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Combined analysis of service expectations and perceptions in lodging industry through quality function deployment

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This study is the first empirical attempt of how quality function deployment (QFD) can be employed as a service quality design and improvement tool in the lodging industry. It combines two complementary perspectives of managers and customers regarding improving service quality in the lodging industry. This study empirically depicts a case where QFD was employed to design service delivery processes in the lodging industry, taking both customer demands and service provider expert knowledge and opinions. First, the dimensions concerning customer needs and expectations are tangibles, food, the adequate features of rooms and housekeeping, communication and accessibility, assurance and responsiveness, reliability, well-cared spaces, and equipment. Even though QFD has been used in the manufacturing industry, it has rarely been utilised in service design processes in the lodging industry. In this regard, this study has the potential to fill a perceived gap in the literature concerning methods to improve service quality through effective service design function using QFD in this industry.

Keywords: lodging industry; QFD; service design; service quality

Introduction

Over the past three decades, the service quality concept has emerged as a major issue in the service industry and literature (Harrington & Akehurst, 1996). Increasing service quality and customer satisfaction is a strategic tool to gain competitive advantage in the service industry (Su, 2004). However, measuring service quality is a challenge for service providers because of the unique service characteristics (Parasuraman, Zeithaml, & Berry, 1985). Furthermore, measuring service quality in the lodging industry is more difficult due to industry-specific characteristics (Mei, Dean, & White, 1999). Increasing service quality has a great impact on corporate performance indicators, such as customer and employee satisfaction and profit margin, in the lodging industry (Yasin & Zimmerer, 1995).

Hotels are a major segment in the service industry and must manage service quality issues in their daily operations. Service design processes at hotels should focus on customers' needs and expectations as well as on service providers' experience, simultaneously. Higher quality depends on precise and appropriate service design outcomes (Juran, 1989). In this regard, the literature shows differences between the perspectives and values of service providers and customers (Nasution & Mavondo, 2008). Saleh and Ryan (1991) emphasised those differences, particularly in the lodging industry. In a similar way,

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Fick and Ritchie (1991) stated that accurately determining customer needs and expectations assists in the effective and efficient use of limited managerial resources.

The problem discussed in this study is how to design and improve service delivery processes that include both service providers' and customers' views. To implement these perspectives in service design processes simultaneously, service providers should utilise appropriate tools and methodologies. In this regard, quality function deployment (QFD) has been used as one of the methodologies in certain scientific disciplines (Chan & Wu, 2002). There are other methodologies such as experimental design and robust design that can be utilised for similar problems in other industries, especially in the manufacturing industry. However, because of the nature of the problem in this study, QFD is seen as the most effective tool in this instance. Revelle, Moran, and Cox (1998) and Akao (1990) stated that QFD is a tool to convert customer demands into design characteristics and targets. QFD takes relatively more important customer needs and expectations, such as the voice of the customer, into consideration and matches them with relatively more important technical requirements, such as the voice of engineers. According to Smith (1995), managers should be more focused on determining which service attributes are important to customers, other than measuring customer expectations. QFD is seen as a beneficial tool for the service industry, particularly for the hospitality industry (Paryani, Masoudi, & Cudney, 2010). Kandampully and Suhartanto (2000) emphasised that some aspects of a lodging service might be more important to customers than others. Furthermore, while service providers may focus on some particular service dimensions and processes, customers may consider the entire picture of service delivery processes (Nasution & Mavondo, 2008). Even though QFD has been used in the manufacturing industry and other service segments, it has rarely been utilised theoretically (c.f. Ikiz & Masoudi, 2008; Akbaba, 2006) or empirically in examining specific functions in the lodging industry (c.f. Miyoung & Haemoon, 1998; Kirk & Galanty, 1994). One of the most important reasons for this is about the familiarity level of relevant shareholders in the lodging industry. Yet, Crick and Spencer (2011) proposed QFD as the most promising tool in the lodging industry. This is because it can readily be used to evaluate customer needs and expectations at every step to design service that meets and potentially exceeds their needs and expectations. Additionally, Stuart and Tax (1996) emphasised the potential of the QFD for both the strategic and tactical levels in terms of service positioning and service delivery planning. However, none of the current studies in the lodging industry literature utilises QFD as a tool in service design processes for the totality of service delivery processes in the lodging industry. Therefore, this study has the potential to fill this gap in the service quality literature through effective service design function using QFD.

The paper is designed as follows: The next section briefly discusses service quality concepts in the lodging industry. The following sections present the structure of QFD and methodology. Discussion, implications and conclusions are followed by the findings.

Literature review

Service quality in the lodging industry

The lodging industry, one of the driving forces in global economy, consists of a major section of the hospitality industry. Psychical, economic, and human assets are driving factors in the lodging industry. From the customer point of view, satisfactory experience is considered one of the impactful factors for powerful brand commitment, positive word of mouth, and hotel patronage. From the lodging providers' point of view, a satisfactory experience means increasing sustainability and competitive advantage.

The importance of service quality in the lodging industry is accepted in the literature (Min, Min, & Chung, 2002; Caruana, 2002). Oberoi and Hales (1990) presented service quality dimensions as antecedents in UK conference hotels. Kandampully and Suhartanto (2000) identified four service quality factors (i.e. reception, housekeeping, food and beverages, and price) that determine customer satisfaction. Min and Min (1997) reported two major service quality dimensions such as overall room values and front-office services. Mei et al. (1999) proposed that service quality in the lodging industry was represented by three dimensions: employees, tangibles, and reliability.

The majority of the next studies examined here utilises SERVQUAL scale as a tool to measure and improve service quality in the lodging industry. SERVQUAL was developed particularly to measure quality in terms of the difference between customer expectations and perceptions in service settings within tangibles, assurance, responsiveness, reliability, and empathy dimensions (Parasuraman et al., 1985). SERVQUAL has been implemented in the hotel industry, reflected by many studies in the literature. For example, Ekinci, Riley, and Fife-Schaw (1998), Gundersen, Heide, and Olsson (1996), and Oberoi and Hales (1990) classified service quality in both the 'tangibles' and 'intangibles' dimensions. Webster and Hung (1994) analyzed service quality in eight dimensions: tangibles, reliability, communication, responsiveness, security, understanding, and convenience. Saleh and Ryan (1992) identified five dimensions of service quality: conviviality, tangibles, reassurance, avoidance of sarcasm, and empathy. Caruana, Money, and Berthon (2000) constructed a three-dimensional structure as reliability, tangibles, responsiveness, assurance, and empathy melding into a single factor. Tsaur, Chiu, and Huang (2002) analysed the service quality of international hotels via eight dimensions: responsiveness, tangibles, meal service, location, reliability, empathy, reputation, and business service. Ekinci and Riley (2001) developed seven dimensions – decoration, cleanliness, staff behaviour and attitude, output quality, accessibility, timeliness, and reliability – for identifying service quality. Juwaheer and Ross (2003) found that an overall evaluation of service quality in hotels is determined largely by assurance and reliability dimensions. Other studies using regular SERVQUAL dimensions were discussed by Gabbie and O'Neill (1997), Akbaba (2006), Chu (2002), and Fick and Ritchie (1991).

As well as the comprehensive acceptance of SERVQUAL in the lodging industry, there are studies criticising SERVQUAL (Wilkins, Merrilees, & Herington, 2007). Brown, Churchill, and Peter (1993), Carman (1990), and Babakus and Boller (1992) discussed the necessity of customising the dimensions to the industry under examination using SERVQUAL. Particular scales unique to the lodging industry, such as LODGQUAL, LODGSERV, SERVQUAL-P and HOLSERV, were developed in the literature. LODGQUAL, which has dimensions similar to SERVQUAL, was developed by Getty and Thompson (1994). HOLSERV contains employee, tangibles, and reliability dimensions (Mei et al., 1999). With a similar approach to SERVQUAL, Knutson, Stevens, Wullaert, Patton, and Yokoyama (1990) developed the LODGSERV scale. In a different perspective, Murphy, Schegg, and Olaru (2007) proposed the SERVQUAL-P service quality (SQ) model for the lodging industry. Lodging Quality Index (LQI) is another sector-specific scale developed by Getty and Getty (2003), including tangibility, reliability, responsiveness, confidence, and communication dimensions.

QFD in the lodging industry

Akao (1990) developed QFD in the 1960s at the Kobe Shipyard of Mitsubishi Heavy Industries Ltd. QFD was implemented by major manufacturing companies, particularly

Western global manufacturers during the 1980s. However, Ansari and Modarress (1994) emphasised that QFD could be applied in non-manufacturing firms, as well as Figure 1.

QFD is constructed in the structure of house of quality (HOQ). HOQ includes customers' needs (Whats) and ways (Hows) of meeting those needs in the technical language of the product/service (Ho, He, Lee, & Emrouznejad, 2012). Gryna (2001, p. 336) mentioned that 'QFD uses a series of interlocking matrixes that translates customers' needs into product and process characteristics'. According to Na, Xiaofei, Yang, and Ming (2012), QFD is capable of helping each function to create effective design measures. They also state that customer needs and expectations, design objects, and rival performance are combined via QFD. The flow of QFD is structured in HOQ in a way of converting customer needs and expectations into engineering specifications (Tontini, 2007). The construction of HOQ is functioned within five sections: (1) customer needs and expectations; (2) planning matrix; (3) technical requirements; (4) relationship matrix; and (5) technical correlation matrix. The voice of the customer is heard in the first section. The planning matrix identifies relatively more important customer needs and expectations. Design characteristics, that is, the voice of engineering, are determined in the technical requirements section. The relationship matrix is built to show the associations between technical requirements and customer expectations, while the technical correlation matrix presents the relationships between technical requirements in the roof of HOQ.

Albeit QFD has been implemented in manufacturing settings, it has rarely been utilised in service delivery processes (c.f. Chen & Chou, 2011; Zuo, Huang, Fan, & Zhang, 2013). As well as the rareness of QFD applications in the service industry, QFD is seldom employed in studies of the lodging industry. For instance, Miyoung and Haemoon (1998) hypothetically implemented QFD in the lodging industry as one of the first examples of QFD in the industry. While Ikiz and Masoudi (2008) presented a conceptual case study of a combination of SERVQUAL and QFD, Jeong and Oh (1998) proposed a hypothetical example of QFD in the lodging sector. Akbaba (2005) and Stuart and Tax (1996) partially implemented QFD in front-office departments to improve service delivery processes. Kirk and Galanty (1994) used QFD to improve the effectiveness of the house-keeping system in hotels. In a different setting, Michael, Johnson, and Renaghan (1999) presented a modified QFD approach in luxury business hotels. A case study using a hybrid approach of QFD and Pareto Analysis was demonstrated by Oke, Ofiabulu, Banjo, and Akanbi (2008). Lin, Chen, and Chang (2011) suggested improvements in

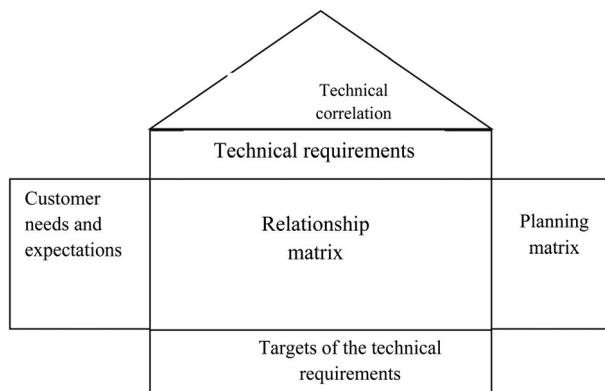


Figure 1. The framework of HOQ.

accommodation service innovation processes using QFD. Chang and Chen (2011) searched customers' brand contacts at hot spring hotels using the KANO model and QFD.

Research design and methodology

This section empirically depicts how QFD was employed to design service delivery processes in the lodging industry, taking both customer demands and service provider expert knowledge and opinions into account. In the following subsections, a description of the implementation of each step of QFD is outlined.

The empirical study was performed at a five-star hot spring hotel in a national park in Turkey. The university-affiliated hotel provides customers with various services such as long-term and daily accommodations, spa, sport activities, and meetings.

Discovering customer needs and expectations

In today's global service industry, a huge competitive advantage is the accurate and timely understanding of customer needs and expectations, particularly before rivals do (Zeithaml, Berry, & Parasuraman, 1996). Keeping this in mind, QFD begins with learning customer needs and expectations using appropriate marketing research tools and techniques. This step can be perceived as the primary driver in the entire QFD process because understanding exactly what customers demand is the most important stage in delivering high-quality service.

In this step of this empirical study, customer needs and expectations were derived from (1) one focus group study; (2) past customers' opinions, suggestions, and complaints; (3) managers' opinions; and (4) items used in LQI and SERVQUAL.

A focus group study was performed with nine customers who experienced services at the hotel. Focus group studies have been widely used in very diverse research areas and analysed scientifically in the literature (Easton, Easton, & Belch, 2003; Massey, 2011). The results of this focus group study were incorporated into the planning matrix to construct the HOQ. Those results also were used as a base to construct the survey questionnaire for the next steps of discovering customer needs and expectations.

As stated above, service design processes should focus simultaneously on customer and service provider points of view. First, past customers' opinions, suggestions, and complaints were obtained and classified for use in the research survey. Second, as the service providers have expert knowledge and experience in the lodging industry, managers' views were incorporated into the research survey questionnaire.

As another tool in this step, SERVQUAL presents the general quality dimensions for service industries, but it does not include specific dimensions for each service type. For this reason, items were derived from the LQI scale, while the SERVQUAL includes comparisons of expectations and perceptions. As stated in the literature, the LQI developed by Getty and Getty (2003) is a valid and reliable scale to measure service quality, particularly in the lodging industry.

Integrating the four components given above, 59 customer needs and expectations along with 3 demographic questions were determined for use in the questionnaire. Both customer expectations and perceptions were rated using a five-point Likert scale, from 1 = strongly disagree to 5 = strongly agree for perceptions and from 1 = unimportant to 5 = very important for expectations. Accepting more than 10,000 customers annually with a 95% confidence level and a 5% error margin (DeVaus, 2000), the sample size consisted of 302 customers. In all, 35% of the sample was below the age of 30 years, and

23.4% was between the ages of 30 and 45 years. Males comprised 45.6% of the sample, and 76% had an undergraduate degree. An internal consistency criterion of 0.7 (Nunnally, 1978) was satisfied because Cronbach alpha was .968 for expectation-related items.

Sample size in this study is good enough for performing factor analysis (FA) as stated by Tabachnick and Fidell (2001). FA was performed to categorise customer needs and expectations. FA was employed because it is a powerful method to reduce items in a single set of variables and discover which variables are relatively independent of one another (Tabachnick & Fidell, 2001). Exploratory FA was done with quartimax rotation through principal components analysis on 59 items (Table 1). The dimensions of needs and expectations derived from FA were named as tangibles, food, the adequate features of rooms and housekeeping, communication and accessibility, assurance and responsiveness, reliability, well-cared spaces, and equipment. Those dimensions constitute the rows of HOQ. Technically, it was possible to utilise an analysis item by item. However, since there are 59 items identifying customer needs and expectations, it was more convenient to implement factor analysis to classify the items. Using 59 items by themselves requires decision-makers to consider all of the items separately to associate with technical requirements in the next steps. In addition, using them item by item results in an exponentially increasing work load in HOQ, which makes it very intimidating for decision-makers in service design processes.

Constructing planning matrix

A planning matrix contains a group of variables calculated on customer needs and expectations in HOQ. These variables are *the importance rate, the customer rate (current and rival firms), the quality plan score, the rate of level up, the priority factor, absolute weight, and relative weight*, respectively. The planning matrix was constructed by the QFD team, including two academicians and three hotel managers. Hotel managers involved in this study are the general director, the operations manager, and the food and beverage manager. They are considered competent to evaluate and improve the service delivery processes, while academicians are experts on processing QFD and service quality.

The *importance* rates for each customer need and expectation in HOQ were calculated from the expectation scores given by respondents in the research survey performed in this study as given above. The highest importance rate was given to the ‘tangibles’ dimension, while the least importance rate was given to ‘the adequate features of rooms and house-keeping’ dimension by respondents (Table 2).

The *customer rates* in the planning matrix were calculated as the perception scores of current customer satisfaction obtained through the survey. In this step, the customer rates were calculated for each customer need and expectation, as the mean value of perception scores given by each customer (Formula 1).

$$CR_i = \frac{\sum_{l=1}^m (\text{Perception}_{il})}{m} \quad i = 1, 2, \dots, n, \quad (1)$$

where CR_i is the mean value of the i th customer rate, n is the number of customer need and expectation, and m is the number of customers. Customer rates are given in Table 2 in the planning matrix. The biggest gap between the importance rates and customer rates is discovered in the ‘tangibles’ dimension.

Table 1. Factor analysis results.

	Assurance and responsiveness ($\alpha = .951$)	Tangibles ($\alpha = .896$)	Adequate features of rooms and housekeeping ($\alpha = .899$)	Communication and accessibility ($\alpha = .890$)	Reliability ($\alpha = .890$)	Well-cared spaces and equipment ($\alpha = .846$)	Food ($\alpha = .861$)	Variance explained
<i>Assurance and responsiveness</i>								35%
Error-free and rapid pool service	0.757	0.087	0.136	0.197	0.046	0.203	0.098	
Rapid restaurant services	0.746	0.125	0.094	0.187	0.177	0.011	0.087	
Rapid action of the employees to solve my problems	0.726	0.089	0.073	0.248	0.204	0.112	0.030	
Employees knowledge about the current services	0.724	0.181	0.129	0.086	0.240	0.000	0.052	
Rapid room service	0.711	0.148	0.126	0.226	0.1947	0.061	0.078	
Rapid response of the employees to my demands	0.709	.109	0.186	0.226	0.190	0.183	0.086	
Error-free and accurate services in the sports centre	0.696	0.111	0.165	0.085	-0.031	0.278	0.210	
Provision information about the hotel	0.692	0.104	0.168	0.138	0.307	0.195	0.078	
Willingness of the employees to answer my questions	0.686	0.096	0.175	0.194	0.255	0.193	0.004	
Error-free and accurate treatment services in the health and beauty centre	0.684	0.197	0.162	0.084	0.025	0.291	0.163	
Knowledge of the employees about the surroundings of the hotel	0.668	0.022	0.126	0.327	0.173	-0.066	0.045	
Interest shown by the authorities during customer calls	0.647	.0195	0.039	0.202	0.223	0.149	-0.018	
Respectful and polite attitude of the employees towards customers	0.616	0.022	0.182	0.417	0.142	-0.013	0.111	

(Continued)

Table 1. Continued.

	Assurance and responsiveness ($\alpha = .951$)	Tangibles ($\alpha = .896$)	Adequate features of rooms and housekeeping ($\alpha = .899$)	Communication and accessibility ($\alpha = .890$)	Reliability ($\alpha = .890$)	Well-cared spaces and equipment ($\alpha = .846$)	Food ($\alpha = .861$)	Variance explained
Provision of a secure atmosphere	0.606	0.042	0.221	0.391	0.100	-0.059	0.265	
The provision of room service when needed	0.489	0.079	0.109	0.435	0.111	-0.085	0.248	
The knowledge of the employees about technical equipment	0.449	0.082	0.090	0.446	0.081	-0.009	0.372	
<i>Tangibles</i>								7%
The good maintenance of the internal and external areas	0.069	0.740	0.098	0.072	0.086	0.022	0.125	
The attractiveness of surroundings of the hotel	0.132	0.736	0.084	0.079	0.166	0.012	0.090	
Good illumination	0.137	0.682	0.076	0.042	0.103	-0.004	0.233	
The satisfying response of the hotel for the transportation demand	0.122	0.680	0.061	0.141	0.097	0.087	0.107	
Sufficient information about transportation	0.036	0.646	0.056	0.096	0.168	0.291	-0.027	
The location of the hotel	0.158	0.641	0.148	0.122	0.123	0.258	-0.115	
Comfortable waiting hall	0.021	0.640	0.388	0.025	-0.053	-0.142	0.085	
Cleanness of the hotel	0.143	0.639	0.365	0.019	0.042	0.039	0.101	
Adequate parking space	0.112	0.632	0.067	0.083	0.143	0.278	-0.082	
Pleasant atmosphere of the restaurant	0.168	0.621	0.012	0.076	0.148	0.237	0.116	
Attractiveness of the shops in the hotel	0.029	0.616	0.085	0.002	0.021	-0.008	0.172	
<i>Adequate features of rooms and housekeeping</i>								6%
Provision of adequate towel, soap, etc.	0.220	0.145	0.731	0.058	0.103	0.303	0.052	
	0.208	0.166	0.680	0.034	0.024	0.236	0.138	

Assurance and responsiveness

Rapid and error-free room service								
Presence of thermal water in my room	0.137	0.286	0.651	0.154	0.236	0.034	0.055	
Presence of adequate equipment in the room to provide maximum comfort	0.085	0.186	0.646	0.194	0.310	0.062	0.063	
Provision of all sorts of hygienic and security measures	0.217	0.110	0.606	0.194	0.459	0.025	0.062	
Having holders and non-skipping floors in the bathroom	0.220	0.162	0.601	0.159	0.192	0.075	0.256	
Getting the value of the price I pay	0.162	0.183	0.573	0.086	-0.071	0.403	0.118	
Having documents about the activities in the hotel and other necessary information in my room	0.165	0.130	0.543	0.160	0.490	0.094	0.090	
Having necessary sound insulation in my room	0.231	0.027	0.542	0.097	0.311	0.185	0.101	
<i>Communication and accessibility</i>								7%
Customised behaviour of employees	0.295	0.119	0.119	0.734	0.088	0.220	0.092	
Easy access to adequate information on the website	0.290	0.133	0.097	0.669	0.087	0.295	0.033	
Estimating customer needs by employees	0.327	0.072	0.054	0.658	0.074	-0.006	0.140	
Showing necessary interest at the reception	0.366	0.145	0.147	0.647	0.226	-0.009	-0.009	
Rapid connection to the Internet	0.374	0.098	0.082	0.644	0.136	0.296	0.053	
Giving detail about my bill	0.351	0.130	0.221	0.575	0.159	0.210	-0.054	
Close interest of the managers whenever I need	0.466	0.091	0.151	0.467	0.125	0.126	0.119	

(Continued)

Table 1. Continued.

	Assurance and responsiveness ($\alpha = .951$)	Tangibles ($\alpha = .896$)	Adequate features of rooms and housekeeping ($\alpha = .899$)	Communication and accessibility ($\alpha = .890$)	Reliability ($\alpha = .890$)	Well-cared spaces and equipment ($\alpha = .846$)	Food ($\alpha = .861$)	Variance explained
Easy and timely access to the facilities	0.412	0.133	0.156	0.449	0.028	-0.035	0.398	
<i>Reliability</i>								8%
Rapid and error-free check-out process	0.285	0.132	0.187	0.119	0.695	0.023	0.052	
Expert health staff	0.185	0.197	0.244	0.116	0.665	0.181	0.150	
Quality hot spring water	0.260	0.152	0.242	0.131	0.648	0.168	0.114	
The good image and the prestige of the hotel	0.272	0.200	0.137	0.159	0.617	0.143	0.194	
Having hygienic and healthy hot spring water	0.302	0.244	0.069	0.134	0.613	0.244	0.221	
Compliance of the employees to the demands	0.375	0.169	0.232	0.079	0.597	0.171	0.080	
<i>Well-cared spaces and equipment</i>								8%
The well-cared and refreshing atmosphere of health and beauty centre	0.139	0.247	0.202	0.146	0.269	0.655	0.199	
The well-cared and refreshing atmosphere of the fitness centre	0.179	0.184	0.206	0.228	0.220	0.631	0.195	
The well-cared and refreshing atmosphere of the pool	0.136	0.150	0.317	0.097	0.198	0.558	0.216	
Rapid and error-free reservation service	0.181	0.142	0.250	0.173	0.143	0.515	0.203	
Well-cared TV, AC, and other equipment	0.324	0.156	0.274	0.136	0.120	0.431	0.250	
<i>Food</i>								6%
Food covering 0.117 g Turkish and world cuisine	0.149	0.212	0.127	0.098	0.209	0.229	0.746	
Showing utmost care to nature	0.100	0.168	0.213	0.117	0.162	0.207	0.731	

Assurance and responsiveness

and the calories of the food provided							
Quality and diversity of the food	0.173	0.269	0.161	0.150	0.119	0.245	0.602
Showing utmost care to the people on diet and the people with diabetes	0.212	0.237	0.167	0.003	0.299	0.390	0.517

For determining *the quality plan* scores, the QFD team members took the customer rates and importance rates into consideration. They also considered the vision and strategic goals of the hotel in this step on the basis of a 5-point Likert scale, using 1 = unimportant and 5 = very important. The highest quality plan scores were allocated to ‘assurance and responsiveness’ and ‘tangibles’ dimensions. Particularly, since the biggest gap between the importance rates and customer rates was discovered in the ‘tangibles’ dimension, this dimension gained the highest quality plan score.

As the next variable in the planning matrix, *rate of level up* scores were computed (Formula 2).

$$RL_i = QP_i \div CR_i, \quad i = 1, 2, \dots, n, \quad (2)$$

where n is the number of customer need and expectation, RL_i is the rate of level up, QP_i is the quality plan score, and CR_i is the mean value of the i th customer rate. The rate of level up values refers to the points where each customer need and expectation requires an improvement with regard to customer and managers’ views. The highest rates of level up values arose in the ‘assurance and responsiveness’ and ‘tangibles’ dimensions in the same line with the dimensions discovered as the highest ones in quality plan scores.

Priority factor is a variable that identifies whether relevant customer need and expectation have the capability to increase total sales of the firm in the near future (Akao, 1990). Considering the potentials of each customer need and expectation in this sense, QFD team members assigned scores for this factor using a scale containing 1 point for no improvement possibility in the sales, 1.2 points for medium improvement possibility, and 1.5 points for strong improvement possibility (Akao, 1990). 1.5 points was given to ‘assurance and responsiveness’, ‘tangibles’, and ‘food’ dimensions, while ‘reliability’ was assigned with 1.2 and the others with 1 point by the QFD team.

The next step in planning matrix includes calculating *absolute weights* and *relative weights* for each customer need and expectation (Formulas 3 and 4).

$$AW_i = IR_i \times RL_i \times PF_i, \quad i = 1, 2, \dots, n, \quad (3)$$

$$RW_i = AW_i \div \sum_{i=1}^n AW_i, \quad i = 1, 2, \dots, n, \quad (4)$$

where n is the number of customer need and expectation, AW_i is the absolute weight, IR_i is the importance rate score, RL_i is the rate of level up, PF_i is the priority factor score, and RW_i is the relative weight. The highest relative weights were discovered on ‘tangibles’, ‘assurance and responsiveness’, and ‘food’ dimensions, with 20%, 20%, and 16% relative weight scores, respectively.

Determining technical requirements

Technical requirements in QFD refer to the design characteristics and specifications of the product/service. Determining accurate technical requirements is a way of increasing customer satisfaction through making sure that customer demands are brought into the product development process (Hauser & Clausing, 1988). It transforms qualitative requirements to quantitative and measurable characteristics in columns of HOQ as defined by

Utne (2009, p. 727). It should be noted that one technical requirement is likely to affect one or more of the customer requirements (Büyüközkan & Berkol, 2011).

After determining customer needs and expectations, technical requirements were designated by the QFD team. In other words, the QFD team investigated in detail how to meet each customer need and expectation in the technical language of service. Twenty-one technical requirements developed in this study are given in HOQ.

Building relationship matrix

The relationship matrix in HOQ matches each customer need and expectation with each technical requirement, considering the associations between them within a design process perspective. QFD team members rated those associations using numeric values as follows: 9 = a strong relationship, 3 = a medium relationship, and 1 = a weak relationship as discussed by Akao (1990). The relationship matrix built in this study is shown in Table 2.

The outcomes of the relationship matrix include calculating *absolute weights* and *relative weights* for each technical requirement (Formulas 5 and 6).

$$AW_j = \sum_{i=1}^n (r_i * AW_i), \quad j = 1, 2, \dots, k, \quad (5)$$

$$RW_j = AW_j \div \sum_{j=1}^k AW_j, \quad j = 1, 2, \dots, k, \quad (6)$$

where AW_i is the absolute weight, r_i is the association rate between the i th customer need and expectation and the j th technical requirement, AW_j is the absolute weight, k is the number of technical requirement, and RW_j is the relative weight. As seen from Table 2, the most important technical requirements to meet customer needs and expectations are (1) error-free service (10%), (2) appropriate behaviours and attitudes towards customers (7%), and (3) meeting the customised needs and expectations of customers (7%).

Constructing technical correlation matrix

While working on optimising technical requirements, design teams should focus on the relationships between and among technical requirements during product/service development studies (Akao, 1990). Any changes in one unique technical requirement may have a positive or negative or null effect on any other technical requirements. The results of this analysis are demonstrated on the roof of HOQ. As seen from HOQ, error-free service is the only technical requirement that has a positive relationship with 12 of 21 technical requirements, and there is only one negative relationship between 'meeting customised needs and expectations of customers' and 'delivering service in predetermined period of time' technical requirements.

Findings

As the first empirical attempt of QFD in the lodging industry, the dimensions of customer needs and expectations in this study are tangibles, food, the adequate features of rooms and housekeeping, communication and accessibility, assurance and responsiveness, reliability,

and well-cared spaces and equipment. There are similar studies in the literature proposing parallel service quality dimensions particularly used in the lodging industry. As an example, Min and Min (1997) identified overall room values and front-office services as dimensions for service quality in the lodging industry. Kandampully and Suhartanto (2000) and Wilkins et al. (2007) also mentioned housekeeping and food dimensions as important ones in determining customer satisfaction. Webster and Hung (1994), Mei et al. (1999), Caruana et al. (2000), Ekinci and Riley (2001), and Tsauro et al. (2002) also assigned tangibles and reliability dimensions in service quality issues. Ekinci et al. (1998), Gundersen et al. (1996), Oberoi and Hales (1990), and Saleh and Ryan (1992) defined service quality in the tangibles dimension. When analysing service quality, Webster and Hung (1994) and Tsauro et al. (2002) assumed communication and responsiveness as related dimensions within service quality.

On one hand, as seen from the importance rate in the planning matrix, the most important customer need and expectation dimension in this study is the 'tangibles' dimension. The biggest gap between importance and customer rates also emerges in the 'tangibles' dimension. In terms of this gap, Tsang and Qu (2000) also declared that the biggest gap between expectations and perceptions is related to 'physical facilities' in the lodging industry. Considering that the 'reliability' dimension has been identified as the most important service quality dimension in the previous studies, this finding may shed light on the importance of visual characteristics of services in the lodging industry. This finding may be perceived in the context of industry-specific characteristics. According to some authors (Akbaba, 2006; Khan, 2003; Tsauro et al., 2002), some tangible features, such as interior decorations and hardware facilities, determine the first impressions of the hotel. Additional facilities and activities such as restaurants, swimming pools, and gyms salons are also seen as features of tangible service qualities affecting consumers' perceptions (Akbaba, 2006; Choi & Chu, 2001; Lund, 2000; Raymond & Chu, 2000).

On the other hand, 'the adequate features of rooms and housekeeping' dimension was rated as the least important customer need and expectation by respondents. This finding may take the practitioners to a different direction; however, Min and Min (1997) identify 'overall room values' as one of the two main service quality dimensions in the lodging industry.

As another important finding of this study, hotel managers and academicians composing the QFD team decided that 'assurance and responsiveness' and 'tangibles' dimensions should be perceived as the leading dimensions in service quality improvement activities, as seen from quality plan scores in HOQ. This view reinforces the customer perspective in terms of values calculated in the rate of level up variable. This finding refers to the point that managers, as the main designers of the service delivery, and service consumers have the same view of the importance of 'assurance and responsiveness' and 'tangibles' dimensions. Knutson et al. (1990) considered the assurance dimension as the second important dimension in service quality for lodging consumers. Mei et al. (1999), Hsieh, Lin, and Lin (2008), and Akbaba (2006) also mentioned tangibles as the important dimension of service quality in the hospitality industry. Also, Chang and Chen (2011) identified atmosphere-oriented contact as the most effective one among the four dimensions of the customer brand contacts. The results reveal that the 'tangibles' dimension has the highest importance and the lowest performance in this study. To overcome this vital dilemma, managers should focus on the physical elements of the service, such as modification and improvement of the interior spaces and surrounding of the hotel.

In the view of managers, 'tangibles', 'assurance and responsiveness', and 'food' dimensions were the most influential dimensions on the total sales of the hotel, while

'reliability' was rated as the medium-level influential one. Kandampully and Suhartanto (2000) also evaluated the food and beverages dimension as a supporting factor in determining customer satisfaction and loyalty. The other dimensions were seen as dimensions with little potential to increase sales.

The most useful knowledge from HOQ is about impactful customer needs and expectations, as the outcome of the planning matrix consists of the views of service providers, academicians, and consumers. In this sense, 'tangibles', 'assurance and responsiveness', and 'food' dimensions were the most impactful customer needs and expectations in this study. The literature presents support from previous studies. Monteson and Singer (1992) accepted assurance dimension as the guarantee of performing services. Juwaheer and Ross (2003) and Fick and Ritchie (1991) found that an evaluation of service quality is determined mostly by 'assurance factors'. Some other studies (Choi & Chu, 2001; Akbaba, 2006; Khan, 2003) indicated the responsiveness dimension as a good way to impress customers. Kandampully and Suhartanto (2000) identified the food dimension as important in determining customer satisfaction.

Another insight generated from HOQ is the essential technical requirements, which can be developed as the outcome of the relationship matrix. Those technical requirements in this study are error-free service, appropriate behaviours and attitudes towards customers, and meeting customised needs and expectations of customers. Mei et al. (1999) mentioned individual attention to customers as the best predictor of overall service quality. Similarly, Saleh and Ryan (1992) and Tsaur et al. (2002) discussed empathy in the same line. Akan (1995) presented employee behaviour as the essential component of service quality. Choi and Chu (2001), Cooper, Fletcher, and Westake (1995), Khan (2003), Low (1989), and Raymond and Chu (2000) also emphasised the positive impacts of courteous and friendly attitudes by employees on customer evaluations of service quality. Employee behaviour is highly related to training programmes and education to improve their competency to solve efficiently and effectively customers' problems.

On one hand, in terms of the interrelationships between technical requirements, error-free service is associated with many other technical requirements in this study. This emphasises the importance of error-free service quality and delivering the right service at the first time, referring to zero defect as the main goal in quality improvement studies (Crosby, 1980). On the other hand, the negative relationship between 'meeting customised needs and expectations of customers' and 'delivering service in predetermined period of time' technical requirements lead managers to the need to make a very detailed and diligent cost/benefit analysis in the design of relevant service delivery processes. Monteson and Singer (1992) stated that different services that are delivered within a predetermined period of time, such as special promotions, could be provided to customers for meeting the customised needs and expectations of customers and solving this dilemma.

Discussion, implications, and conclusions

This study is the first empirical attempt of employing QFD as a service quality design and improvement tool in the lodging industry. It combines two complementary perspectives between managers and customers regarding service quality improvement. Lin et al. (2011) highlighted the accurate and timely measurement of customers' needs and expectations when defining service quality dimensions, improving service quality, and allocating resources efficiently and effectively. Service providers and planners also have an effective role in service design processes. QFD application in the lodging industry could be seen as an effective method to design and improve service quality.

Customer and service provider cultural differences may impact customer needs and expectations and the way that service design and delivery are perceived in the lodging industry. Those differences may also affect the next steps of QFD. Armstrong, Mok, Go, and Chan (1997) emphasised that customer needs and expectations of service quality might differ from culture to culture. Therefore, the same study could be replicated in various cultures to see the outcomes of cultural variations on service quality expectations.

In addition to the nature of the features of services, the definition, delivery, and measurement of service quality in hotels are complicated due to hotel industry-specific characteristics such as short distribution channels, interactive communication and exchange of information, reliability, consistency, fluctuating demand, and non-well-defined standards (Barrington & Olsen, 1987). Highly fluctuating demand complicates delivering consistent service quality in particular (Mei et al., 1999). The hotel industry is faced with a capacity constraint which necessitates keeping existing capacity in a balance with demand (Lovelock, 1984). Hotel managers should implement effective strategies for managing capacity and demand (Kandampully, 2000). Several studies focus on the importance of managing demand and capacity for consistency of service quality (Sasser, 1976; Rhyne, 1987; Chase & Bowen, 1991; Lovelock, 1992; Armistead & Clark, 1994). Constant supply and fluctuating demand are more likely to increase the probability of service failures (Lewis & McCann, 2004). As competition increases and service quality improvements gain importance in hotels, defining service quality dimensions and identifying critical ones from the customer perspective have become crucial for hotel managers (Fick & Ritchie, 1991). In this sense, having knowledge about those points helps hotel managers improve service quality (Asubonteng, McCleary, & Swan, 1996).

For hotel managers, it is crucial to learn accurately what customers demand (Akbaba, 2006). Market segmentation is the key success factor in competitive markets (Dolnicar 2002). Especially in the tourism industry, the importance of market segmentation is crucial (Manthiou, Tang, Morrison, & Shin, 2011). In this industry, market segmentation is trending due to consumers' negative attitudes towards homogenous service delivery (Timothy & Teye, 2009). Rutes, Penner, and Adams (2001) also identified standard service delivery in hotels as a potential factor in lost competitive advantage. However, various market segments were ignored in previous studies. Only Akbaba's (2006) work on business hotels, Oberoi and Hales's (1990) research on conference hotels, and Ekinci et al.'s (1998) study on resort hotels studies dealt specifically with this topic. The different segments in the lodging industry could be analysed and compared in terms of service quality improvement efforts. Akbaba (2006) mentioned that the purpose of the hotel stays may be an important determining element in evaluating the service quality in the lodging industry. Considering the impact of service quality, Horner and Swarbrooke (2005) advised the hotel industry to focus on increasing the numbers of niche products and services to satisfy customers' needs and expectations. The findings of this study may lead hotels to determine the dimensions of service quality for other hotel segments.

As further research opportunities, some methods that make it possible to decrease uncertainty and subjectivity in the service processes may be implemented in QFD. For instance, fuzzy logic can be utilised as an appropriate tool in this line. Also, as another future research opportunity, researchers can compare the results of the two different QFD studies. Also, de Oña and de Oña (2014) emphasise the implementation of cluster analysis and if-then rules in service quality research in the transportation sector.

Disclosure statement

No potential conflict of interest was reported by the authors.

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