Deployment of Service Quality Characteristics

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Abstract—This work discusses an innovative methodology for deployment of service quality characteristics. Four groups of organizational features that may influence the quality of services are identified: human resource, technology, planning, and organizational relationships. A House of Service Quality (HOSQ) matrix is built to extract the desired improvement in the service quality characteristics and to translate them into a hierarchy of important organizational features. The Mean Square Error (MSE) criterion enables the pinpointing of the few essential service quality characteristics to be improved as well as selection of the vital organizational features. The method was implemented in an engineering supply enterprise and provides useful information on its vital service dimensions.

Keywords—HOQ, organizational features, service quality.

I. INTRODUCTION

IN every market in which a firm acts, it should evaluate criteria such as price, delivery, product/service quality and product range in order to gain advantages over its competitors. When a firm's priority is to enhance its service quality, it is important to identify the service quality characteristics that require improvement as well as the organizational features that could influence them.

Heskett et al., over ten years ago, [1], [2] developed the concept of 'the service profit chain'. From their analysis of successful service organizations, they proved the linkage between profitability, customer loyalty, employee satisfaction, loyalty, and productivity.

Reference [3] examined the relationships between organizational climate, employee attitudes, customer satisfaction, and sales performance in the retail-banking sector. In their study, teamwork climate, job enablers, and support climate are organizational climate variables, commitment is an employee attitude, and customer satisfaction and sales achievement are organizational performance measures.

Reference [4], which analyzed studies from three different disciplines–service management, organizational psychology and marketing–created a causal map connecting organizational features and employee attitudes to customer loyalty and financial outcomes. According to this map, organizational features and employee attitudes are on the same level in the causal map and have a direct influence on service quality.

Reference [5] examined different service quality models reported in the literature. The authors concluded that customer

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expectations regarding particular services can be changed with respect to factors such as time, increase in the number of encounters with a particular service and competitive environment.

The current study indicates that basic guidelines are needed for dynamically revealing customer needs or desires and to translate them into a hierarchy of important organizational features.

Quality Function Deployment (QFD) is a method for structured product planning and development that enables a development team to clearly specify a customer's wants and needs, and then to systematically evaluate each proposed product or service capability in terms of its impact on meeting these needs [6]. The QFD process involves constructing one or more matrices. The first of these matrices is called the House of Quality (HOQ). The HOQ maps the WHATs representing desired customer product attributes (the customer's voice) into the HOWs—that is, technical characteristics as viewed by the development team.

Reference [7], building on the concept of the HOQ, developed a House of Strategy (HOS) for translating the improvement needs of a company's business objectives into a hierarchy reflecting the relative importance of its competitive priorities. This paper extends the above concept and develops a House of Service Quality (HOSQ), which translates the desired improvement in quality service characteristics into a hierarchy of important organizational features. The HOSQ supported, by the MSE criterion reveal the unique service quality model that an individual company should adopt.

II. SERVICE QUALITY DIMENSIONS

A. Service Quality Characteristics

Using focus group studies, Reference [8] identified ten detailed dimensions of service quality: tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding the customer and access. Reference [9] provided 18 service dimensions: access, aesthetics, attentiveness, availability, care, cleanliness, comfort, commitment, communication, competence, courtesy, flexibility, friendliness, functionality, integrity, reliability, responsiveness, security.

B. Organizational Features

This work identifies four groups of organizational features that may influence the quality of services: human resource, technology, planning, and organizational relationships.

Human Resource: Reference [10] emphasized that organizational activities, the workplace and job design, and

Human Resource (HR) polices and practices comprise the foundation on which employee satisfaction, productivity and retention rest. Reference [11] described how the Human Resource Management (HRM) function can positively influence the satisfaction of both its internal customers, such as line employees, and external customers. Reference [12] examined the links between critical aspects of the employee–organization relationship (perceived organizational support, organizational identification), and customers' perceptions of service quality.

Technology: Reference [13] described the use of information technology (IT) for improving service quality through a number of case studies from a variety of sectors (banking, courier, transportation, manufacturing and service industries). Reference [14] investigated the relationship between IT and customers' perceptions of service quality in consumer banking. The IT-based services are utilized for creating value-added services.

Planning: Reference [15] argued that in order to create added value for services, business process re-engineering (BPR) and information technology (IT) must be brought into harmony. Reference [16] demonstrated the application and usefulness of quality function deployment (QFD) in large-scale system redesign, such as the system of social services serving a large urban municipality.

Organizational relationships: Reference [17] offered a framework for integrating internal quality improvements and external measures of customer. Reference [18] examined the implementation of customer relationship management (CRM) processes for the delivery of high service quality. The authors presented a holistic framework for CRM implementation that integrates three key perspectives of CRM: business, technology and customers.

III. METHODOLOGY

A. House of Service Quality (HOSQ)

The House of Service Quality (HOSQ) is used to translate the required improvement level of the HOWs – the service quality characteristics – into the required improvement level of the WHATs – organizational features. The building sequence of the HOSQ comprises the following five major components:

1) The firm's service quality characteristics (the WHATs).
2) The required improvement level of the WHATs.
3) The firm's organizational features (the HOWs).
4) The impact of each organizational feature on each service quality characteristic.
5) The required improvement level of the HOWs.

The required improvement level of a WHAT is calculated by multiplying the values of two factors – the importance of each WHAT and the capability gap between its desired state and its current state. The required improvement level of the HOWs is calculated as usual in QFD by multiplying the required improvement level of the WHATs with the HOSQ

matrix representing $R_{i,j}$, the relationship strengths between each HOW (j) and each WHAT (i).

B. MSE Criterion for Selecting Vital Quality Service Dimensions

Reference [7] utilized the Mean Square Error (MSE) criterion (introduced previously by Reference [19] as a quantitative tool for implementing the Pareto Principle. This principle was presented by [20] as a universal principle he referred to as the "vital few and trivial many". Here the Mean Square Error (MSE) criterion enables the pinpointing of the vital few service quality characteristics to be improved as well as selection of the vital organizational features.

The method suggested by [7] is detailed below:

(1) Arrange the normalized required improvement levels of the k components in descending order, where p_1 represents the highest improvement level needed and p_k the lowest improvement level needed, $0 \le p_j \le 1$, $j = 1,.....,k$.

(2) While maintaining this order, divide the k components into two groups, A and B. Group A consists of the first m components, while group B comprises the remaining $k-m$ components. Assuming that each group includes at least one component, there are $k-1$ possibilities for selecting an m value for splitting the items into two groups.

(3) Calculate $MSE(m)$, $m = 1,...,k-1$ using the following equation,

$$MSE(m) = \left\{ \sum_{j=1}^{m} \left(p_j - \bar{p}_A \right)^2 + \sum_{j=m+1}^{k} \left(p_j - \bar{p}_B \right)^2 \right\}, \quad (1)$$

where $\bar{p}_A$ and $\bar{p}_B$ are the average improvement levels in vital group A and in trivial group B. respectively.

(4) Find,

$$MSE(m^*) = \underset{1 \le m \le k-1}{Min} \left[MSE(m) \right]. \quad (2)$$

IV. IMPLEMENTATION EXAMPLE

This section describes the implementation of the above methodology in an engineering supply enterprise. Two groups were interviewed – ten customers and three managers.

The customers suggested relevant service quality characteristics and assigned their importance and capability gap, respectively, on a Likert scale (from 1 to 5). The corresponding values in Table I represent the mean values among those assigned by the ten customers.

The managers suggested relevant measures of the organizational features and assigned the relationship strengths in the HOSQ matrix, on a nonlinear scale (1,3,9) for highlighting the strong relationships. The corresponding values in Table I represent the median values among those assigned by the three managers.

A. HOSQ Results

Table I presents the HOSQ of the engineering supply enterprise. The five components of the HOSQ are detailed below:

1) The firm's service quality characteristics (the WHATs): reliability, availability, response, product customization, communication, courtesy, and integrity.

2) The corresponding normalized required improvement level of the WHATs: 0.151, 0.127, 0.159, 0.188, 0.109, 0.085, 0.181.

3) The firm's organizational features (the HOWs): professionalism and selling efficiency (human resource), information system and equipment (technology), product variety (planning), customer relationships and internal relationships (organizational relationships).

4) The relationship strengths between the WHATs and the HOWs: there is a strong relationship between reliability, on the one hand, and professionalism and information system, on the other. There is strong relationship between the availability and the selling efficiency. The response characteristic is strongly affected by: professionalism, selling efficiency, information system, and internal relationships. Product customization is strongly affected by: professionalism, information system, equipment, product variety, and internal relationships. The communication characteristic is strongly affected by selling efficiency and customer relationships. There are strong relationships between courtesy and professionalism; and between integrity and customer relationships.

5) The normalized required improvement level of the HOWs: 0.185, 0.165, 0.172, 0.086, 0.128, 0.146, 0.116.

B. MSE for Selecting the Vital Organizational Features

There are seven service quality characteristics, and seven organizational features in Table I. Each of these groups has to be divided into two groups. The MSE criterion was utilized for selecting the vital service quality characteristics and the vital organizational features. The partitioning method for selecting the vital organizational features is presented below:

The required improvement levels of the organizational features (HOSQ output) arranged in descending order are: 0.185, 0.172, 0.165, 0.146, 0.128, 0.116, 0.086.

The calculation of $MSE(m)$ was carried out using formula (1). Following are the results: 0.0052, 0.0037, 0.0021, 0.0017, 0.0025, 0.0036. It is seen that the lowest $MSE(m)$ is obtained for $MSE(4) = 0.0017$. Therefore, the vital few organizational features that require improvement are the first four on the list: professionalism, selling efficiency, information system, and customer relationships.

Utilizing the same procedure described above enables the pinpointing of the essential service quality characteristics that should always be the organization's top priority: product customization, integrity, response and reliability.

V. CONCLUSION

The House of Quality (HOQ) model, a product oriented quality analysis technique, supported by the MSE criterion, was applied in an innovative way to reveal the unique organizational efforts that need to be adopted by an individual enterprise in order to improve its quality service characteristics. A House of Service Quality (HOSQ) matrix was built to extract the desired improvement in the service quality characteristics and to translate them into a hierarchy of important organizational features. The Mean Square Error (MSE) criterion enables the pinpointing of the few essential service quality characteristics to be improved vis-à-vis the identified vital organizational features. The method provides useful information and understanding regarding the relative importance of the organizational features: human resource, technology, planning, and organizational relationships.

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TABLE I
HOUSE OF SERVICE QUALITY (HOSQ)

		HOSQ input				Organizational Features						
		Service Quality Characteristics				Human Resource		Technology		Planning	Organizational relationships	
		Importance	Capability gap	Required improvement level	Normalized	Professionalism	Selling efficiency	Information system	Equipment	Product variety	Customer relationships	Internal relationships
Service Quality Characteristics	Reliability	4.1	2	8.2	0.151	9	3	9	3	1	3	3
	Availability	3.6	1.9	6.9	0.127	3	9	1	1	1	3	3
	Response	3.8	2.3	8.6	0.159	9	9	9	1	9	3	9
	Product customization	4.2	2.4	10.2	0.188	9	3	9	9	9	3	3
	Communication	3.4	1.7	5.9	0.109	3	9	3	1	1	9	3
	Courtesy	5.3	1.3	4.6	0.085	3	3	1	1	1	3	1
	Integrity	4.4	2.2	9.8	0.181	3	3	3	1	3	9	3
HOSQ output	Required improvement level of the Organizational Features					6.00	5.37	5.55	2.80	4.13	4.74	3.78
	Normalized					0.185	0.165	0.172	0.086	0.128	0.146	0.116

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