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PRIORITIZATION OF CUSTOMER NEEDS IN HOUSE OF QUALITY USING CONJOINT ANALYSIS

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Abstract: *The priority structure of customer needs in House of Quality (HOQ) forms the basis for the company to make the product more attractive to customers. In the traditional Quality Function Deployment (QFD) approach, the priority structure of customer needs is developed through assigning different importance weights for customer needs, which are based on QFD team members' direct experience with the customers or on the results of surveys. In this paper Conjoint analysis is adopted to obtain the priority structure of customer needs. The priority ratings of customer needs may be different for different customer segments. k-means cluster method is used to cluster customers according to their main benefits. Prior to adopt the conjoint analysis, Factor analysis is employed to reduce the size of the customer needs portion of HOQ. A case study on domestic refrigerator is presented to illustrate the proposed methodology to establish priority structure of customer needs.al unit, which would significantly improve the business.*

Keywords: *House of quality, Customer needs, Factor analysis, Conjoint analysis, Cluster analysis*

1. INTRODUCTION

In the early days by adopting product driven approach, manufacturing industries or businesses were introducing their goods into market place without considering the customer views and needs. But in successful product development, understanding of the customers' needs and requirements is regarded as a key issue (Engelbrektsson, 2002).

Now-a-days manufacturing industries are looking for changing their business operations from a product-oriented approach to marketing - oriented approach in order to meet the expectations of customers and long term success in the competitive business environment (Lai, 2003). As quality is defined as fulfilling of customer needs, the customer needs of the product play an important role in customer satisfaction.

Satisfaction of the customer is the focal point of the firm culture and it is the prerequisite for design a product under marketing oriented approach (Caglar *et al*, 2006).

Therefore, it is essential to adopt a customer - focused design approach for developing products and services to meet the expectations of the customer. Quality Function Deployment (QFD) is one of the Total Quality Management quantitative tools and techniques that could be used to translate customer requirements and specifications into appropriate technical or service requirements (Baba *etal*, 2009). QFD process initiated with capturing the voice of customer and it can be used to measure customer satisfaction (Durga Prasad *etal*, 2008).

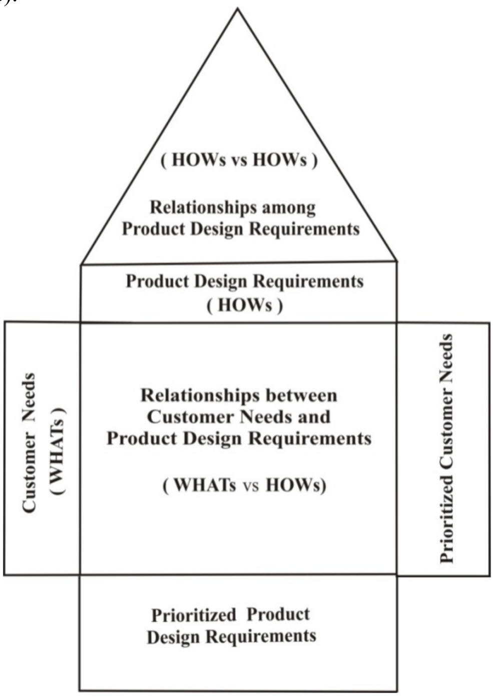

Figure 1: House of Quality

The basic design tool of the QFD approach is the House of Quality (HOQ). It is a kind of conceptual map that provides the means for interfunctional planning and communications (Hauser and Clausing, 1988). It is mainly built on the belief that products or services should be designed to reflect the customer needs. The House of Quality shown in figure 1 looks like a normal house with foundation, walls and roof. HOQ has a number of components, which are: customer needs (WHATs), product design requirements (HOWs), prioritized customer needs, inter-relationship between customer needs and product design requirements (WHATs vs HOWs), relationship among product design requirements (HOWs vs HOWs) and prioritized design requirements. The prioritized product design requirements form the foundation of the house. Customer needs and prioritized customer needs form the walls. Relationships between customer needs and design requirements form the main body of the house. Relationships among product design requirements form the roof of the house. Product design requirements form the ceiling of the house (Rafikul Islam *etal*, 2007).

Although QFD is widely used in the different manufacturing companies, the traditional methodology has certain shortcomings. When there is a single customer group for a product, the designers can easily find the appropriate technical requirements for the product development. If the different customer groups have similar needs for the same product, the implementation of traditional HOQ is easier as the importance ratings of the customer needs are almost unique. But, sometimes for the same product there are different customer groups and they may have different needs. The importance ratings of customer needs are also different for different customer groups. The process of dividing total market into market groups consisting of individuals whose characteristics are relatively homogeneous within each set is termed as market segmentation. The market segmentation issue is not addressed in the traditional HOQ. Prioritization of customer needs is critical, since design of products and services with QFD will be driven to fulfill these prioritized needs (Enriquez *etal*, 2004). A few approaches have been introduced for the determination of priority ratings of customer needs (Sharma *etal*, 2007). In the traditional QFD approach, the customer importance ratings are achieved through assigning different importance weights for customer needs without considering the customers' views. The weightages assigned to the customer needs are based on QFD team members' direct experience with the customers or on the results of surveys. This relative importance of customer needs significantly affects the target values to be set for the design requirements. Therefore, there exists a gap between the customers' conception and designers' conception and due to which it is difficult for designers to translate the actual needs of customers into technical requirements. Also one of the major difficulties of using QFD is the large size of the charts, which increases as it increases the number of variables involved in the process. Even for a simple product design, the size can grow rapidly. This requires a large amount of time to fill out the QFD charts (Marvin *et al*, 2003).

In this paper, an attempt is made to propose a methodology to establish priority structure of customer needs in HOQ and to reduce the complexity of constructing HOQ. The methodology obviates the following difficulties in the implementation of traditional QFD approach

(i) If the customer needs portion of HOQ is unreasonable size that leads to increase the size of HOQ. As the size of HOQ increases, complexity increases. It becomes more difficult and inefficient to manage a design project as the problem size becomes larger (Shin *et al*, 1998). In this paper factor analysis is employed to reduce the customer needs for the purpose of simplifying the structure of HOQ.

(ii) With an increasing proliferation of tastes in modern society, it is necessary to consider market segmentation in product family design depending on the different needs of customers for the same product. But no focus is made on market segmentation in the traditional QFD methodology (van de Poel, 2007). An approach to market segmentation, whereby it is possible to identify market segments by causal factors rather than descriptive factors might be called "benefit segmentation" (Russell, 1995). Benefit segmentation divides a heterogeneous population into homogeneous customer groups on the basis of product benefits customers perceive as important. In this paper *k*-means cluster method is used to cluster customers according to their main benefits.

(iii) If the customer preferences and the engineering capabilities are in isolation from one another, it is not possible to obtain optimal product development decisions. Therefore, there is a need to modify the methods for input to the traditional HOQ to bridge the conceptual gap between the voice of customers and voice of designers of a product. In this paper conjoint analysis, a marketing research technique in which customer preferences are considered is adopted to obtain the priority ratings of customer needs.

2. THE PROPOSED METHODOLOGY

The methodology proposed in this paper deals with the methodological problems in the construction of HOQ by adopting marketing research techniques such as factor analysis, cluster analysis and conjoint analysis. In the first step, factor analysis is employed to reduce the list of customer needs so as to decrease the size of the customer needs matrix of HOQ. Conjoint analysis is employed in the second step to bridge the conceptual gap between the customers and designers and also to obtain priority structure of customer needs. The third step of the methodology employs benefit segmentation approach and two-stage clustering method to cluster the customers according to their benefits. In the fourth step, conjoint analysis is carried out for each customer segment with the same procedure followed in the first step. Finally the priority structures of customer needs for each customer segment are obtained.

2.1 Factor Analysis

Factor analysis is a statistical approach that can be used to analyze interrelationships among a large number of variables and to explain these variables in terms of their common underlying factors. It is a multivariate data reduction technique, consists of selecting the method of extracting the components, the number of components to be extracted, and the method of rotation for interpretation of the factors. Principal component analysis is the most commonly used method for extracting factors in factor analysis. To determine the number of factors, there are different approaches based on eigen values, scree plot, percentage of variance accounted for, split-half reliability etc. The rotation of factors is done in order to improve the meaningfulness, reliability, and reproducibility of factors. The goal of rotation is to simplify and clarify the data structure. There are two types of rotations namely orthogonal rotation, which produce uncorrelated factors, and oblique rotation, which produce correlated factors. It is advisable to use orthogonal rotation as it produces more easily interpretable results (Costello and Osborne, 2005). Varimax, quartimax and equamax are commonly available orthogonal methods of rotation. In this paper principle component method followed by the varimax rotation is adopted by using SPSS17.0 package.

2.2 Conjoint Analysis

Conjoint Analysis (CA) is a marketing method which allows for a quantitative assessment of the impact of individual product attributes on overall product demand (Andrews and Kemper, 2007). It is a survey-based multivariate technique that measures consumer preferences about the attributes of a product or a service. The goal of CA is to identify the most desirable combination of features to be offered or included in the product or the service. It is best suited for understanding consumers' reactions to and evaluations of predetermined attribute combinations that represent potential products or services (Shalini and Masood, 2010). Conjoint analysis has recently been introduced as a tool supporting the use of QFD in the design process (Gustafsson *etal*, 1999). Both CA and QFD have the same objective of capturing the customer needs and incorporating them in the new product design as much as possible (Chaudhuri and Bhattacharyya, 2005).

The procedure of conjoint analysis (Naresh, 2007) consists of six steps. The first step is to formulate the problem, which involves the identification of the salient attributes and their levels that are to be used in constructing the stimuli. The second step is to construct the stimuli. There are two approaches available in constructing the conjoint analysis stimuli namely pair-wise approach (two-factor evaluation) and full-profile approach (multiple-factor evaluations). In the pair-wise approach, the respondents evaluate two attributes at a time until all the possible pairs of attributes have been evaluated. But in the full-profile approach, full or complete profiles of brands are constructed for all the attributes. In this paper full-profile conjoint analysis stimuli approach is employed. In the next step, the decision to be taken on the form of input data. The input data can be either non metric or metric. For non metric data, the respondents are typically required to provide rank order evaluations. In the metric form, the respondents provide ratings, rather than rankings. For the full-profile approach, respondents rank all the stimulus profiles. In this paper non metric form of input data is considered. In the fourth step, the analysis of the data is carried out on the basis of choices made in the previous steps. If ratings are collected, simple regression can be used; for probability of purchase, Logit models can be used; finally if rankings are used, MONANOVA is recommended (Andrew *etal*, 2007) . Part-worth utility for each level of customer need is calculated in this step. The results are interpreted in the next step. Finally the reliability and validity of the results are assessed in the last step. In this paper, conjoint analysis is carried by using SPSS17.0 package.

2.3 Benefit segmentation using cluster analysis

Benefit segmentation is the process of grouping customers into market segments according to the benefits they seek from the product. Once the customers have been classified into segments in accordance with the benefits they are seeking, each segment is contrasted with all of the other segments in terms of demographics, behaviors, perceptions, personality and lifestyle etc. In many markets, segmentation based on benefits, needs, or motivations has proven to be more powerful than demographic factors or product features in understanding market dynamics (Shwu-IngWu, 2001). In this approach, customers may be clustered on the basis of benefits sought from the purchase of a product. There are different methods of cluster analysis such as hierarchical cluster analysis, *k*-means cluster method, and two-step cluster method.

For a moderately sized data set and the number of clusters decided in advance, *k*-means cluster method is suitable. Computational simplicity is also an advantage of using this method. In this paper, *k*-means cluster method is adopted.

3. ILLUSTRATIVE EXAMPLE

A case of designing refrigerator family is considered to demonstrate the proposed methodology. Refrigeration has played an important role in the growth and attainment of the present day standard of living. In India, refrigerators have the highest aspirational value of all consumer durables, with the exception of televisions. This accounts for the high growth rate of the refrigerator market.

3.1 Questionnaire Survey

In order to obtain the customer expectations in a domestic refrigerator, personal interviews with the customers, market surveys, and brain storming sessions with the targeted customers were conducted. After the comprehensive discussions, 11 basic customer attributes were short – listed. A questionnaire was developed on these attributes are shown in table1 and which was administered to 200 respondents of various categories include different age groups, education level, gender, and occupation. The respondents were asked to indicate the degree of importance of needs in terms of a five - point Likert scale (1 = not important, 2 = slightly important, 3 = somewhat important, 4 = important, 5 = very important). The demographics of the respondents are presented in table 2.

3.2 Factor Analysis

To overcome the difficulty of including all the needs in the customer needs portion of HOQ, and to reduce the complexity in constructing HOQ, further data reduction is needed. For this purpose, factor analysis is performed by conducting questionnaire survey and the analysis is made with the help of SPSS package.

Kaiser-Meyer-Olkin (KMO) measure of the sample adequacy was used to validate the use of factor analysis. It is an index used to examine the appropriateness of factor analysis. The value of KMO in between 0.5 and 1.0 indicates the factor analysis is appropriate. Values below 0.5 imply that factor analysis may not be appropriate for the data. Bartlett's test of sphericity is used to examine the hypothesis that the variables are uncorrelated in the population. The significance level gives the result of the test. Very small values (less than 0.05) indicate that there are probably significant relationships among the variables. If the significance value is more than 0.10 then it may indicate that the data is not suitable for factor analysis. The results of KMO and Bartlett's test are summarized in table 3.

Table 1: Questionnaire

Note: 1- Not Important ; 2- Slightly Important ; 3- Somewhat Important ; 4- Important ; 5-Very Important						
Q1	Preservation of perishable food items for long time freshness					
Q2	Preservation of fruits, vegetables, medicines and beverages					
Q3	Less power consumption					
Q4	Cheap price					
Q5	High cooling capacity					
Q6	More available space in the refrigerator					
Q7	Quick cooling					
Q8	Easy availability of spares					
Q9	Long life of the refrigerator					
Q10	Good service availability					
Q11	Quick customer care response					

Table 2: Sample Demographics

Gender	Freq.
Men	135
Women	65

Education Level	Freq.
Intermediate	5
Graduation	66
Post Graduation	124
Ph.D	5

Occupation	Frequency
Govt.Employee	50
Pvt. Employee	141
Business men	6
House wives	3

Age (years)	18-25	26-35	36-50	Above 50
Freq.	69	100	26	5

From the table 3, it is observed that the KMO value is 0.699 (≈0.7) and the significance value is 0.000. Therefore the data is appropriate to proceed with factor analysis. Factor analysis consists of selecting the method of extracting the components, the number of components to be extracted, and the method of rotation for interpretation of the factors. Principal component method of extraction and the varimax method of rotation are employed in this paper. Communality is the amount of variance a variable shares with all the other being considered. Communalities indicate the amount of variance in each variable that is accounted for. Initial communalities are estimates of the variance in each variable accounted for by all components or factors. Extraction communalities are estimates of the variance in each variable accounted for by the factors (or components) in the factor solution. Small values indicate variables that do not fit well with the factor solution, and should possibly be dropped from the analysis. Table 4 shows the communalities. From the table 4, it is to be noted that all the variables have their communalities above 0.538. The eigenvalue represents the total variance explained by each factor. The eigenvalues associated with each linear component before extraction, after extraction and after rotation are listed in table 5.

Table 3: KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.699
Bartlett's Test of Sphericity Approx. Chi-Square	464.861
df	55
Sig.	0.000

Table 4: Communalities

Variable	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Initial	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Extraction	0.838	0.859	0.951	0.982	0.771	0.903	0.731	0.612	0.538	0.646	0.696

Table 5: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% variance	Cumulative Percentage	Total	% variance	Cumulative Percentage	Total	% variance	Cumulative Percentage
1	3.035	27.595	27.595	3.035	27.595	27.595	2.237	20.339	20.339
2	1.572	14.288	41.883	1.572	14.288	41.883	1.723	15.660	35.999
3	1.342	12.197	54.080	1.342	12.197	54.080	1.483	13.480	49.479
4	0.997	9.067	63.147	0.997	9.067	63.147	1.074	9.761	59.240
5	0.848	7.707	70.854	0.848	7.707	70.854	1.020	9.270	68.511
6	0.732	6.658	77.512	0.732	6.658	77.512	0.990	9.001	77.512
7	0.700	6.364	83.876						
8	0.592	5.384	89.260						
9	0.508	4.620	93.880						
10	0.397	3.605	97.485						
11	0.277	2.515	100.000						

From the table 5, it should be clear that the first few factors explain relatively large amounts of variance whereas subsequent factors explain only small amounts of variance. The extraction sums of squared loadings group gives information regarding the extracted factors or components. For principal components extraction, these values will be the same as those reported under Initial eigenvalues. The variance accounted for by rotated factors or components may be different from those reported for the extraction but the cumulative percentage for the set of factors or components will always be the same. A Scree plot is shown in figure2 which indicates the eigenvalues against the number of factors in order of extraction.From the Scree plot, a distinct break occurs at six factors. The plot suggests that the six factors appear to be reasonable. In order to easily interpret the factors, the rotated component matrix is obtained by using varimax rotation. The partitions of six mutually exclusive groups are formed, which are shown in table 6. The first group of variables signifies the reliability of the service offered by the company. The variables in the second group and third group are pertaining to preservation and refrigeration effect respectively. The aspects related to storage volume, price and energy consumption come under the fourth, fifth and sixth groups respectively.

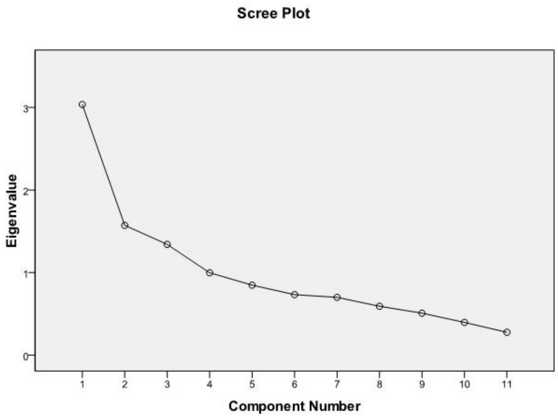

Figure 2: Scree Plot

Table 6: Rotated Component Matrix

	Component					
	1	2	3	4	5	6
Q 11	0.816					
Q 10	0.749					
Q 8	0.681					
Q 9	0.678					
Q 2		0.915				
Q 1		0.885				
Q 5			0.838			
Q 7			0.803			
Q 6				0.912		
Q 4					0.985	
Q 3						0.943

3. 3 Conjoint Analysis

To conduct conjoint analysis the levels of the customer needs (factors) obtained through factor analysis, are identified through the discussions with the prospective customers and technical experts. The customer needs and their levels are shown in table 7.

Table 7: Customer needs and levels for refrigerator

Profile ID	Service Reliability
Customer Needs (CN)	Levels
CN 1 : Service Reliability (SR)	L_{11}: Low ; L_{12}: Medium; L_{13}: High
CN 2 : Preservation (PRE)	L_{21}: food items only; L_{22}: Food items and beverages L_{23}: Food items, beverages and medicines
CN 3 : Refrigeration Effect(RE)	L_{31}: Low; L_{32}: Medium; L_{33}: High
CN 4 : Storage Volume (SV)	L_{41}: Low; L_{42}: Medium; L_{43}: High
CN 5 : Price (PR)	L_{51}: Low; L_{52}: Medium; L_{53}: High
CN 6 : Energy Consumption (EC)	L_{61}: Un Important ; L_{62}: Important ; L_{63}: Very Important

In the subsequent step, a full profile approach is adopted to carry out the conjoint analysis. This method requires that respondents rank a huge number of profiles. To reduce the number of profiles to a convenient size SPSS conjoint was used. The SPSS generated 22 profiles which are presented in the table 8. The respondents are asked to rank the profiles from 1 to 22.

Table 8: Design of profiles for developing a refrigerator

Profile ID	Service Reliability	Preservation	Refrigeration Effect	Storage volume	Price	Energy Consumption
1	H	F, B and Med.	L	H	M	U I
2	H	F, B and Med.	M	H	L	V I
3	L	F	M	L	M	V I
4	L	F, B and Med.	M	M	H	U I
5	H	F	L	M	H	V I
6	H	F	H	M	L	I
7	M	F	M	H	H	I
8	M	F, B and Med.	H	L	H	V I
9	M	F and B	L	M	M	V I
10	L	F and B	L	H	H	I
11	L	F, B and Med.	H	M	M	I
12	M	F, B and Med.	L	L	L	I
13	H	F and B	M	L	M	I
14	L	F and B	H	H	L	V I
15	M	F and B	M	M	L	U I
16	L	F	L	L	L	U I
17	M	F	H	H	M	U I
18	H	F and B	H	L	H	U I
19	H	F	L	M	H	U I
20	M	F	H	L	L	U I
21	L	F, B and Med.	H	H	M	I
22	H	F	H	L	M	I

Note:
H : High — F: Food — I : Important
M: Medium — B: Beverages — V I : Very Important
L : Low — Med.: Medicines — U I : Un Important

Table 9: Utility scores and their standard errors for each customer level

C N	Level	Utility Estimate	Std. Error
S R	L	-1. 033	0.267
	M	-0.659	0.267
	H	1.692	0.267
PRE	F	-0.243	0.267
	F and B	-0.982	0.267
	F , B and Med.	1.225	0.267
RE	L	-0.333	0.267
	M	-0.725	0.267
	H	-0.391	0.267
S V	L	-0.717	0.267
	M	0.333	0.267
	H	0.384	0.267
PR	L	0.587	0.267
	M	0.094	0.267
	H	-0.681	0.267
E C	U I	-3.623	0.267
	I	0.808	0.267
	V I	2.815	0.267

The customer preferential ranking data for sample customer group of 50 customers on design profiles is used to obtain utility scores with the help of SPSS. The utility scores or part worth utilities for overall customer group are presented in table 9. Part-worth utility scores indicate the influence of each factor level on the respondent's preference for a particular combination. The importance values are computed by taking the utility range for the particular factor and dividing it by the sum of all the utility ranges. The importance values for the customer needs shown in table 10 are obtained by SPSS Conjoint.

Table 10: Importance values of customer needs

Customer Need	Importance value
SR	17.470
PRE	14.579
RE	11.459
SV	11.482
PR	13.699
EC	31.311

3.4 Cluster Analysis

After collecting the data from the prospective customers of different categories in terms of preferential ranking of 22 profiles using conjoint study, k-means cluster method is employed to segment the sample of 50 customers based on the similarities in the main benefits.

Table 11: Number of customers in each cluster

Cluster 1	39.000
Cluster 2	1.000
Cluster 3	10.000
Valid	50.000
Missing	0.000

On the basis of the benefits derived from the 22 profiles, 50 customers were completely assigned to three segments using SPSS software. The outcome of cluster analysis is shown in table 11,from which it is observed that segments 1, 2 and 3 included 39 (78 %), 1(2 %) and 10 (20 %) customers respectively.

3.5 Conjoint Analysis for each customer segment

The conjoint analysis is carried out by using SPSS 17.0 for each segment of customers as discussed in the earlier section. The table 12 shows the part-worth utility and relative importance value for each customer need by considering overall customer group and each customer segment separately.Priority ratings of the customer needs for overall customer group and for each customer segment are shown in table 12, from which it is observed that the highest priority is given to energy consumption for overall customer group and the customer segment1also. For whole customers, the next priorities are given to service reliability, preservation, price, storage volume and refrigeration effect respectively. Customer segments 2 and 3 have given highest priorities to preservation and service reliability respectively. The energy consumption, service reliability, preservation, price, refrigeration effect and storage volume are in order of priority of customer needs for customer segment 1. For customer segment 2, preservation, price, energy consumption, storage volume, service reliability and refrigeration effect are in the order of priority. Customer segment 3 has given more priority for service reliability. The next priorities in order are given to energy consumption, preservation, price, refrigeration effect and storage volume. By considering these customer needs priority structures in HOQ, it is possible to develop domestic refrigerator family to delight the customers.

Table 12: The part-worth utility and relative importance values of customer needs for overall customers and each customer segment

Customer Needs	Levels	The part-worth utility values				The relative importance values			
		Overall	Segment 1	Segment 2	Segment 3	Overall	Segment 1	Segment 2	Segment 3
CN 1 (SR)	L_{11}	-1.033	-0.917	-0.500	-1.556	17.470	15.365	10.656	26.647
	L_{12}	-0.659	-0.574	1.333	-1.222				
	L_{13}	1.692	1.491	-0.833	2.778				
CN 2 (PRE)	L_{21}	-0.243	-0.120	4.000	-1.204	14.579	14.125	31.148	14.552
	L_{22}	-0.982	-1.176	-1.667	-0.130				
	L_{23}	1.225	1.296	-2.333	1.333				
CN 3 (RE)	L_{31}	-0.333	-0.181	0.667	-1.056	11.459	11.166	9.836	12.811
	L_{32}	0.725	0.940	-1.333	0.093				
	L_{33}	-0.391	-0.759	0.667	0.963				
CN 4 (SV)	L_{41}	-0.717	-0.630	-1.667	-0.963	11.482	11.127	13.115	12.719
	L_{42}	0.333	0.514	0.667	-0.426				
	L_{43}	0.384	0.116	1.000	1.389				
CN 5 (PR)	L_{51}	0.587	0.708	-1.500	0.333	13.699	13.421	18.852	14.238
	L_{52}	0.094	0.079	2.333	-0.093				
	L_{53}	-0.681	-0.787	-0.833	-0.241				
CN 6 (EC)	L_{61}	-3.623	-4.282	-1.167	-1.259	31.311	34.796	16.393	19.032
	L_{62}	0.808	1.083	-1.000	-0.093				
	L_{63}	2.815	3.199	2.167	1.352				

4. CONCLUSION

Priority structure of customer needs is a key component of HOQ. As the set of customer needs is the input to HOQ, it is important to prioritize them in a systematic way. The set of customer needs priorities will have a major impact on further product development activities. In the conventional HOQ approach, the QFD team assigns numeric values to each of the customer needs. But QFD is primarily focused on the accurate and exact translation of customer needs into design requirements. Therefore, there exists a gap between the customers' conception and designers' conception and due to which it is difficult for designers to translate the actual needs of customers into design requirements. Conjoint analysis helps to understand about the importance of different customer attributes in creating value to the customers. Therefore it is aimed at contributing to increasing customer satisfaction, conjoint method can be used to analyze and prioritize the customer needs while constructing HOQ. The conjoint analysis results were further processed by k-means cluster analysis for possible sub segments as the customers are not homogeneous. The customer needs priority structure obtained by using the proposed methodology helps a product development team to design product family to meet the expectations of the customers.

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