowledge management”, “technology”, “top management”, “personnel”, “service customizing” and “system integration” on customer relationship management Friedman test was utilized.

Table 3: The results of applying Friedman test

Variables	Standard error	Sig	Results
Knowledge management	0.05	0.015	Positive relationship
Technology	0.05	0.019	Positive relationship
Top management	0.05	0.041	Positive relationship
Personnel	0.05	0.034	Positive relationship
Service customizing	0.05	0.025	Positive relationship
Systems integration	0.05	0.027	Positive relationship

Table 3 shows all dimensions has positive influence on customer relationship management.

Fuzzy TOPSIS technique

To rank customer relationship management sub criteria, fuzzy TOPSIS technique was applied.

Decision making matrix and fuzzy weights are shown in table 4:

Because of high volume of calculation we ignored fuzzy decision making matrix and fuzzy weighted decision making matrix. Finally by applying formulas 8, 9 and 10, table 5 was designed:

Table 5 illustrates “Reviewing and changing customers’ activities and other ones to achieve more customer orientation”, “Putting comprehensive information to customers about organizational services” and “Leading executive customer oriented plans by top managers” were chosen as the most important ones.

Conclusion and suggestions

In the current research we try to identify and rank sub criteria of customer relationship management by fuzzy TOPSIS technique.

Firs of all by applying Chi Square test the relation between customer relationship management with “knowledge management”, “technology”, “top management”, “personnel”, “service customizing” and “system integration”.

Then the results of Friedman test shows that all dimensions have positive and meaningful influence on customer relationship management.

Finally the results of applying fuzzy TOPSIS technique illustrate that “Reviewing and changing customers’ activities and other ones to achieve more customer orientation”, “Putting comprehensive information to customers about organizational services” and “Leading executive customer oriented plans by top managers” were selected as the most important sub criteria. Meanwhile top management was the most important criterion and system integration was the last one.

Attending to gotten results some suggestions are present:

a) Knowledge management

1. Formulating appropriate plans about organizational culture and creating knowledge- based culture in organization
2. Considering motivational regulations to stimulate employees for knowledge sharing
3. Designing appropriate tools like knowledge management integrated system

Table 5: Linguistic variables for the importance weight (Chen, 2000)

Very Low	VL	(0, 0, 1, 2)
Low	L	(1, 2, 2, 3)
Medium Low	ML	(2, 3, 4, 5)
Medium	M	(4, 5, 5, 6)
Medium High	MH	(5, 6, 7, 8)
High	H	(7, 8, 8, 9)
Very High	VH	(8, 9, 10, 10)

Table 4: decision making matrix and fuzzy weights

	7	8	8	9	7	8	8	10	8	9	10	10
	Knowledge management				Technology				Top management			
P1	7	8	8	9	7	8	8	9	7	8	8	9
P2	5	6	7	8	7	8	8	9	2	3	4	5
P3	8	9	10	10	2	3	4	5	7	8	8	9
P4	4	5	5	6	7	8	8	9	1	2	2	3
P5	7	8	8	9	7	8	8	9	0	1	1	2
P6	2	3	4	5	8	9	10	10	5	6	7	8
P7	5	6	7	8	2	3	4	5	7	8	8	9
P8	7	8	8	9	5	6	7	8	7	8	8	9
P9	2	3	4	5	8	9	10	10	5	6	7	8
P10	1	2	2	3	7	8	8	9	8	9	10	10
P11	5	6	7	8	8	9	10	10	8	9	10	10
P12	4	5	5	6	7	8	8	9	5	6	7	8
P13	8	9	10	10	0	1	1	2	7	8	8	9
P14	7	8	8	9	4	5	5	6	1	2	2	3
P15	8	9	10	10	8	9	10	10	0	0	1	2
P16	1	2	2	3	2	3	4	5	7	8	8	9
P17	7	8	8	9	8	9	10	10	7	8	8	9
P18	5	6	7	8	1	2	2	3	7	8	8	9
P19	2	3	4	5	8	9	10	10	2	3	4	5
P20	8	9	10	10	4	5	5	6	8	9	10	10
P21	7	8	8	9	5	6	7	8	5	6	7	8

Continued Table 4: decision making matrix and fuzzy weights

	5	6	7	8	8	9	10	10	5	6	7	8
	Personnel				Service customizing				System integration			
P1	8	9	10	10	7	8	8	9	8	9	10	10
P2	5	6	7	8	8	9	10	10	0	0	1	2
P3	8	9	10	10	0	1	1	2	1	2	2	3
P4	2	3	4	5	2	3	4	5	2	3	4	5
P5	4	5	5	6	4	5	5	6	2	3	4	5
P6	4	5	5	6	7	8	8	9	7	8	8	9
P7	8	9	10	10	2	3	4	5	4	5	5	6
P8	5	6	7	8	4	5	5	6	2	3	4	5
P9	8	9	10	10	7	8	8	9	8	9	10	10
P10	7	8	8	9	1	2	2	3	4	5	5	6
P11	8	9	10	10	2	3	4	5	7	8	8	9
P12	5	6	7	8	7	8	8	9	8	9	10	10
P13	8	9	10	10	8	9	10	10	4	5	5	6
P14	7	8	8	9	7	8	8	9	2	3	4	5
P15	0	0	1	2	5	6	7	8	5	6	7	8
P16	2	3	4	5	7	8	8	9	2	3	4	5
P17	7	8	8	9	8	9	10	10	4	5	5	6
P18	5	6	7	8	4	5	5	6	5	6	7	8
P19	2	3	4	5	4	5	5	6	8	9	10	10
P20	1	2	2	3	5	6	7	8	7	8	8	9
P21	4	5	5	6	1	2	2	3	8	9	10	10

Table 5: Positive and negative ideal solution, closeness coefficient and final ranks of variables

Variables	D_i		C_c	Final rank
Putting comprehensive information to customers about organizational services	1.562155339	3.506660869	0.691810617	2
Collecting and registering customers' information in their database	2.26433198	2.988750371	0.568951745	8
Managing and registering customers' suggestions and complaints	2.646931632	2.575615527	0.493172287	14
Analyzing customers' gathered information	3.1546173112	2.003359229	0.388400216	21
Sharing customers' gathered information and its analysis for all organization's departments	2.777326241	2.379524548	0.4614291124	18
Applying information technologies for more communication with customers	2.355925116	2.877457108	0.549827432	10
Utilizing interorganizational technologies like software systems and internal networks to information storage and sharing all over the organization	2.623442744	2.597023143	0.497469613	13
Affective usage of software tools and instrument	2.2711122855	2.933032183	0.563522846	9
Updating databases periodically and continuously	2.0996588112	3.158810471	0.600709115	4
Top management commitment and supporting of customer oriented strategies	2.69949318	2.482251359	0.479037772	6
Leading executive customer oriented plans by top managers	2.062696071	3.218452265	0.609422811	3
Connecting business perspective, mission, functions and customer oriented strategies	2.223475542	2.976319281	0.572391677	7
Motivating employees by motivational systems	2.170665192	3.094526621	0.587732932	5
Employees' training and making educational courses	2.512180714	2.65255897	0.513590061	12
Creating cooperation and trust among employees	2.1120007495	2.485419723	0.472026223	15
Making closer relationships to special and profitable customers and pressing specific services to them	2.842632359	2.354058169	0.452991795	19
Reviewing and changing customers' activities and other ones to achieve more customer orientation	1.625739334	3.662403071	0.692568919	1
Categorizing different customers to present different services to them	2.1124241059	2.397549595	0.462687468	17
Identifying customers and providing possibility of completing their information by communicational channels (internet, telephone, fax and . . .)	2.938380403	2.274100659	0.436279889	20
Connecting organization's departments together and notifying of the customer oriented activities	2.384514848	2.83269856	0.542952404	11
Integrating and making more relationship between gathered information of customers and sharing to all organization's departments	2.7526112006	2.436812702	0.469566683	16

b) Technology

1. Considering an appropriate budget to purchase and utilize more modern and update technologies
2. Applying inter organizational technologies

c) Top management

1. Formulating customer-based strategies and executive plans
2. Connecting organizational vision and mission

d) Personnel

1. Making training courses
2. Motivating employees by payment enhancing
3. Making them more cooperated and integrated

e) Service customizing

1. Making periodical meeting with profitable customers
2. Identifying customer needs and desires and registering in their database

f) System integration

1. Sharing employees' information to all employees in each department
2. Quick transferring new customers' information to all employees

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