Customer satisfaction modeling (CSM) in product planning according to quality function deployment (QFD) and Kano model

Hossein Vazifehdust and Sahel Farokhian

Department of Business Management, School of Management and Economics, Islamic Azad University, Tehran. Science and Research Branch, Ashrafee-e-Esfahani Highway, Hesarak Road, Zip code: 1477893855, Tehran, Iran.

Business Management Department, Islamic Azad University, Neyshabur Branch, Pajoesh Avenue, Zip code: 9319613668, Neyshabur, Khorasan Razavi, Iran.

Accepted 17 August, 2011

Service quality improvement and considering customers’ wants and requirements in designing and producing the products is one of the important business strategies in today’s competitive world. It is very important for maintaining the market, higher-quality activities and satisfying customers’ needs, since it can lead to increase in companies’ loyalty and success. Rapid changes in services and productions marketing requires companies to go beyond customers’ satisfaction making the conditions of their please and loyalty by forming innovation and presenting services beyond customers’ expectations. This paper tries to measure customers’ real needs, their satisfaction level and loyalty. Kano cooperative model and quality function deployment (QFD) were used in order to prevent any shortage in evaluating customers’ satisfaction which may exist in any usual method of evaluating customers’ satisfaction. First customers’ needs are analyzed by using Kano model and then the relationship between the values made for the customer and customers’ loyalty is investigated by combining Kano and QFD models. The results shows the importance of considering customers’ wants in designing the products before their manufacture and their considerable role in customers’ satisfaction and loyalty.

Keywords: Customers’ requirements, customers’ satisfaction, customers’ loyalty, product design.

INTRODUCTION

Until some decades ago the products/services offered by organizations were considered as the result of the creative mind of their design engineers rather than conforming to their customers’ requirements. In other words, in most cases customers’ roles were solely limited to a satisfied consumer and these were design engineers who played their role in the manufacturing process of the product (Bowen and Lihchen, 2001).

In recent decades, customers’ satisfaction is being considered as one of the important factors in measuring the management’s performance and the organization’s profitability. During the past ten years, different types of organizations, whether big or small, recognized the importance of customers’ satisfaction. For example everyone knows that maintaining the existing customers is less expensive than attracting new ones (Burns and Neisner, 2006). Therefore customers’ satisfaction has become the operational goal of many organizations. They have invested very much where performance improvement is very effective on customers’ satisfaction.
Examples of loyalty in small-selling level have grown too moving currently toward the business segment (Cample, 2004).

In researches in the field of customers’ value and customers’ satisfaction, researchers suggested that customers’ cognition of service viewpoint changes very much with time. In addition, the investigation/provision of customers’ satisfaction considering customers’ wants/requirements in designing or producing the products in long term can lead to increase in loyalty which is an element that is considered as the critical key and the salvation factor of the organizations in today’s changing economical and competitive conditions which in turn may have a considerable role in increasing the share/profitability of the organizations (Fundin and Witell, 2005). The appearance of these challenges in business process is a serious threat for the organizations that still deal with past equations and rules. Conversely, it is a golden opportunity for the ones that thanks to the flexible structure of their organization are able to conform themselves with their ever customers increasing demands every day.

Kano model

With the advent of Hertzberg’s encouraging-hygiene theory in behavioral sciences, Dr. Kano et al made the fundamental requirements theory in service quality. Kano method is one of the effective tools for measuring customers’ needs. According to Kano, people expect that the produced goods satisfy three types of their fundamental needs, that is, fundamental, performance and encouraging needs. Kano et al suggested that in design planning, companies should identify their customers’ operation and different forms of their demands and then improve the manufactured goods with performance with the highest degree of value for the customers.

Reinhart said about Kano model that: “in my cognition about Kano model, it is a standardized method which is classified by previous five methods related to customers’ needs whose questions are presented from complete operation to incomplete one about the goods”.

First group: Fundamental needs – this means that if it does not exist in the goods, it causes dissatisfaction in the customer which is of the fundamental component.
Second group: Performance needs - this means that the more their operation, the higher the customers’ satisfaction.
Third group: This means that customers are very happy when obtaining them, but if this product does not exist, it does not cause customers’ complaint.
Forth group: Ignorable needs – this means that customers do not pay attention to their presented shape(s) at all.
Fifth group: Reversed needs – this means that producers probably make mistakes which causes a negative cooperation with other goods/services performances.

Kano model is a 2D diagram used in order to display three groups of qualitative wants and needs of customers. These three groups include basic needs, performance needs and motivational needs (Hanemark and Albinsson, 2004).

Most of the times, identification of customers’ ideas regarding quality are confusing. In case most of customers’ wants and needs are identified and divided into several groups, such ideas may be observed clearly, as needs and wants have been classified as shown in Figure 1. Horizontal axis of Kano model includes performance manner of some fields of products and services. Vertical axis shows how customers become satisfied with receiving products and services (Kondo, 2001).

Basic needs curve of Kano model shows that if customers expect more satisfaction with receiving products and services, it cannot satisfy customers. In other words, inclusion of basic needs in the product will not cause customer’s satisfaction but only prevents him from his dissatisfaction.

Excitement needs curve shows that whenever the product has a higher performance, customers receive more satisfaction, but lower performance will not cause customers’ dissatisfaction.

Performance requirements curve indicates the fact that non-fulfillment of performance requirements in the product will cause dissatisfaction, but complete and suitable fulfillment of them will be followed by customers’ satisfaction (Kelsey and Bond, 2001). According to Kano, people expect the produced products to meet three types of their basic needs, namely basic needs, performance needs and motivational needs. Kano et al. proposed that companies should identify customers’ performance and forms of demands in the products in planning the design of a product. They should then improve the produced product by the performances which provide the highest level of value for customer (Kondo, 2001).

Value provided for customers

A customer has a certain goal in using a specific type of a product. He/she expects a certain performance from the selected product. When the product has such performance, the customer achieves his/her expected goal (customer satisfaction). If all performances of a product don’t provide customer’s certain goal, the customer will become dissatisfied (customer dissatisfaction).

Motivational characteristics will be caused once they are concentrated on unexpected values (Reis et al., 2003)

Expected value means the value we should provide for customers at the time of delivery of products and services. By value, it is meant to be the relation in whom
customer finds a benefit, that is, the benefits obtained from providing products and services to customer exceeding the payable costs for obtaining that service. From marketing viewpoint, this relation is a relation in which advantages obtained as the result of providing a service or product to customers are more than its monetary revenues in addition to financial profitability during the time (Rowley and Dawes, 1999).

Unexpected value is called to procurement of a service or product for which the customer has no idea or cost and organizations provide that in order to increase level of satisfaction and repurchase from the concerned organization (Schvaneveldt et al., 1991).

The relationship between the values provided for customer and customer satisfaction

As it was said before, customers follow certain expectations in using the products. In fact, each product is a series of values and customer compares such values provided in the product with his/her own expectations. In case the values conform to their expectations, they will be satisfied. Customer satisfaction can be defined as "the process of customer's understanding and assessment of experiencing product consumption or use of other services" (Shahin, 2003).

Customer experiences satisfaction from different aspects including basic characteristics of products, superior performance characteristics of products and manner of contacting and interaction with customer.

Based on the researches made in 1994 by Jouran Institute, almost 90% of senior managers of more than 200 American companies believe that improvement of customer satisfaction will result in improvement of profitability and increase of market level. Customers' satisfaction which is the result of fulfillment of wants and expectations by addressing the provided value is considered as one of the initial elements for determining the repetition of repurchase and customers' purchasing behavior.

For the role of customer satisfaction, researchers focus on expectations, perceptual performance and satisfaction that have become a dominant pattern in most researches (Shenx et al., 2000a).

Customers' satisfaction

Undoubtedly, customers' satisfaction is one of the very fundamental issues of the recent decade. Now that in the global economics, customers make the organizations durable, companies cannot ignore their customers' expectations/ demands anymore. They should focus all of their capabilities on their customers' satisfaction, since the only source of capital return is customers' money; therefore the first principle in today's business world is making customer-oriented values.

One way to maintain customers in an organization is to ensure customers' satisfaction. Organizations must ensure that the manufactured products can satisfy their customers' satisfaction.
In 1986, Deming presented a framework for the determination of customers’ satisfaction level for the first time which was a very important guidance for improving satisfaction in the organization. He presented a general marketing method for quality management which was called total quality management. The measurement of satisfaction includes understanding the gap between customers’ expectations and the cognition performance which is a relationship between satisfaction and profitability. The importance of customers’ satisfaction for the success of consumable goods/products and the importance of customers’ satisfaction for the small-sellers are well imagined.

Customer loyalty

Loyalty is a traditional concept which describes deep commitment to the country, family or friends. It was first entered in the field of marketing under the term of “commercial loyalty”. For making loyalty, the company should make distinctions the meaning of which is the separation between profitable customers and non-profitable ones. Smart companies have defined the type of customers they look for. These customers obtain the most advantages from company’s offers and remain loyal to company. Loyal customers pay their debts to company by establishing a long term flow of funds and by presenting new customers (Shenx et al., 2000b). Generally, there are two basic aspects for customer loyalty: Behavioral loyalty and Attitude loyalty (Burns and Neisner, 2006).

Behavioral aspect of customer loyalty goes back to customers’ behaviors in repeating purchase which encompasses the preference of trade mark or receipt of services during the time (Kondo, 2001).

One of the popular views presented by these two researchers regarding loyalty includes four basic classifications for customer loyalty which are loyalty, latent loyalty, spurious loyalty and no loyalty (Walden, 1993).

The relationship between the values provided to customer and loyalty

Providing customers’ satisfaction is the main condition for customers’ maintain. In the recent years, the concepts relevant to customer loyalty have been highly addressed. Loyal customers do not only increase business value, but also allow business to keep its costs low proportional to omission of new customers (Witell and Lofgren, 2007).

Loyalty occurs when customers feel that organization can best meet their concerned needs in the manner that its rivals are set aside from customers’ considerations and customers exclusively purchase from the organization (Shahin, 2003) Increase of customer existence periods is caused as a result of customers’ satisfaction increase and this is called period or number of buying cycles in which customer only refers to organization to supply his/her needs before referring to other suppliers (Cample, 2004).

Shenx et al (2000) investigated the effect of confrontation with losing customers and specified the value of customers’ maintain for different industries. These researchers showed that confrontation with losing only 5% of customers will have 25-85% (depending on the type of different industries) increase of annual income for supplying organization (Shenx et al., 2000a).

Quality function deployment (QFD) model

One of the most famous quality techniques is QFD which aimed for the first time to hearing customers’ demands meaning understanding the needs/wants before the designing step. By determining the viewpoints related to qualities which are related to customers’ satisfaction and its effective factors such as product designing process, QFD helps to decrease the duration of designing/engineering the new product and the production costs. On the other hand, it causes higher customers’ satisfaction.

The main goal of this toll is quality improvement in the first step of production process, that is, design. In this cycle, market identification is considered too which is the first loop of the chain. In general, two goals are considered as follows:

1. Provision of product’s quality in terms of technical, operational, security, efficiency and durability.
2. Provision of customers’ satisfaction by considering customers’ special wants/needs.

As an engineering tool, QFD allows us to be able to perform both above-mentioned goals with a unique conformity/harmony in order to reach customers’ needs/wants. QFD is a suitable tool for decreasing the amount of product’s changes in the trial design/production process of new products/services which necessitates group work and all-around attempt from the staff of different units of the organization including marketing, technical/engineering, production, services, after-sale services, etc. the staff of the marketing unit can communicate with the product’s design engineers for transferring customers’ quality needs.

Identification and understanding of customers’ wants, expectations and needs are among the most important steps of QFD performance. The use of analysis obtained from customers’ calls provides inputs in QFD for better achievement of customers’ needs. QFD creates a tool that allows us to compare customers’ needs to characteristics and processes of producing a new product and to do that throughout the whole product manufacturing process to achieve high quality (Yang and Ch.Ch, 2003).

As one of the modern methods of quality engineering, QFD begins from market study and identification of product customers. In its investigation and analysis process, it does not only identify customers’ needs and
wants, but also tries to include them in all design and production phases. In other words, the main philosophy of using QFD is to exercise and include qualitative wants of customers in different steps of product creation.

Customers from the standpoint of QFD

The point which must not be ignored in QFD is the customer's concept in which customers are in two types: Internal customers: These are factors which are active in a way in designing/producing/investing for producing a product including a wide spectrum of jobs. All people in production task including workers, office staff, design engineers, etc. are considered as internal customers.

External customers: These include the same customer's general concept. Indeed this group is the consumers of the products of internal customers at the end of services delivery process.

Expectation value

Expectation value means a value that we should offer while receiving the service by the customers. Value means a relationship in which the customer sees a profit, that is, the advantages of presenting the goods/services to them exceed the costs paid for obtaining the service. In terms of marketing, besides its financial profitability with time, this relationship is a relationship whose advantages of presenting the service/product to the customer exceed its money profits.

There are various methods for considering expectation value viewpoints. These selections are based on their roles in the evaluation of the goods/services transfer process. The ability of a company in offering value to the customers has a close relationship with its capability of making satisfaction in the staff and other profitakers. Jack Velsh says about customers’ expected value that: 'we live in the value era. If we cannot sell a high-qualified service with minimum cost, we would lose. From Katler's standpoint, value is the integration of a proper combination of quality, services and price for the goal.

Unexpected value

Unexpected value is the making of services/goods in which the customer has no idea or cost which is offered by organizations in order to increase the satisfaction level and repurchase from the organization under consideration.

Kano believes that pleasant needs are not declared by the customer. They are not obvious for the producer and listening to the voice of the customer causes their identification. The activities below must be done to determine customers’ needs/wants:

1. Determine different types of customers and their habits
2. Prepare data collection plan from the customers
3. Gather customers' talks/needs/wants
4. Transform customers' declarations into needs
5. Determine most important customers' needs
6. Clarify the relationship among important needs
7. Define customers' needs in operational form
8. Determine goods' quality specifications
9. Design the responsiveness process
10. Determine the proper measure for customers’ needs.

Kano and QFD combinational models

This model includes the analysis of Kano and QFD models and collecting customers’ ideas in relation to the product’s performance via which three types of customers’ needs (fundamental, performance and encouraging needs) can be identified in order to prepare suitable conditions of developing new goods and innovation in products. In addition, richer information can be obtained about the target customers via this model in order to determine how to provide the most attractiveness and viewpoint for them so that it causes their satisfaction and loyalty and the success of the company.

RESEARCH METHODOLOGY

In this research, the relationship of product’s performance (basic, performance and motivational requirements) and the value provided for customer (expected and unexpected values) and customer satisfaction and loyalty has been investigated. Research statistical society consists of all consumers of manufactured products of Sansuan factory in Mashhad. This research addresses those individuals who have used one of the products of Sansuan factory.

A number of 100 purchasers of company’s products have been selected by using random cluster sampling method. People in cluster sampling are not considered as measurement unit, but it’s a group of people who have gathered naturally and have established the group. Cluster sampling is used when the selection of a group of people is easier and more possible than selection of people in a defined society. And this situation occurs when we cannot prepare and codify the list of individuals or members of society. The main advantage of this type of sampling is to prevent from waste of time and to save in financial resources (Shahin, 2003).

In this research, the researcher first selected all service centers of Sansuan factory in Mashhad. Then he considered as target society a number of customers of these centers who use factory products. Finally, questionnaires were provided for the concerned customers for gathering research data.

Characteristics of the contents of this tool (questions), method of its design and codification and the results of investigation of different reliabilities were investigated by using explanatory factor analysis, confirmatory factor analysis methods and reliability coefficients. Exploratory factor analysis was performed through Kruit bartlait test and the obtained results indicate a correlation between the questions explaining each variable. Linear structural relations (LISREL) plan was used in order to confirm the obtained factor structures and to test power and significance of contribution of each of the variables in measuring the structure, basic, performance and motivational requirements as well as expected and unexpected values. Indexes including excellence, suitability and confirmatory factor analysis were confirmed.
The questionnaire of this research includes 24 questions planned based on a five point Likert-type scale. Each part of the questions is for measuring one of the characteristics (research variables). Research method is descriptive-surveying method and the relationship between the variables is of correlation type. Before exercising on the final sample group, the questionnaire was conducted on a small group and its validity and reliability were investigated.

Validity: Considering the main text and some partial changes in some of the expressions, apparent form of expressions, their relation with the factor under measurement, fluency and capability of total expressions in measuring the variables, the questionnaire was confirmed.

Reliability: The whole questionnaire is reliable with 0.82 Cronbach Alpha using retest method. Alpha coefficients of partial tests for basic needs, performance needs, motivational needs, expected value, unexpected value, customer satisfaction and customer reliability include 0.84, 0.73, 0.89, 0.87, 0.85, 0.79 and 0.72 which show the reliability of measuring tool.

In this research seven variables including basic, performance and motivational needs as well as expected and unexpected values, customers’ satisfaction and loyalty were studied (Figure 2). Theoretical framework of research was designed by considering the studies made regarding Kano model and QFD and based on analytical model and research hypotheses.

According to Kano model, each product can have a series of three classes of needs (basic, performance and motivational) which indicates product performance. In fact, it shows the needs and wants of customers and their complete fulfillment in the product can lead to increase of customers.

Customers have certain expectations from each product whose fulfillment by the product will cause expected value in them (conformity of product to customers’ needs) and in case a product’s performance exceeds beyond customers’ wants and meets their need in a higher level, it will result in an unexpected value (customer happiness) and will be followed by more satisfaction than the previous condition. In QFD model, customers’ implicit needs and wants are practically considered in design and production of product so that in this way the provided value for customer is increased. And finally, fulfillment of customers’ expectations in product performance and increase of provided value can lead to satisfaction in higher levels and increase of loyalty.

Variables’ construct validity
In order to analyze the internal construct of the questionnaire and discover the factors constituting the variables, construct validity was performed in two steps, that is, discovery factor analysis and conformational factor analysis whose results are shown in Table 1.

Research’s data collection tool
The data collection tool of this research is a standardized questionnaire which is used in Dr. Kano’s research. The questionnaire of this research includes twenty questions which are designed based on Lickert’s spectrum. The questions are classified in seven parts each of which is used for measuring one of the properties. Basic requirements are measured with questions number (1, 2, 3, 4, 5), performance requirements with questions number (6, 7, 8, 9), encouraging requirements with questions number (10, 11, 12), expectation value with questions number (13, 14, 15), unexpected value with questions number (16, 17, 18), customers’ satisfaction with questions number (19, 20, 21, 22) and customer’s loyalty with questions number (23, 24).

Research’s measurement scale and spectrum
The content specifications of the questions, how to design and write them, the results of investigating different types of validity with both discovery factor analysis and conformational factor analysis, and also validity coefficients were used in this research.

Content validity: Content validity ensures that the scale includes a series of sufficient sample items for using the concept. The more the number of the introductory items of the conceptual range, the
higher its content validity.

**Face validity:** Face validity shows the items which are expected to measure a concept. They measure the concept’s appearance and seemingly measure the concepts.

**Construct validity:** Construct validity deals with how to obtain the results from the application of the scale which is used for testing the assumptions.

**Data analysis**

Structural equations modeling method (SEM) was used to analyze the data and test the research’s assumptions. SEM is a very robust and general multi-variable analysis technique from the family of multi-variable regression or in more exact terms is the extension of the general linear model which allows the researchers to test a collection of regression equations simultaneously.

SEM is an integrated statistical viewpoint for testing assumptions about the relationships among the observed/unobserved variables which is sometimes called covariance construct analysis, clear modeling and sometimes LISREL.

In order to analyze the data, first descriptive information about sample was gathered and after those cohesions hidden (internal and external) variables were presented in the form of two separated tables and then the data of the model were offered. In order to analyze the data, first descriptive information about sample was gathered and after that the analysis began by testing the hypothetical model. Then the research’s assumptions were investigated by Statistical Package for the Social Sciences (SPSS) and LISREL.

According to the population-oriented of the second part of the questionnaire, it is necessary to mention that from 100 questionnaires collected in Mashhad, about 11 were ignored due to their inconformity and lack of response by the software. Based on the results obtained, 38% of the responders were male and 60% were female.

In addition, among the responders, 56% were employed and the others were unemployed. The educational level of the responders was 50% diploma and post-diploma, 32% bachelor’s degree, 9% master’s degree, 1% PhD. And the remaining ones did not answer the options.

According to the descriptive information obtained, each of the results measurement scales was obtained in Table 2.

The analysis basis of LISREL program is covariance matrix or cohesion between hidden and clear variables. Table 3 shows covariance matrix and cohesion among hidden variables. LISREL program is based on covariance matrix and cohesion between hidden and clear variables.
Table 3. Correlation matrix and covariance of latent variables.

<table>
<thead>
<tr>
<th>Latent variable</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivational needs</td>
<td>0/590**</td>
<td>0/670**</td>
<td>6/88</td>
<td>2/13</td>
<td>5/44</td>
<td>3/08</td>
<td>3/94</td>
</tr>
<tr>
<td>Unexpected value</td>
<td>0/239**</td>
<td>0/293**</td>
<td>0/344**</td>
<td>5/50</td>
<td>2/35</td>
<td>2/68</td>
<td>1/85</td>
</tr>
<tr>
<td>Expected value</td>
<td>0/617**</td>
<td>0/578**</td>
<td>0/567**</td>
<td>0/284**</td>
<td>12/64</td>
<td>5/50</td>
<td>6/98</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>0/402**</td>
<td>0/385**</td>
<td>0/357**</td>
<td>0/354**</td>
<td>0/504**</td>
<td>9/46</td>
<td>24/6</td>
</tr>
<tr>
<td>Customer loyalty</td>
<td>0/495**</td>
<td>0/407**</td>
<td>0/459**</td>
<td>0/254**</td>
<td>0/623**</td>
<td>0/642**</td>
<td>10/04</td>
</tr>
</tbody>
</table>

Table 4. Variance determined from internal hidden variables.

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>Predicted variable</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance requirements</td>
<td>Expectation value</td>
<td>0.11</td>
</tr>
<tr>
<td>fundamental requirements</td>
<td>Customer's satisfaction</td>
<td>0.027</td>
</tr>
<tr>
<td>Encouraging requirements</td>
<td>Unexpected value</td>
<td>0.24</td>
</tr>
<tr>
<td>Expectation value</td>
<td>Customer's satisfaction</td>
<td>0.11</td>
</tr>
<tr>
<td>Expectation value</td>
<td>Customer's loyalty</td>
<td>0.027</td>
</tr>
<tr>
<td>Unexpected value</td>
<td>Customer's satisfaction</td>
<td>0.026</td>
</tr>
<tr>
<td>Unexpected value</td>
<td>Customer's loyalty</td>
<td>0.345</td>
</tr>
</tbody>
</table>

matrix or the correlation between latent and evident variables. Data related to matrix diameter and its above shows covariance and sub-diameter and the correlation matrix between latent variables (endogenous and exogenous). Common dispersion values between latent variables (covariance) are significant considering Table 4. Moreover, the information obtained from correlation matrix (matrix sub-diameter data) shows that all the relationships between endogenous and exogenous latent variables are significant and positive. Table 4 shows the variance determined from internal hidden variables by external/internal variables.

Test results of the research’s assumptions

Theory 1: In designing the product, performance requirements are directly proportional to the expectation value. Based on the information obtained for the first theory, performance requirements’ external variable path coefficient is positively meaningful with the expected value with T= 0.33 value on the level of P < 0.05 and therefore the zero theory is rejected.

Theory 2: In designing the product, fundamental requirements are directly proportional to the customer’s satisfaction. Based on the information obtained for the second theory, fundamental requirements’ external variable path coefficient is positively meaningful with the customer’s satisfaction (0.16) with T= -1.80 values on the level of P < 0.05 and therefore the zero theory is not rejected being remained as a correct assumption with 95% probability.

Theory 3: In designing the product, encouraging requirements are directly proportional to the unexpected value. Based on the information obtained for the third theory, encouraging requirements’ external variable path coefficient is negatively unmeaning with the customer’s satisfaction (0.17) with T= -1.54 values on the level of P < 0.05 and therefore the zero theory is not rejected being remained as a correct assumption with 95% probability.

Theory 4: In designing the product, expectation value is directly proportional to the customer’s satisfaction. Based on the information obtained for the fourth theory, expectation value’s internal variable path coefficient is positively meaningful with the customer’s satisfaction (0.23) with T= 4.90 values on the level of P<0.05 and therefore the zero theory is rejected.

Theory 5: In designing the product, unexpected value is directly proportional to the customer’s satisfaction. Based on the information obtained for the fifth theory, expectation value’s internal variable path coefficient is positively meaningful with the customer’s satisfaction (0.35) with T= 3.83 values on the level of P < 0.05 and therefore the zero theory is rejected.

Theory 6: In designing the product, expectation value is directly proportional to the customer’s loyalty. Based on the information obtained for the sixth theory, expectation value’s internal variable path coefficient is positively meaningful with the customer’s satisfaction (0.45) with T= 2.59 values on the level of P < 0.05 and therefore the zero theory is rejected.

Theory 7: In designing the product, unexpected value is directly proportional to the customer’s loyalty. Based on the information obtained for the seventh theory, expectation value’s internal variable path coefficient is negatively unmeaning with the customer’s satisfaction (0.71) with T= -1.79 values on the level of P< 0.05 and therefore the zero theory is not rejected being remained as a correct assumption.
Figure 3. Relationships between the research's variables in the statistical society.

Table 5. Statistics of the model's fitting goodness.

<table>
<thead>
<tr>
<th>Fitting statistic</th>
<th>value</th>
</tr>
</thead>
<tbody>
<tr>
<td>K square</td>
<td>261.90</td>
</tr>
<tr>
<td>Degree of freedom</td>
<td>98</td>
</tr>
<tr>
<td>Meaningfulness level</td>
<td>0</td>
</tr>
<tr>
<td>Approximation squares average error root</td>
<td>0.085</td>
</tr>
<tr>
<td>Residuals average standard root</td>
<td>0.12</td>
</tr>
<tr>
<td>Fitting goodness index</td>
<td>0.88</td>
</tr>
<tr>
<td>Balanced fitting goodness index</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Analytical model

Product performance in the analytical model included basic performance and motivational requirements, and performance requirements were expected to play a role in the increase of the expected value. This was proven by acceptance of hypothesis 1, but they were not confirmed in relation to the relationship of basic needs with satisfaction increase as well as the relationship of motivational requirements with unexpected value (hypotheses 2 and 3). Following that, the relationship of expected value in the increase of satisfaction in hypothesis 4 was confirmed but this hypothesis was rejected regarding unexpected value and increase of satisfaction in hypothesis 5. Finally, the relationship of the expected and loyalty values were accepted in hypothesis 6, but hypothesis 7 indicating the relationship of unexpected value and increase of loyalty was not accepted which can be observed in Figure 3 considering the obtained results of the final model. Considering the results and analyses selected in the sample of Sansuan factory products, the aforementioned model can be presented for future researches and in the above service industry as well.

According to the results, all seven assumptions were accepted except the 2nd, 3rd and 7th ones; although the final confirmed model was presented in the foregoing.

In general, in working with LISREL program, each of the indices obtained for the model alone is the reason of the model's fitting or lack of fitting, but these indices should be translated together. Table 5 includes indices that show the pattern/model and has a proper relative fit with the data.

RESULTS

To analyze data, the descriptive data related to the sample has first been provided. Subsequently, correlations between latent variables (endogenous and exogenous) have been provided in the form of two separate tables followed by data related to the model. Data analysis begins by using model test or research given model. Research hypotheses are then investigated by dividing the aforesaid model. In testing each hypothesis, the parameters of measurement pattern of latent variables
Gama path coefficient, Beta and Goodness of Fit Index which test the conformity of obtained pattern with available data have been investigated in addition to presentation of the diagram of obtained path. After investigation of research hypotheses, the final research model was tested with the presence of all variables that had shown convergence. In the final model obtained from this study, parameters of variables measuring model, coefficient of the route between latent variables, coefficients of direct, indirect and total parameters on each other, and finally Goodness of Fit Index of model have been provided and all tests have been analyzed by using SPSS and LISREL software packages.

**Conclusion**

Service quality improvement is one of the important strategies of business in today’s competitive world. In order to understand/present customers’ needs for every entrepreneurship having high-quality activities and satisfying customers’ needs are very important. Anyway the measurement methods used for evaluating customer’s satisfaction and service quality have many deficiencies. The main purpose of this research is to measure customers’ real needs and the real level of customer’s satisfaction and loyalty.

The improvement of this cooperative model and combination leads to the knowledge of staff and producers for considering customer’s cognitions. In this respect, we can have a better evaluation of the quality of the information obtained by using Kano and QFD models.

Based on the researches made, what can be considered as findings beyond the concerned findings of this research and its hypotheses includes the followings: Based on the designed hypotheses of this research, direct and indirect effects of concerned components and finally their total effect (total direct and indirect effects) on each other were analyzed and tested and the results are as follows:

1. Total direct effect of the exogenous variable Performance Needs on the endogenous variable Expected Value in the customers of Sansuan factory was considered as positive and significant.
2. Total direct effect of the exogenous variable Basic Needs on the endogenous variable Customer Satisfaction in Sansuan factory was negative and insignificance.
3. Total direct effect of the exogenous variable Motivational Needs on the endogenous variable Unexpected Value in Sansuan factory was considered negative and insignificance.
4. Indirect effect of endogenous hidden variable Expected Value on the variable Customer Satisfaction and Customer Loyalty in Sansuan factory was considered positive and significance.
5. Indirect effect of the endogenous Latent variable Unexpected Value on customer satisfaction was considered positive and significant, but indirect effect of endogenous Latent variable Unexpected Value on customer loyalty was considered negative and insignificance.

**REFERENCES**


