

Evaluating Hospital Service Quality: An Application of CZSQ and CZIPA

M. Mujiya Ulkhaq, Muhammad F. A. Prakoso, Verana K. Sari, and Lia Maduma

Abstract—The objectives of this study is to evaluate service quality of hospital by benchmarking against its competitors and prioritize the service attributes that have to be improved. The first was obtained by employing the customer zone of tolerance-based service quality (CZSQ) and the second was attained by CZSQ-based importance-performance analysis (CZIPA). They are considered as novel assessment tools which were proposed to handle the inability of customer zone of tolerance and a classic importance-performance analysis to evaluate the priorities of service attributes that have to be improved. Six criteria which comprise of twenty sub-criteria were used to accomplish those aforementioned objectives. A case study to exhibit the applicability of the methods was conducted to assess a public hospital located in Semarang, Indonesia, and compare it with two private hospitals which are also located in the same city. The result shows that respondents are not satisfied enough with the service provided by the public hospital (the CZSQ scores are negative for 19 of 20 sub-criteria). It is indicated that there are a lot of rooms for improvement. The CZIPA were used to recognize what sub-criteria have to be enhanced to achieve customer satisfaction whereas at the same time avoiding the excessive investment spent by the particular hospital.

Index Terms—Hospital service, CZIPA, CZSQ, service quality.

I. INTRODUCTION

In this highly competitive market, there has been a huge shift in the industrial sector from the manufacturing sector to the service sector. It is proved by the fact that in most of the developed countries, such as the United States, United Kingdom, Germany, France, and Japan, more than 70% of the labor forces are engaged in the service sector [1]. This change has some consequences so that the service providers require not only to have a sensitivity for any changes that can affect the sustainability of their businesses but also to put a concern in the customer satisfaction as their primary goals [2]. In fact, they have to continuously improve their service quality since it is believed as a critical factor for the service providers' successes (it has a close connection with the customer satisfaction [3], [4]). Furthermore, an excellent service precedes customer retention and leads to repeat customer purchase behavior [5] which can increase the market share and generates high revenues as well [6].

Although there is a need to assess the quality of the service, this task is considered as uneasy yet challenging due to the

nature of the service, i.e., intangible, heterogeneous, inseparable, as well as simultaneous [7]. However, some researchers have extensively studied and established various scales to assess the service quality, for instance, SERVQUAL [8] and SERVPERF [5] for “general” services; DINESERV [9] for fine-dining restaurants; LibQUAL+ [10] for research libraries; and LODGSERV [11] for hotels or lodging industries. Nevertheless, those scales are regarded to fail in evaluating the priority of improving the service quality attributes.

The rationale behind the need of prioritizing is because each company is constrained by its limited resources so that it has to be decided how those limited resources are best deployed to achieve the customer satisfaction. The classic importance-performance analysis (IPA) model [12] is the conventional means of prioritizing attributes to improve service quality [13]. It can be used to prioritize the service attributes based on the importance and the performance. It is considered as a simple and effective method to find out attributes that are doing well and attributes that need to be improved [14]. Although the IPA is popular due to its simplicity, as well as easy to use and be interpreted, the applicability has certain limitations [15]. The IPA might lead to measurement bias since there is no definitive standard for setting the range of horizontal and vertical axes, measurement scale, and placement of the vertical and horizontal lines [16]. In addition, IPA is also criticized that it only regards the firm's own performance but disregards the relative performance of its competitors [17].

This research tried to apply the customer zone of tolerance-based service quality (CZSQ) to assess the service quality of the hospital based on the competitive zone of tolerance by benchmarking against its competitors, as well as to prioritize the service attributes to be improved using CZSQ-based IPA (CZIPA) [18]. Despite the superiority of CZSQ and CZIPA, their application to evaluate the service quality of hospital remains limited (they have been applied to evaluate service quality of airline service [19]).

In order to demonstrate the applicability of the methods, a case study was conducted to evaluate three hospitals in Semarang, Indonesia. They are called Hospital A, Hospital B, and Hospital C. Hospital A is a public hospital while Hospital B and C are private hospitals. As a developing country, Indonesia still has a plenty of problems related to health care. Indonesia ranks 92 out of 191 countries based on health system performance index [21]. Indonesia has only 0.3 doctors and 0.6 hospital beds for every 1,000 people [22]. Moreover, there is also an imbalance distribution of facilities among provinces and regions. Sometimes, the patients' family members have an issue of health care access, fees, and inattentive medical personnel. Those aforementioned

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obstacles are motivated us to evaluate the hospital service quality to give such an insight into improving its quality.

II. RESEARCH METHODS

In this study, there are six criteria for evaluating the hospital service quality, namely, reliability, responsiveness, professionalism, empathy, assurance, and tangible [20], [23]. Those six criteria which consist of twenty sub-criteria are used to evaluate public hospital service quality compared to other two private hospitals.

The first criterion is reliability. It is determined as the ability to perform the promised service dependably and accurately. Therefore, this criterion has two sub-criteria, i.e., (i) accuracy (RE1), which is providing an accuracy and consistency of the given information (e.g., cost, diagnose of the disease) and (ii) image (RE2), which is creating a good image for the public.

The second criterion is responsiveness, which means a willingness to help customers and provide prompt service accurately and consistently. It comprises timeliness (RS1), which is the ability to provide operations and the promised service on time. Timeliness also refers to the factors involved in arranging to receive medical services, such as waiting time, the ease of changing appointments and hours of operation [24], [25]. The second sub-criterion is completeness (RS2). It is the availability of all kind of services at the hospital. Next is willingness (RS3), that is helping the patients willingly whenever help is needed, listening to the patients' complaints and developing solutions for the needs of customers [25], [26]. The last sub-criterion is automatic (RS4), as to provide an automated process by utilizing a system.

The third criterion is professionalism. It is about the competence, amount of training and experience, technical expertise, and also innovations of the medical and non-medical personnel [24], [25]. It composes of four sub-criteria, i.e., (i) Skill (PR1), as the competence and performance of health workers; (ii) experience (PR2), which is the accumulation come into existence step by step; (iii) innovation (PR3) as developing the personnel and hospital services by training and using new technologies; and (iv) physical access (PR4), as medical personnel is easily encountered by patients in consultation or other medical treatments.

The fourth criterion is empathy, which refers to all aspects belong to both medical and non-medical personnel of the hospital who serve the patients with a pleasant disposition. This criterion consists of three sub-criteria. The first is caring (EM1) which demonstrates individualized customer service and attention to the patients as well as focus on understanding needs of the patients [4], [27]. Manner (EM2) as the second sub-criterion is defined as the attitude of health workers and their ability to inspire trust and confidence. The last sub-criterion is communication (EM3), which is a transfer of information between health workers and customers, the degree of interaction, and the level of two-way communication.

The fifth criterion is assurance, which refers to knowledge and courtesy of personnel and their ability to inspire trust and confidence. It consists of four sub-criteria, i.e., cost (AS1), which is favorable cost of service to patient; (ii) courtesy (AS2), as courtesy of personnel and their ability to inspire trust and confidence; (iii) compensation (AS3) as providing

guarantees to the patients in case of problems; and (iv) standard (AS4), as comply with applicable standards for personnel, processes, and infrastructure that are used (e.g., implementing ISO or performing hospital accreditation of the Ministry of Health).

The last criterion is tangible which comprises of three sub-criteria, namely, (i) building layout (TA1), as the aesthetics and the convenience; (ii) equipment (TA2), which is availability of equipment in the hospital to provide a satisfactory service; and (iii) hygiene (TA3) as hygiene of the hospital and personnel. Those six criteria were then used to evaluate the service quality of the hospital by employing the *CZSQ* and *CZIPA* which are described in the following subsections.

A. CZSQ

The *CZSQ* is based on the competitive zone of tolerance (*CZSQ*) which was inspired by zone of tolerance (*ZOT*) [23]. *ZOT* is a zone between two areas, which are the desired service (*DS*) area and adequate service (*AS*) area [28]. *DS* is the area which the customer believes that an excellent service provider should offer or the best performance; while *AS* is the area which the customer can barely accept (the minimum or the lowest level of performance). The *ZOT* then evaluates how perceived service (*PS*) differs from *DS*. This difference refers to service superiority (*SS*). Next, the service adequacy (*SA*) is defined as the difference between *PS* and *AS*. If *PS* falls below the *AS* then the customers become frustrated and dissatisfied; on the other hand, when *PS* exceeds *DS*, they feel satisfied in Fig. 1.

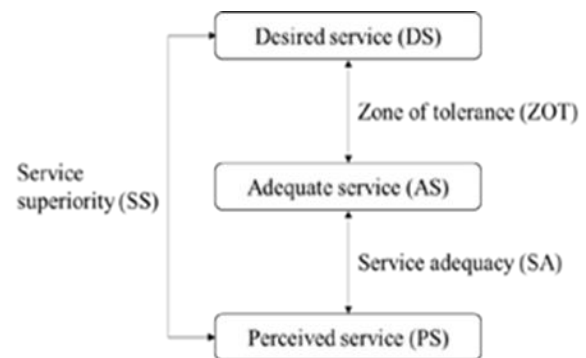


Fig. 1. The concept of zone of tolerance.

The concept of *ZOT* then was refined by [18] as competitive zone of tolerance (*CZOT*). The customers' perceived service of competitors (*CPS*) is regarded as the minimum level of service performance or *AS*. Therefore, the *CZOT* can be viewed as the gap between customers' desired service performance (*CDS*) or the maximum value and the *CPS* or the minimum value. While the customers' service adequacy (*CSA*) refers to the gap between *PS* and *CPS*.

Based on this *CZOT* concept, the *CZSQ* was proposed to assess the service quality of the service providers. It is based on the concept of the performance ratio in the customer satisfaction area. The *CZSQ* can be expressed as follows:

$$CZSQ = \frac{PS - CPS}{CDS - CPS} = \frac{CSA}{CZOT} \quad (1)$$

The different values of *CZSQ* have a different implication for service quality as follows. There are three categories, i.e.,

(i) $CZSQ < 0$; (ii) $0 \leq CZSQ \leq 1$; and (iii) $1 < CZSQ$. The first category is defined when PS is lower than CPS. It means that the customers may be dissatisfied with the performance of the service provider. In this case, the managers should make some improvements due to the dissatisfaction and the possibility for the customers to create a negative word-of-mouth. The second category is defined when PS is approximately equal to, or higher than, CPS. It means that the customer is satisfied but the performance of the service provider has not yet reached the highest expectation. The last category is defined when PS exceeds CDS. In this situation, the customer feels delighted and satisfied, so that the service provider enjoys high customer loyalty.

B. CZIPA

The CZIPA is considered as a remedy of the classic IPA [12] which suffers for several conditions. The two-dimensional state space CZIPA diagram is similar to the IPA diagram which is categorized as four quadrants, i.e., (I) concentrate here, (II) keep up with the good work, (III) low priority, and (IV) possible overkill. The first quadrant has the attributes that become the priority of the management due to having high importance but indicates low-performance ratings. The second quadrant identifies that both importance and performance of the customers already highly rated and should be maintained well by the management. Attributes that are rated low in both importance and performance were put in the third quadrant. The last quadrant is where there are unnecessary attributes that need to be maintained by the management due to having low importance but high-performance rating.

In the CZIPA, the vertical axis represents the difference in importance (service provider to be studied against its competitors) and the horizontal axis represents the CZSQ. The difference in gap values d for the comparable service qualities is then defined as follows:

$$d = CZSQ - DI \tag{2}$$

where DI refers to the difference in importance. This value can also be viewed as the difference between the superiority in performance of the particular service quality with respect to a particular attribute and that of competitors and the corresponding superiority in importance.

Even though the CZIPA diagram has similar four quadrants as in the classic IPA, the diagram itself is slightly modified. A diagonal line which represents the ideal line passes through the original where $CZSQ = DI$; hence, service attributes that are located in the left of the line are categorized as worse than that of its competitors. According to this principle, service attributes on a diagonal line that is parallel to the ideal line have the same gap d . On the other hand, when two service attributes fall on the different diagonal lines parallel to the ideal lines, the one on the diagonal that is further to the right has a larger positive gap, i.e. better performance. The typical CZIPA diagram is depicted in Fig. 2.

The different values of d have different implication as follows. When $d \geq 0$, it is a situation in which not only the particular service attributes fall on the ideal line or to the right of it, but also that the service performance equals or exceeds the service performance of competitors. So, the improvement

of this particular service attributes has a low priority. When $d < 0$, it is a situation in which a particular service attribute falls to the left of the ideal line, indicating that improvement has a high priority.

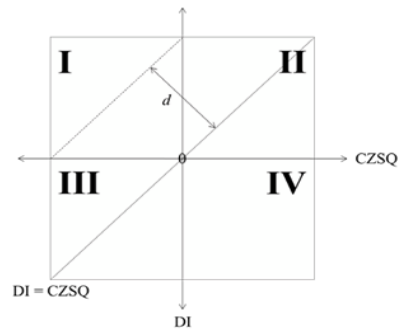


Fig. 2. The CZIPA diagram.

III. CASE STUDY

To exhibit the applicability of the methods, the case study was conducted to evaluate the public hospital which is located in Semarang, Indonesia, namely, Hospital A. This hospital is then compared to the other two private hospitals as its competitors, namely, Hospital B and Hospital C.

The survey to accomplish the objectives of this study composes of three parts. The first section aims to collect demographic data of the respondents. The second and third sections utilize the six criteria and twenty criteria abovementioned. The respondents, i.e., the patients of the Hospital A were asked to provide the names of other hospitals (Hospital B or Hospital C) that they have been treated before they answered the questions. Designing in a two-column format, the questionnaire asked the respondents, “Based on your experience when having a medical treatment in Hospital A, evaluate the importance of each sub-criterion (column 1: Hospital A and column 2: the competitors). The question items were measured using a Likert five-point scale ranging from “very unimportant” (1) to “very important” (5).

The third section is a three-column format. The content is largely similar to that of the second section. This section evaluates the service quality provided by Hospital A that is perceived and desired by the respondents. The first column asked the respondents to score the service level that is provided by the competitors; the second column requested the respondents to rate the service they receive from Hospital A; while the third column examined them to indicate their desired service levels. The question items are also measured on a Likert five-point scale, ranging from “very low” (1) to “very high” (5).

The potential respondents were first approached and asked if they agreed to participate in the survey. There were 156 respondents participated in this survey. Most of them (80.80%) are in the age of 18-25 years old, while the others are: 4.50% of them are in 26-40 years old, and 14.70% of them are in 41-60 years old. There are 35.70% of male respondents while the rests are female.

The reliability test with Cronbach’s alpha [29] was conducted to check whether the participants’ scores on any item questions tend to relate to other items or not (see Table I). Note that all of the criteria have the value of Cronbach’s

alpha more than 0.7, indicated that the questionnaire being utilized is reliable [30].

TABLE I: THE CRONBACH'S ALPHA SCORES FOR EACH CRITERION

	Number of sub-criteria	The Cronbach's alpha
Reliability	2	0.778
Responsiveness	4	0.835
Professionalism	4	0.874
Empathy	3	0.887
Assurance	4	0.837
Tangible	3	0.794

A. CZSQ Results

TABLE II: THE CZSQ RESULT

Sub-criteria	CSA	CZOT	CZSQ	DI	d
Reliability					
RE1	-0.30	0.52	-0.58	-0.15	-0.43
RE2	-0.27	0.35	-0.78	-0.15	-0.63
Responsiveness					
RS1	-0.58	0.56	-1.03	-0.22	-0.82
RS2	-0.01	0.56	-0.01	-0.08	0.07
RS3	-0.29	0.53	-0.55	-0.13	-0.43
RS4	-0.35	0.52	-0.68	-0.10	-0.58
Professionalism					
PR1	-0.35	0.47	-0.74	-0.17	-0.57
PR2	-0.19	0.51	-0.37	-0.12	-0.25
PR3	-0.28	0.44	-0.64	-0.10	-0.54
PR4	-0.47	0.58	-0.80	-0.16	-0.64
Empathy					
EM1	-0.53	0.40	-1.34	-0.09	-1.25
EM2	-0.43	0.51	-0.84	-0.10	-0.74
EM3	-0.44	0.42	-1.05	-0.10	-0.94
Assurance					
AS1	-0.11	0.67	-0.16	-0.11	-0.05
AS2	-0.38	0.49	-0.79	-0.13	-0.66
AS3	-0.20	0.58	-0.34	-0.09	-0.25
AS4	-0.30	0.46	-0.66	-0.08	-0.59
Tangible					
TA1	-0.62	0.34	-1.81	-0.24	-1.57
TA1	0.06	0.62	0.09	-0.03	-0.13
TA1	-0.58	0.39	-1.48	-0.08	-1.40

Based on the calculation that has been performed for all sub-criteria abovementioned, the scores of CSA and CZOT are found by averaging all values that have been obtained throughout all respondents (see Table II). The lowest score of CZSQ is TA1 sub-criterion which is -1.81. It seems that the respondents viewed the building's aesthetics of the outdoor garden in Hospital B and C are more beautiful than the Hospital A. The lowest score of CZSQ in criterion empathy is EM1 (caring) with the score of -1.34. It means that although the respondents mentioned the medical personnel service of Hospital A is good, the performance of the competitors are better than Hospital A. In the responsiveness criterion, the lowest score of CZSQ is obtained by RS1 with the score of -1.03. It seems that the doctors usually do not come on time to the hospital. The patients frequently wait for the doctors for a plenty of time. In professionalism criterion, the lowest score is obtained by PR4 with the score of -0.80. It shows that this particular service of Hospital A is lower than Hospital B and C because the doctors have other duties in other hospitals. AS2 or courtesy is regarded as the lowest CZSQ score for assurance criterion with the score of -0.79. It seems that

comparing to other competitors, the doctors, nurses, and other personnel of Hospital A do not do the best on building patients' trust and serve them politely, such as using the high tone voice. Most of the public hospital face the problem related to the bad reputation from patients as the customer; this results RE2 has the lowest score of CZSQ in reliability criterion. This bad image and reputation usually come from the long waiting time, such as queuing in waiting for the doctors as well as waiting for the prescriptions.

On the other hand, there is the highest performance scores among others, i.e., TA2, which is the availability of equipment in the hospital to provide a satisfactory service. The respondents give high scores for the completeness of the equipment in Hospital A. The hospital is considered as having the complete facilities than other hospitals in Semarang.

B. CZIPA Results

The CZIPA was utilized in this study to prioritize the service attributes that needs to be improved by the service provider. The result of the case study is depicted in Fig. 3. It shows that the respondents considered the level of service attributes' importance of the competitors is more important than Hospital A (the DI scores are all negative). On the other side, almost all the d scores are negative, except RS2 and TA2. This means that Hospital A's performance is worse than its competitors.

There are four quadrants in the CZIPA diagram which is divided by the midpoint of the diagram, i.e., 0. However, there is no sub-criterion which falls into the first and the second quadrant. In the third quadrant, there are some sub-criteria which are placed in this area. They are EM1, EM2, EM3, PR1, PR2, PR3, PR4, RS1, RS2, RS3, RS4, RE1, RE2, TA1, TA3, AS1, AS2, AS3, and AS4. It means that the sub-criteria are performed well. Therefore, the hospital does not need to prioritize the improvement of these sub-criteria. In quadrant four, there is only one sub-criterion, i.e., TA2. This shows us that the hospital has excessive equipment but cannot give a satisfaction to the patient; hence, it needs correct allocation from the investment of the equipment to other sub-criteria which could give more customer satisfaction.

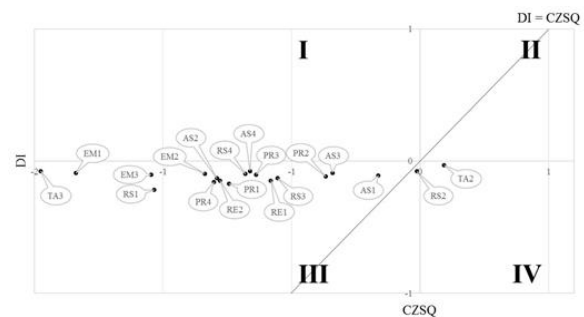


Fig. 3. CZIPA results.

IV. CONCLUSION & FUTURE RESEARCH DIRECTION

This paper has showed how to assess the service quality of hospital by comparing against its competitors as well as prioritizing the service attributes for improvement. The case study has been successfully conducted to evaluate service

quality of Hospital A, comparing with Hospital B and C using six criteria that composes in twenty sub-criteria. First, all of the data are compiled and calculated to get the CZSQ scores. Second, by comparing with the other competitors, the service quality of the public hospital is mapped into the four quadrants of CZIPA diagram. The result of this study indicates that all of the six criteria have negative scores of CZSQ, except TA2 (see Table II). This means that the patients are dissatisfied with service performance of Hospital A; and the manager should improve actively those sub-criteria. From the CZIPA analysis, 19 sub-criteria are located in the third quadrant, or only one sub-criterion is located in the fourth quadrant. This suggests the management of Hospital A not to prioritize the 19 sub-criteria to be improved since they have low performance and less importance for the patients' point of view.

As a future research, it is interesting to compare the methods, i.e., CZSQ and CZIPA, with the multi-criteria decision making tools, such as the analytical hierarchy process (AHP) [31] or technique for order preference by similarity to ideal solution (TOPSIS) [32]. Currently, those methods are extended in the field of fuzzy set theory to present the fuzzy AHP and fuzzy TOPSIS.

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