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Integrating Kano Model and Quality Function Deployment for designing service in hospital front office

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Abstract

Purpose: The aims of this study are twofold: first, it attempts to investigate service attributes in a hospital front office; and second, to identify strategies to improve those service attributes.

Design/methodology: This study used integration of Quality Function Deployment and Kano Model. The research instrument, which takes the SERVQUAL model as its starting point, was developed using a comprehensive set of techniques, including a literature review of relevant topics, interviews and focus group discussions. Using a sample of 140 customers of an international hospital situated in Yogyakarta, Indonesia, 14 service attributes required by customers were identified. The attributes, which were further categorised into 5 attractive, 4 one-dimensional and 5 'must-be' attributes, were analysed using the Kano Model.

Findings: Using the integrated QFD and Kano Model, the service attributes needed for improvement were identified. The results are different from those when the company used either SERVQUAL or QFD alone. This study also reveals that benchmarking with competitor might produce misleading results. The results are different when the analysis combined a comprehensive method of QFD and Kano Model.

Practical implications: Service providers will benefit from the findings of this study, as both the service attributes and technical requirements that require improvement as a priority are identified.

Originality/value: It is the first time that front office quality of hospital is examined using integrated method of SERVQUAL, QFD and Kano Model. The recommendations proposed from this comprehensive method offer novel solution that has never been found in existing study.

Keywords: Service quality, Kano Model, Quality Function Deployment, Hospital front office, House of Quality

Jel Codes: M11, M20, M31

1. Introduction

Fierce competition has caused companies to continuously improve the services that they offer to customers; in order to ensure competitive advantage, service providers should be able to satisfy customers' needs. Understanding customers' needs can thus be viewed as a critical source of competitive advantage. However, meeting customers' need through the provision of services with ordinary attributes will not always maintain or increase market share. For this reason, companies need to better understand what its customers' requirements are, and how those customers prioritise particular attributes of service provision.

Service quality is important for any service provider aiming to achieve customer satisfaction. In addition, it is also a critical success factor for maintaining competitive advantage (Baki, Sahin Basfirinci, Murat & Cilingir, 2009). On the other hand, measuring service quality is a complex process, due to its intangible nature. As a consequence, measurement of service quality (SERVQUAL) deserves a special attention.

Without doubt, SERVQUAL, developed by Parasuraman, Zithaml and Berry (1988), is the most cited measurement instrument and study in the field of service quality measurement. The model created in the study consists of 5 main constructs, namely tangibles, reliability, responsiveness, assurance and empathy, which are further broken down into 22 specific dimensions. The five constructs are tangibles, reliability, responsiveness, assurance and empathy.

These categories and dimensions have been modified in later studies, such as Parasuraman, Zithaml and Berry (1994a), Parasuraman, Zithaml and Berry (1994b) and Abdullah (2006). Another variation of SERVQUAL is service performance (SERVPERF), which was proposed by Cronin and Taylor (1992). A number of variations have emerged in the application of SERVQUAL in different contexts. Some

examples include Abdullah (2009) and Abdullah (2006), who develop instruments for measuring service quality in higher education, while Iwaarden and Wiele (2003) compile a list of desirable attributes for websites. Other variations include Hossain and Leo (2009), who examine service quality in retail banking, Randheer, Al-motawa and Prince Vijay (2011), who investigate commuters' perceptions of public transportation, and Pakdil and Aydin (2007), who study the perceptions and expectations of airline services customers. The attributes proposed in those studies are entirely different from those outlined by Parasuraman, Zithaml and Berry (1985); however, the basic idea underlying the measurement framework was derived from that original study.

The use of SERVQUAL has been subject to criticism for at least three key reasons (Tan & Pawitra, 2001). First, the model assumes that the relationship between service attributes and service performance is linear. Thus, companies can simply increase customers satisfaction by improving the performance of service attributes. Unfortunately, this assumption is not always correct, as customers might take some attributes for granted. As such, the existence of the attributes only avoids customer dissatisfaction, rather than increasing their satisfaction. For example, providing a debit card to banking customers is no longer viewed as a special service attribute, as most banks now provide this facility to their customers. Thus, the existence of this attribute does not much affect customer satisfaction levels.

Second, Parasuraman et al. (1988) claim that SERVQUAL is a practical tool for analysing to what extent customers are satisfied with performance of services offered by firms. SERVQUAL focuses on the differences between customers' expectations and perceptions. Negative gaps imply that customers are not satisfied because customers' expectations are higher compared to perceptions. By identifying these gaps, service providers can enhance the quality of their service provision via continuous improvement. However, this is not sufficient in a fierce competitive environment. Shen, Tan and Xie (2010) support this idea, arguing that companies should focus on how to meet or exceed customers' expectations through innovation. Unfortunately, SERVQUAL was designed without considering the role of innovation (Tan & Pawitra, 2001).

Third, as mentioned above, SERVQUAL can identify gaps between service perception and expectation; unfortunately, though, SERVQUAL does not recommend how to address these gaps. In order to address service gaps, other tools such as Quality Function Deployment (QFD), must also be deployed (Tan & Pawitra, 2001). As such, it is strongly recommended to combine SERVQUAL with other such tools in order to improve service quality.

In order for companies to maintain a competitive advantage, they should focus on three particular areas: customer requirements, company performance, and performance of competitors (Huiskonen &

Pirttila, 1998). In order to address these three areas, a combination of three tools is used: SERVQUAL, QFD and the Kano Model. SERVQUAL is used as a starting point to identify the service attributes that customers are looking for. Even though the method has weaknesses, as outlined above, there are certain generic concepts that can be applied across various industries. For instance, QFD helps companies to identify customer requirements, and measure the performance of the company in comparison to its competitors. Meanwhile, Kano Model helps companies to better understand that the relationship between services attributes and customers' satisfaction is not linear. Kano Model facilitates companies to emphasize which service attributes result in higher level of customer satisfaction compared to others. It is also able to overcome the three drawbacks of SERVUAL discussed earlier in this paper.

In recent years, a number of studies using SERVQUAL, QFD and Kano Model as an integrated method have been conducted. For instance, Pawitra and Tan (2003) examine Indonesian tourist satisfaction, specifically tourists visiting Singapore, and Baki et al. (2009) examine quality of service in logistics sectors. Using the same method, Garibay, Gutierrez and Figueroa (2010) identify service attributes for online library. These studies have successfully considered the non-linear nature of service quality.

Although those studies used the same method, there are some variations in terms of their method of analysis. The focus of investigation in Garibay et al.'s (2010) study, a university library, does not have direct competitor, meaning there was no need to undertake competitor analysis. However, the absence of competitor analysis in this case does not undermine the usefulness of the research results. On the other hand, the study undertaken by Baki et al. (2009) considers the existence of competitors, which are used as benchmarks for the quality of the service delivered by the case company. The variety of analytical techniques used in the studies utilising the integrated method – i.e. SERVQUAL, QFD and the Kano Model –indicates that its application is flexible, meaning it can be applied in various business contexts.

2. Conceptual background

2.1. Quality Function Deployment (QFD)

QFD is a powerful tool for translating customer requirements into technical specifications, and is applied in the design of products and services (Sullivan, 1986; Pawitra & Tan, 2003). Figure 1 presents an example of the use of QFD to design an effective website. In the figure, Section A presents a list of service attributes required by customers, also referred to as the '*Voice of Customers*'. In QFD terms, this

section is often referred as the '*Whats*'. Section B analyses identified service attributes from the perspective of companies. Mainly, this part discusses how to fulfill the service attributes required by customers. Comparison of to what extent service attributes have fulfilled the need of customers is also compared with competitors in Section B.

Section C explains how service providers attempt to provide the attributes required by customers or the '*Hows*'. Section D connects the 'Whats' to the '*Hows*'. Using this section, service providers can identify '*What*' changes will happen to service attributes if they alter the '*How*'. Section E, located in a room in the House of Quality (HoQ), explains the technical correlation between the strategies of service providers, or the relationship between the '*Hows*'. Section F provides important information for service providers, needed to improve the quality of their services. Benchmark, technical differences with competitor, and value targets are among a number of factors listed in this section, which also contains a 'target value' that service providers are expected to achieve.

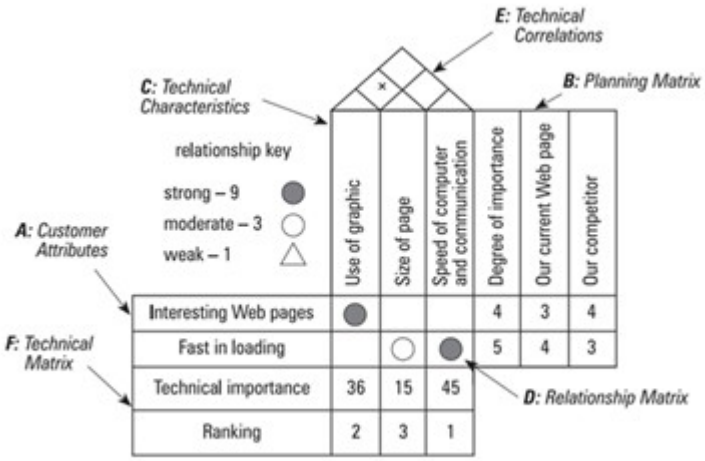

Figure 1. QFD for a website (Shen et al., 2010)

2.2. Kano Model

As mentioned earlier, SERVQUAL assumes that the relationship between customer satisfaction and service quality is linear. Here, 'linear' means that when the service quality is improved, the customer satisfaction will also increase proportionally (Tan & Pawitra, 2001). However, Kano, Seraku and Tsuji (1984) disagree with this assumption, and suggest that in fact the relationship is non-linear, whereby the perceived service quality does not necessarily directly correspond to customer satisfaction or dissatisfaction. Different service attributes can have either a greater or lesser impact on customer satisfaction depending on which category those attributes fall into. Based on their impact on customer

satisfaction, Kano et al. (1994) identify three categories of service attributes: must be, one-dimensional and attractive. This categorisation is depicted in Figure 2, followed by a more detailed description.

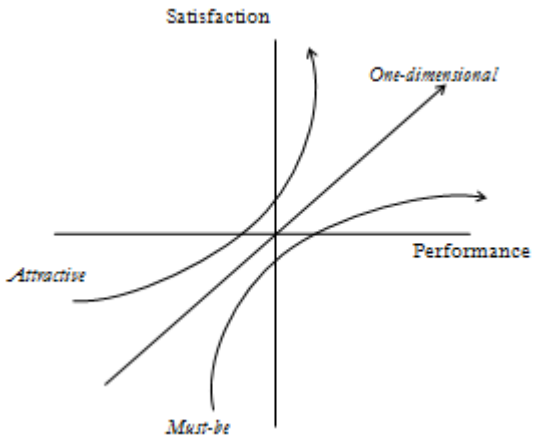

Figure 2. The Kano Model

Must be requirements are service attributes that have to be provided by companies. When companies do not offer the service attributed categorised in must be requirements, customers are very disappointed. Meanwhile, the presence of the attributes does not necessarily make customers satisfied; customers take these service characteristics for granted, and do not explicitly demand them (Matzler, Hinterhuber, Bailom & Sauerwein, 1996). In other words, these attributes are necessary, but they are not sufficient to produce customer satisfaction (Busacca & Padula, 2005). Thus, the presence of these attributes is to avoid customer dissatisfaction only (Matzler et al., 1996).

One-dimensional attributes, on the other hand, do have a linear relationship with customer satisfaction. With regard to these attributes, there is a positive relationship between perceived service quality and customers satisfaction. Customers' satisfaction increases proportionally with the improvement of service attributes performed by companies. Accordingly, this group of service attributes is an important element to increase customers' satisfaction (Busacca & Padula, 2005).

Attractive requirements make the largest contribution to customer satisfaction, in comparison with must-be and one-dimensional attributes. Customers do not expect these attributes to be offered, but their presence could excite customers. However, the absence of these attributes does not lead to customer dissatisfaction (Berger et al., 1993). Attributes in this category can be used to increase market share by attracting companies' competitors (Busacca & Padula, 2005), as they have a strong influence on perceived service quality (Sauerwein, Bailom, Matzler & Hinterhuber, 1996).

2.3. Significance of front office service quality

A hospital is a complex system, within which each department is tasked with delivering specific services (Platchek & Kim, 2012). Adding to this complexity is the custom nature of the services required and desired by the customers, who in this context are patients. Patients' service requirements will not be identical with others; each patient requires customised treatments. As a system, the performance of departments is interrelated with others (Platchek & Kim, 2012; Monti & Nuti, 1996). As such, the performance of a single department within a hospital could affect the performance of other departments. However, there is a need to examine a particular department within a hospital, as each department also has unique characteristics.

There are a number of reasons why the front office is a critical point within a hospital. First, the front office is responsible for collecting payment from patients; this requires additional administrative processes. Inefficient handling of this task at the front office can increase the work load of the back office, which consequently results in reduced cash flow. Empirical findings demonstrate that improvement of payment collection processes at the front office can reduce the work load of the back office, and increase cash on hand by 124% (Essex, 2016).

Another reason why front office is a critical department in a hospital because it functions as a central point of contact across the organisation (Watt, 2007). The front office offers assistance to guests related to the services they require. The department is the nerve centre of the overall organisation, as it stores information regarding what is occurring throughout the hospital (Hogan, 2006). It also plays a key role in forming overall impressions of the service provided by the organisation.

In the healthcare context, a large number of studies have been undertaken examining service quality. For instance, Li et al. (2015) examine service quality in 9 Chinese hospitals using 22 items derived from the dimensions developed by Parasuraman et al. (1988). Using similar dimensions, Chakravarty (2011) examine outpatient department services in reference to the department's specific characteristics. Other studies examine the quality of the information system used in a hospital, and the level of service it provides, with regard to the perspective of nurses as the users (Cohen, Coleman & Kangethe, 2015; Chang, Pang, Tarn, Liu & Yen, 2015). Despite the significance of the front office to the overall organisation, no study is devoted to the quality of the front office service in a hospital setting.

A plethora of studies examine service quality of front offices in other settings, such as Sriyam (2010), and Kumar and Vetrivel (2015), who examine the quality of the service provided by a hotel front office. However, a hospital front office is significantly different from those in other contexts, such as restaurants, banks, hotels, beauty centres and so on. As gatekeepers managing the arrivals and

departures of patients, staffs at the front office should have good knowledge of the healthcare context, they cannot be non-specialised personnel. Front office staff at hotels, restaurants, or other service providers are less likely to be qualified to fill a position on a hospital front office, due to lack of healthcare knowledge.

Previous work has identified several unique characteristics of hospital service. People come to hospital due to the need of health, something which is desperately needed. Customers come to hospital because they have some health problems. Also, patients are difficult to control because they can come and go depend on their health conditions. They even cannot decide when their diseases will disappear and they could leave hospital (Pai and Chary, 2013).

Hospitals should recruit and hire top quality people to fill front office roles (Nelson, 2016). This is because front office staffs in hospitals typically also hold other various roles that are critical to the operations of the hospital, such as phone operators, receptionists, medical secretaries and transcriptionists. In addition, they are required to be able to solve any problems encountered by patients, convenience of booking appointment, promptness of check-in/check-out processes for inpatient care (Kumar & Vetrivel, 2015).

The main challenge of hiring for front office positions is that diverse roles are available but with low pay. The professional role of front office staff is not an easy one; for example, keeping stress levels low amongst staff is difficult. One of the main causes of stress is interacting with unhappy patients, who are principally are unhappy as they simply do not feel well (Nelson, 2016).

As a healthcare provider in a hospital, the hospital chief executive officer (CEO) should ensure that the overall business process within a hospital is high performing, which requires standardised operations, quality control and revenue optimisation. According to survey of CEOs, front office management is one of the biggest challenges faced by hospital chief executive officers (Ansel, 2016).

3. Research method

3.1. Subjects

An international hospital situated in Yogyakarta, Indonesia (subsequently referred to as InterNat Hospital) was selected as object of this research. Two other hospitals located in the same city were selected as benchmarks. A brief description of the three hospitals is presented in Table 1.

Case company (InterNat Hospital)	NatPrivate Hospital	NatPublic Hospital
Private hospital with international orientation	Private hospital	Public hospital
Established in 2007	The oldest private hospital in the city, established in 1933	The oldest public hospital in the city, established 1955
Capacity: 500 patients	Capacity: 2,000 patients	Capacity: 1,000 patients
Funding: most patients use personal funding or private insurance	Funding: most patients use government insurance, and a few use private insurance	Funding: nearly all patient rely on government insurance

Table 1. Description of the case and benchmark companies

The samples were selected using the purposive sampling method. Following the suggestion from Cooper and Schindler (2013), two criteria needed to be satisfied before an individual was selected to participate in the research. First, the sample should have visited the three hospitals under investigation. This purpose of using this criterion was to ensure that the object would be able to benchmark against other hospitals, from their own experience. Second, they should have experienced using the services of InterNat Hospital at least once in the 6 months prior to conducting the research. The time limit of 6 months was set to ensure that participants could accurately recall their experience of using the service.

3.2. Instrument development

In general, the procedure was divided into three phases: instrument development, current service level assessment, and improvement of the service. Figure 3 presents the procedure of the analysis carried out in this study, integrating SERVQUAL, QFD and the Kano Model. The instrument used in this study was developed through a series of steps. The first phase covers a number of activities, including a literature review on the area of SERVQUAL in general, as well as front-office services and the healthcare industry specifically. The four most commonly used databases were searched, namely Emerald, Ebsco, ScienceDirect, and Proquest. It was found that no research study has thus far investigated the quality of front office services in a hospital context. This corroborates the observation made at the beginning of the paper that there is a lack of understanding of this topic currently.

The second phase involved analysing the responses given by participants regarding the current perceived service quality, as well as the perceived service quality of the hospital's competitors. At this stage, some service attributes that are important from the perspective of customers were identified. In the third phase, some recommendations for the service providers are made. In this phase, the priorities of technical requirements requiring improvement are developed.

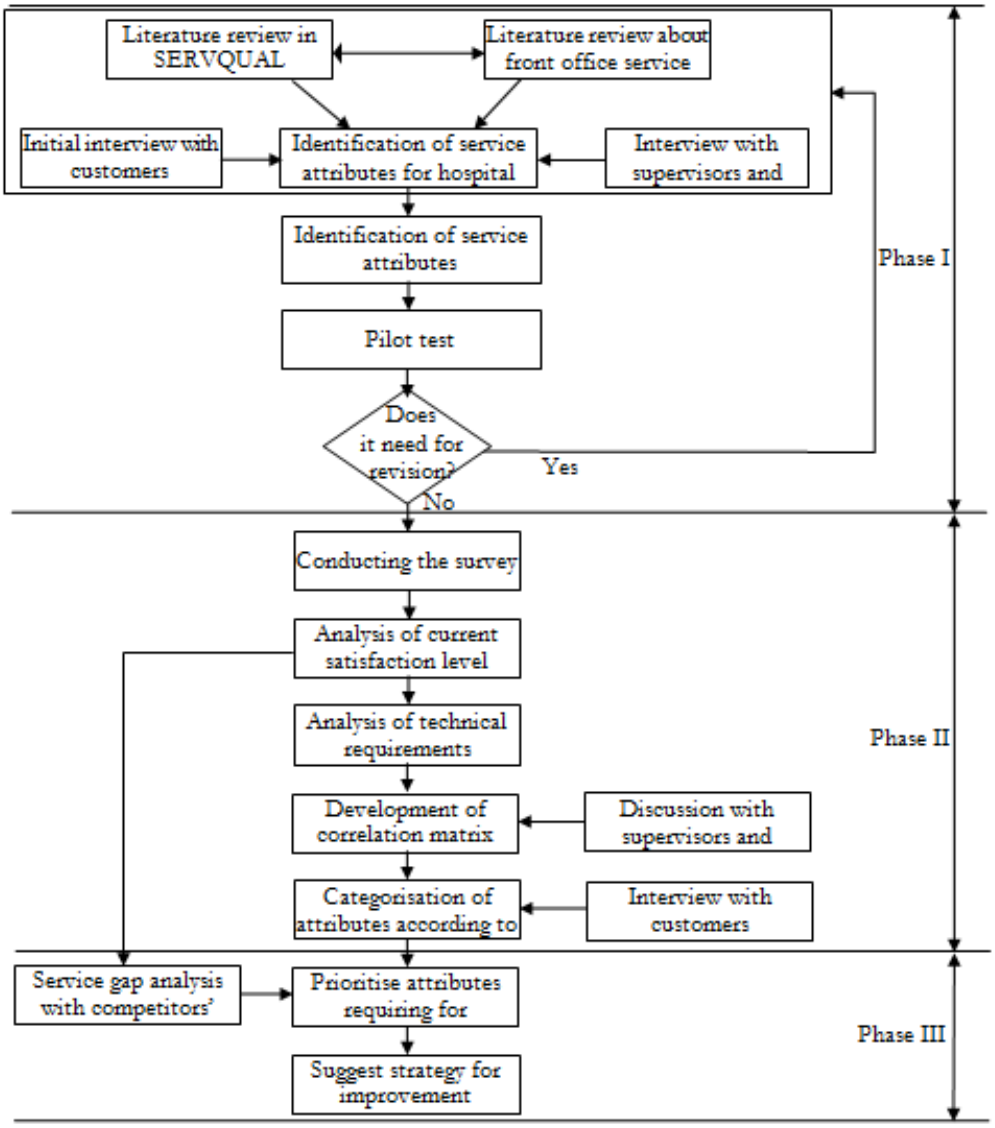

Figure 3. The procedures of this study

4. Data analysis

In this study, QFD and the Kano Model are combined, as they are complementary in nature. The combination offers a suitable tool to improve quality of services (Sauerwein et al., 1996). The role of the Kano Model is to categorise service attributes according to their importance, while QFD is able to link customer needs with technical specifications within the company.

To ensure validity of the instrument, several techniques were applied. Initially, two managers at the case hospital were interviewed independently, to provide feedback on the instrument developed following the literature review, focus group discussions and interviews with customers. Then, the instrument was

pre-tested using 20 hospital patients to establish the face validity. Once this step was completed, minor revisions were undertaken to fix some grammatical issues that were highlighted (phase I in Figure 3).

In total, 140 respondents participated in this study by completing questionnaires that used a 5-point Likert's scale. The data was then tested to assess its validity and reliability. Using the Cronbach's Alpha to test reliability, the expected and perceived quality of the hospital's service were found to have values of 89% and 90% respectively. Meanwhile, the Cronbach's Alpha values for the company's competitors – NatPrivate and NatPublic Hospital– were calculated at 88% and 90% respectively. These values indicate that the collected data is internally consistent.

4.1. Integrating SERVQUAL, QFD and the Kano Model

In general, this study utilise the method developed by Tan and Pawitra (2001) to integrate service quality measurement, the Kano Model and QFD, as well as techniques proposed by Garibay et al. (2010) to analyse the data. The steps are as follows:

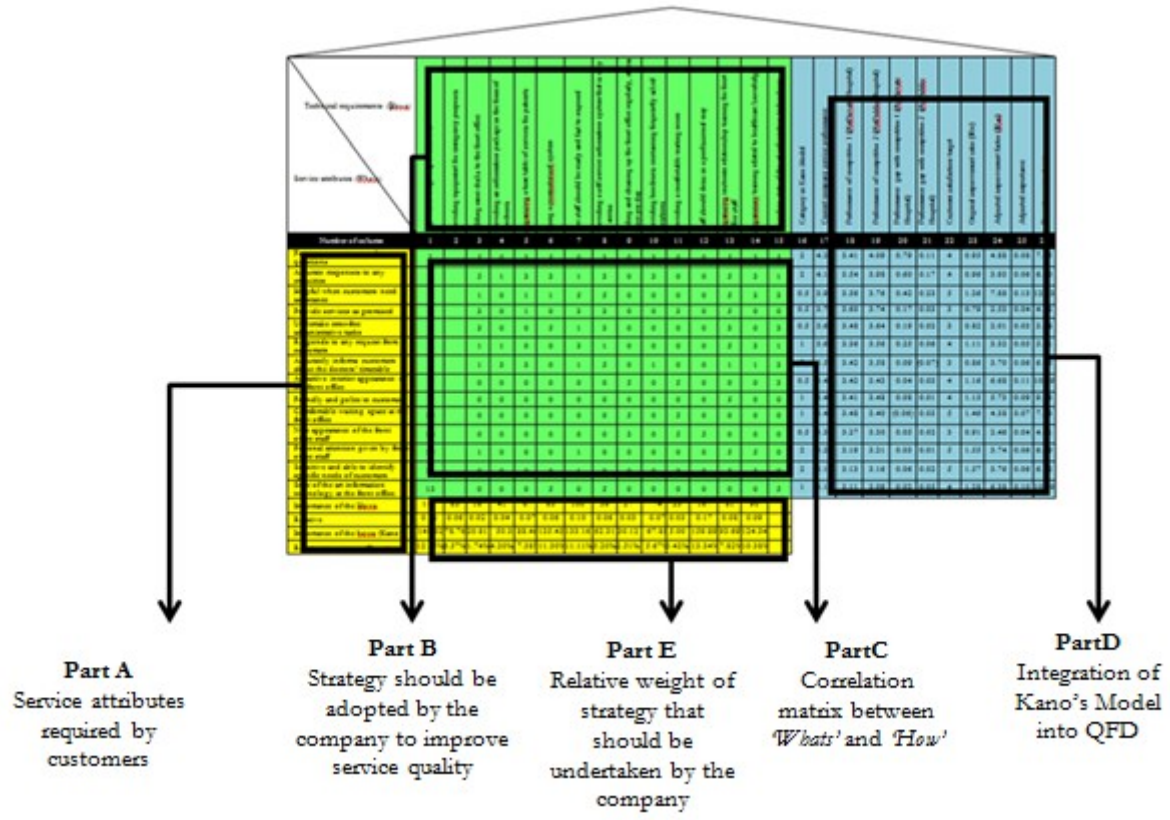

Figure 4. Integrating SERVQUAL, QFD and Kano Model

- Identifying the service attributes required by customers. To do this, extensive literature reviews, focus group discussions with customers as well as with the service provider, were undertaken. The starting point for outlining the service attributes was taken from existing studies (Parasuraman et al., 1988; Parasuraman et al., 1985; Parasuraman et al., 1994b; Parasuraman et al., 1994a). Next, some attributes specific to a front office in the healthcare industry were added. The output of this stage is known as establishing the '*Whats*' in QFD terms, which are presented in Part A of Figure 4 in orange. The detailed results of this study are presented in Table 2.
- Analysing how the case company translates '*Whats*' into service attributes for a front office in a hospital setting is a very specific process, as a hospital front office is different from a front office in other types of industries and services. Thus, the implementation of the '*Whats*' is specific to the front office of a hospital. In Figure 4, this step is shown in Part B, highlighted in green. The detailed findings of this part are presented in Table 3 followed with discussion.
- Analysing the relationship between the '*Whats*' and the '*Hows*', and assigning a score to each, ranging from 5, 3, 1 and 0 for high, medium, low and no relationship, respectively. The degree of the relationship between the attributes was determined based on discussions between the researchers, the staffs and the manager of hospital. In Figure 4, this stage is presented in Part C, highlighted in grey. Like Part B, the details of this part in this study are presented in Table 3.
- Integrating service attributes, identified in the first phase of Figure 3, into the Kano Model. In Figure 4, this step is presented in Part D in blue, and the details are presented in Table 4.
- Identification of the strategies that should be adopted by the hospital to improve its service quality. In Figure 4, this last step is highlighted in yellow in Part E. The identification of strategies in this study is presented in Table 5.

More detail as to how the 5 steps above were undertaken will be provided in the following sub-sections.

4.2. Customers' requirements of the company

The results of the analysis demonstrate that 14 service attributes are required by customers, as presented in Table 2. From the table, it can be noted that *Fast responses to any phone questions* received the highest score overall of the service attributes, followed by *Accurate responses to any enquiries*, *Helpful when customers need assistance*, and *Provide services as promised*. The attribute that received the lowest scores was *Use of state of the art information technology at the front office*. Once the service attributes required by

customers had been identified, the next step was to justify the importance of *Whats*. To do this, semi-structured interviews with customers and front office staff were undertaken.

As shown in Table 2, the service attributes are categorised into three groups: attractive, one-dimensional and must-be. The categorisation was based on the discussions between customers, with the assistance of the researchers. Of the 14 attributes, 5 were categorised as attractive, 4 as one-dimensional and 5 as must-be.

In QFD method, the first step is identification of service attributes required by customers, which is also recognised as '*Voice of Customers*'. Customer requirements were identified using a series of techniques, as explained in the Research Method section, and the results are presented in Table 2. In Table 2, as mentioned previously, the classification of service attributes according to the Kano Model is also shown.

No.	Service attributes	Average	Classification
1	Fast responses to any phone questions	4.29	attractive
2	Accurate responses to any enquiries	4.27	attractive
3	Helpful when customers need assistance	4.14	must-be
4	Provide services as promised	4.06	must-be
5	Undertake error-free administrative tasks	4.05	must-be
6	Responds to any request from customers	4.05	one-dimensional
7	Accurately informs customers about the doctors' timetable	4.04	attractive
8	Attractive interior appearance of the front office	4.03	must-be
9	Friendly and polite to customers	4.02	one-dimensional
10	Comfortable waiting space at the front office	4.02	one-dimensional
11	Neat appearance of the front office staff	4.00	must-be
12	Personal attention given by front office staff	3.98	attractive
13	Be sensitive and able to identify the specific needs of customers	3.97	attractive
14	Use of state of the art information technology at the front office.	3.95	one-dimensional

Table 2. Summary of responses from subjects

Next, the company should identify how to fulfill the needs of its customers (*Hows*). The identification of strategies to fulfill the *Whats* used a series of iterative group discussions with service providers and customers. This ensures that the Voice of the Customers (*Whats*) is considered in the service design. This step is presented in Figure 3, marked as Phase II.

The results of the process are presented in Table 3, in columns 2-15. Following this step, the relationships between the *Whats* and *Hows* were identified by a group of experts, consisting of managers of the hospital and the researchers. These are attributes that should be attended to by the service provider, if the company adopts QFD alone. As can be seen from the figure, the attribute should have the highest priority is *Responds to any request from customers*, followed with *Fast responses to any phone questions*, and *Accurate responses for any enquiries*. The top three service attributes are consistent in that

they all deal with information related issues. This is unsurprising, as the front office is the centre of information within the organization; as a shortcut, anyone requiring information would ask the staff at the front office. At this point, the classical QFD analysis has been completed. In the later stages of the analysis, these columns will be used as the starting point for integrating QFD into Kano Model.

Service attributes *(Whats)*	**Technical requirements *(Hows)***														
	Importance weighting of attributes	**Providing equipment for emergency purposes**	**Adding more desks to the front office**	**Providing an information package in the form of brochures**	**Organising a time table of services for patients**	**Using a computerised system**	**The staff should be ready and fast to respond**	**Providing a self-service information system that is easy to access**	**Tiding and cleaning up the front office regularly**	**Providing brochures containing frequently asked questions**	**Providing a comfortable waiting room**	**Staff should dress in a professional way**	**Organising customer relationship training for front office staff**	**Organining training related to healthcare knowledge**	**Providing state-of-the art information technology**
Number of column	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Fast responses to any phone questions	2	5	5	0	3	5	0	3	0	3	0	0	5	3	5
Accurate responses to any enquiries	3	5	5	1	3	3	1	3	0	3	0	0	5	3	1
Helpful when customers need assistance	7	3	1	0	1	1	5	5	0	0	0	0	5	3	3
Provide services as promised	5	0	3	0	1	0	3	3	0	0	3	0	5	0	0
Undertake error-free administrative tasks	6	3	3	0	0	5	1	3	0	0	0	0	3	0	3
Responds to any request from customers	1	3	1	1	0	0	3	1	0	0	0	0	5	3	1
Accurately informs customers about the doctors' timetable	8	0	1	3	3	0	1	5	0	1	0	0	1	1	3
Attractive interior appearance of the front office	9	0	0	0	0	0	0	0	5	0	5	0	0	0	3
Friendly and polite to customers	4	0	0	0	0	0	0	0	0	0	0	0	5	0	0
Comfortable waiting space at the front office	12	0	0	0	0	0	0	0	5	0	5	0	0	0	0
Neat appearance of the front office staff	14	0	0	0	0	0	0	0	3	0	5	5	0	0	0
Personal attention given by front office staff	10	3	1	0	0	0	1	0	0	0	0	0	5	5	0
Sensitive and able to identify specific needs of customers	11	5	0	0	0	0	1	0	0	0	0	0	5	3	0
State of the art information technology at the front office	13	5	0	0	0	5	0	5	0	0	0	0	0	0	5

Table 3. Interrelationships between *Whats* and *Hows*

4.3. Integrating QFD into the Kano Model

The questionnaire results provide clear insights regarding customer requirements. The insights provided by the questionnaire results are grounded in sound theoretical background; as mentioned in the Research Method section, the questionnaire was developed iteratively, drawing on existing literature and discussion with customers. However, it does not only rely solely on a theoretical foundation, practical information is also referenced, and thus, the relevance of the information is assured.

Customer requirements *(Whats)*	**Technical requirements *(Hows)***										
	Category in Kano Model	**Current company service performance**	**Performance of competitor 1 (NatPrivate Hospital)**	**Performance of competitor 2 (NatPublic Hospital)**	**Performance gap with competitor 1 (NatPrivate Hospital)**	**Performance gap with competitor 2 (NatPublic Hospital)**	**Customer satisfaction target**	**Original improvement ratio (IR_O)**	**Adjusted improvement factor (IR_{adj})**	**Adjusted importance**	**Percentage importance**
Column Number	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Fast responses to any phone questions	2	4.20	3.41	4.09	0.79	0.11	4	0.95	4.88	0.08	7.95
Accurate responses to any enquiries	2	4.15	3.54	3.98	0.60	0.17	4	0.96	3.93	0.06	6.40
Helpful when customers need assistance	0.5	3.98	3.56	3.76	0.42	0.23	5	1.26	7.88	0.13	12.83
Provide services as promised	0.5	3.77	3.60	3.74	0.17	0.03	3	0.79	2.53	0.04	4.12
Undertake error-free administrative tasks	0.5	3.66	3.48	3.64	0.19	0.02	3	0.82	2.01	0.03	3.28
Responds to any request from customers	1	3.61	3.36	3.56	0.25	0.06	4	1.11	3.32	0.05	5.41
Accurately informs customers about the doctors' timetable	2	3.51	3.42	3.58	0.09	(0.07)	3	0.86	3.70	0.06	6.03
Attractive interior appearance of the front office	0.5	3.46	3.42	3.43	0.04	0.03	4	1.16	6.68	0.11	10.89
Friendly and polite to customers	1	3.49	3.41	3.48	0.08	0.01	4	1.15	5.73	0.09	9.33
Comfortable waiting space at the front office	1	3.43	3.48	3.40	(0.06)	0.03	5	1.46	4.38	0.07	7.13
Neat appearance of the front office staff	0.5	3.31	3.27	3.30	0.05	0.02	3	0.91	2.46	0.04	4.01
Personal attention given by front office staff	2	3.22	3.19	3.21	0.03	0.01	5	1.55	3.74	0.06	6.09
Sensitive and able to identify specific needs of customers	2	3.19	3.13	3.16	0.06	0.02	5	1.57	3.76	0.06	6.12
State of the art information technology at the front office	1	3.14	3.11	3.09	0.02	0.05	4	1.28	6.38	0.10	10.39

Table 4. Integration of service attributes into the Kano Model

The integration of QFD into the Kano Model is presented on the right hand side of Table 4, in column 16-26. As explained in the Research Method section, the Kano Model attempts to categorise customer requirements by considering the non-linear relationship between service quality and customer satisfaction.

Column 16 presents the categorisation of front office service attributes. Of the fourteen attributes, five were categorised as attractive, four as one-dimensional, and five as must-be. Then, a Kano index was assigned to each category –e.g. 2, 1 and 0.5 for attractive, one-dimensional and must-be respectively.

The next column, column 17, presents current perceived service quality. The value in this column describes how customers responded to the questionnaire items. The next step is taking service quality competitors into consideration.

Columns 18-22 present the results of SERVQUAL gap analysis. The gap analysis did not only compare perception and expectation, but also between perceptions of the company's service and that of its competitors - i.e. NatPrivate Hospital and NatPublic Hospital. The positive results of this analysis indicate that the company is outperforming customers' expectations. Conversely, negative gaps means that customers expectations are much higher in comparison the service delivered by companies.

The benchmarks against competitors reveal that only two attributes have a negative gap, indicating that they need improvement, namely *Comfortable waiting space at the front office* and *Accurately informs customers about the doctors' timetable*. Thus, the hospital case study should assign these two attributes first priority for improvement. In general, the gaps between the other service attributes are positive; i.e. the case company outperforms competitors, meaning so it is not necessary for the company to improve them if it relies on the results from benchmark with competitors only. The results were different when the researchers combined QFD with the Kano Model.

To include Kano Model into analysis, the first step is setting up customer satisfaction target. To achieve this, managers of the hospital and the researchers discussed the customer satisfaction target; the result is shown in column 22. At this stage, the level of satisfaction that customers expected was determined. Next, the value of the original improvement ratio (IR_0) was calculated, and then presented in column 23. An IR_0 value of more than 1 indicates that the performance of the service attributes needs improvement, and should receive attention. The higher the IR_0 value, the more urgently improvement is needed. Following the suggestion of Tan and Shen (2010), IR_0 is calculated using the following equation:

$$IR_0 = S_1/S_0 \quad (1)$$

Where:

IR_0: Original improvement ratio

S_1: Current customer satisfaction level

S_0: Target value for customer satisfaction

It is important to note that the value here is still raw, in that it has not considered the adjustment factor, as suggested by Tan and Shen (2010). Here, the adjustment factor refers to the value resulting from the categorisation of the Kano Model. The value adjusted improvement ratio was calculated using a formula proposed by Tan and Shen (2010), as follows:

$$IR_{adj} = (IR_0)^{1/k} \quad (2)$$

Where:

IR_0: Original improvement ratio

S_1: Current customer satisfaction level

S_0: Kano Index – the value for Kano index is as follows: 0.5, 1 and 2 for must-be attributes, one dimensional and attractive respectively.

Once the adjustment factor has been considered in the calculation, the value is displayed in column 24. As can be seen in the figure, the value of the improvement ratio before and after using the adjustment factor is different.

As shown in Table 4, the three service attributes with highest original improvement ratio (IR_0) requiring improvement are: *Sensitive and able to identify specific needs of customers*, *Personal attention given by front office staff*, and *Comfortable waiting space at the front office*. On the other hand, when the adjustment factor is taken into consideration in the calculation (IR_{adj}), the top three attributes requiring improvement are: *Helpful when customers need assistance*, *Interior appearance of the front office*, and *State of the art information technology at the front office*. The priority of service attributes requiring improvement is different *before* and *after* taking the Kano index into account.

An improvement factor larger than one indicates a need to improve the corresponding service attributes, however, there is no indication regarding which attributes should be given first priority. To identify the priority ranking of the required improvements, IR_{adj} is multiplied by the importance of *Whats* (column 1, in green). The value derived from this calculation offers clear insight regarding what should be improved first.

As mentioned previously, the results of the calculation revealed that *Helpful when customers need assistance* has the highest percentage (12.83%), followed by *Interior appearance of the front office* (10.89), and *State of the art information technology at the front office* (10.39%). The percentage value indicates to what extent one attribute is important in comparison with others. As an example, the adjusted importance for *Undertake free of error administrative tasks* is 3.28%, which is roughly one third of the importance of *Helpful when customers need assistance* (12.83%), which received the highest priority. Therefore, paying attention to the latter attribute will result in much better service improvement, rather than to the former. At this point, the analysis of the required service attributes from the perspective of customers has been completed, using an integrated method of QFD and the Kano Model.

4.4. Identification of strategy for improving service quality

The Kano Model is useful not only for identifying relevant service attributes requiring improvement; it also offers insights regarding how to identify strategies for improving service quality. The process of strategy identification consists of several steps. First, identifying the technical requirements that need improvement, and in what order. To achieve this, importance of the *Whats* is substituted with the value of Adjusted Importance that takes the Kano Model into account.

Customer requirements *(Whats)*	**Technical requirements *(Hows)***													
	Providing equipment for emergency purposes	**Adding desk staff to the front office**	**Providing an information package in the form of brochures**	**Organise timetable of services for patients**	**Using a computerised system**	**Making sure that the staff are ready and fast to respond**	**Providing a self-service information system that is easy to access**	**Tiding and cleaning up the front office regularly, at least twice per day**	**Providing brochures containing frequently asked**	**Providing a comfortable waiting room**	**Staff should dress in a professional way**	**Organising customer relationship training for front office staff**	**Organining training related to healthcare knowledge**	**Providing state-of-the art information technology**
Number of Column	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Importance of the Hows	117	63	16	41	67	63	100	59	27	74	25	167	81	90
Relative importance	0.12	0.06	0.02	0.04	0.07	0.06	0.10	0.06	0.03	0.07	0.03	0.17	0.08	0.09
Importance of the hows (Kano)	148.02	78.76	20.81	50.38	88.46	135.43	133.16	62.31	30.12	67.88	5.00	159.89	93.69	124.34
Relative importance (Kano) in percentage	12.35	6.57	1.74	4.20	7.38	11.30	11.11	5.20	2.51	5.67	0.42	13.34	7.82	10.38

Table 5. Integrating the Kano Model into technical requirements

In classical QFD methodology, the relative importance of the '*Hows*' indicates which technical requirements should be addressed by the company, as the service provider. The higher the importance value, the more critical it is for improvement. The results are presented in the first row of Table 5. In the next row, the relative importance of the '*Hows*' is presented. This value does not take into consideration the non-linearity of customer satisfaction. Thus, the value should be replaced with the Adjusted Importance column that has considered the Kano categories. The new calculation after the Kano methodology has been taken into account, is as follows: Σ Adjusted Importance × Relationship value of technical requirement. For example, the calculation for *Providing equipment for emergency* purposes is as follows: (5×0.08) + (5×0.06) + (3×0.13) + (0×0.04) + (3×0.03) + (3×0.05) + (0×0.06) + (0×0.11) + (0×0.09) + (0×0.07) + (0×0.04) + (3×0.06) + (5×0.06) + (5×0.10). The result of the calculation is presented in the last row of Table 5. From the table, we can see that the importance value of Hows is different after taking into account Kano categories. It can be noted that the first priority is *Organising customer relationship training for front office staffs* (13.34%), followed by *Providing equipment for emergency purposes* (12.35%), and *Making sure that the staff are ready and fast to respond* (11.30%).

5. Conclusion and suggestions for future research

This paper has demonstrated the use of an integrated method of SERVQUAL, QFD and the Kano Model. The results of the analysis identified a number of service attributes requiring improvement, and a priority order of technical requirements that should be addressed. These recommendations are different to what they would have been if the researchers had used either service gap analysis or the benchmark method alone.

If the company relies only on the results of the service gap analysis, this would not always be beneficial for the service provider. According to the analysis presented in this paper, the results of the service gap analysis reveal that the majority of its attributes in the must-be category have positive values. This indicates that the perception of the service is higher than expected. Thus, provided that the basic needs in the must-be category are fulfilled, there will be no issue with customer satisfaction. On the other hand, when the Kano methodology into account, the case company needs to improve service attributes that are categorised as must be. Meanwhile, most of attributes classified as attractive and one-dimensional are at an acceptable level.

This study offers contributions to practical field particularly related to benchmarking. Benchmarking is useful for companies to improve service quality but it should be used with caution. When benchmarking, the actions and strategies of competitors will direct how the case company operates.

Thus, if the benchmarking company is going in the wrong direction, the case company will most likely follow. This study has empirically demonstrated that the combined use of QFD and the Kano Model offers more insightful suggestions regarding what actions the company should take. These suggestions are different to those yielded via the classical benchmarking method.

Future research could examine whether the results of this study are confirmed in other countries. There are some differences between countries in terms of healthcare systems, which may affect how the hospital front office operates, and consequently, will influence how customers perceive the quality of its service provision.

Another point of interest for future examination is the categorisation in the Kano Model. A future study could utilise a more detailed categorisation, including 'very attractive', 'slightly attractive', 'slightly must-be' and 'must-be' (Kano et al., 1984).

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