Non-Linear Berger's Coefficient Prioritization for Quality of Sustainability in Healthcare Services

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ABSTRACT

The study is conducted in order to determine the determinant factors towards the quality for sustainability in healthcare services. The sampling location was the Perlis and Kedah state and 103 target samples were selected to involve in this study. Quality Function Deployment (QFD) was one of the quality improvement methods for high quality services. However, there is a limitation for QFD to identify the patient's needs. The Kano Model provides a way to better understand of patients' needs through the Kano Quality Attribute categories. Thus, the integration approach of Kano Model and QFD is proposed in this study. The patients' requirement regarding the determinant factors was first obtained through the Kano analysis. Next, the quantitative results from the Kano Model Berger's coefficient were translated into the QFD. In the QFD, the technical attributes were developed to identify the correlation between the patients' voices and technical attributes. Finally, both the patients and technical prioritized elements are rank based on their importance by satisfaction index (SS) and dissatisfaction index (DS). The findings from the study able to benefits the healthcare decision maker to design and improve the medical service quality to enhance quality for sustainability in the healthcare services based on the patients and technical prioritized.

Keywords: Quality of Sustainability; Berger's Coefficient, Quality Function Deployment (QFD), Kano Model

1. INTRODUCTION

Healthcare industry is one of the industries that experiences most dynamic and rapid grow in world economy. Since 90's, the healthcare industry in Malaysia has experience a rapid and steady grow. In the recent 10th Malaysia Plan (2011-2015), healthcare industry has been recognized as one of the National Key Economic Area (NKEA) (Jamaludin & Habidin, 2013). The scenario can be observed from the mushrooming of private and public hospital in Malaysia. There are many instruments and methods developed in order to study the customers' meds and expectations to attain the sustainability in long term. Kano model is one of the most helpful method to understand the voice of the customer in order to determine the factors that influence the quality for sustainability in healthcare service. Based on Tan and Shen (2000), customer satisfaction can be improved with making minor performance improvement in the product or service attributes. The requirements are categorized in the Kano model in order to understand the most critical requirement to achieve the quality for sustainability in order to deliver the product or service that able to maximize the consumer value. In this study, the quality for sustainability factors that would concern including physical environment, patient satisfaction, quality culture and brand image. In order to study the relationship between the factors towards the quality for sustainability in healthcare services, the research objectives have been development and methods has been designed in order to achieve the research objectives.

2. PROBLEM STATEMENT

There is a changing in consumer trends nowadays due to increases in human lifestyle. The person has increasing demand to persuade a better quality of life including services in healthcare services (Noor Fadzlina & Jusop, 2012). The increases in consumer demand trend had driven the healthcare institutes especially the private and self-funded institute to develop strategies in order to fulfill the consumer needs and wants (Goh & Marimuthu, 2016).

The importance role of the healthcare services is to fulfill the consumer satisfaction demand and also their expectations. Thus, the element of quality control, quality assurance and effectiveness of healthcare service should take into account to ensure healthcare institute long term sustainability. However, the patient expectation is difficult to identify and manage them into the service package (Camgoz-Akdag & Tarm, 2013). To better understanding the consumer expectations and translate these expectations into better services specification and performance, Quality Function Deployment (QFD) technique is suggested (Camgoz-Akdag & Tarm, 2013).

Not with standing the same challenges were facing in managing healthcare to be sustained in Malaysia. There are an increasing number in healthcare service institute from years to year. The table below shows the hospitals and number of beds in Malaysia.

Table 1 Hospitals and number of beds in Malaysia

Year	Numbers of public		Numbers of private		Numbers of registered doctors and dentists
	Hospitals	Beds	Hospitals	Beds	
2000	120*	34,573	224	9,547	17,763
2005	125*	34,414	218	10,542	20,796
2006	128*	34,716	222	10,794	22,856
2007	134*	35,739	223	11,637	24,877
2008	136*	38,004	209	11,689	28,742
2009	136*	38,004	209	12,216	34,103
2010	137*	37,793	217	13,186	36,789

Note: * number of public hospitals includes MOH Special Institutions

Source: Health Facts 2010, published by the Ministry of Health
Malaysia August 2011, www.moh.gov.my

The Quality Function Deployment has some difficulties in reflect the accurate customer preferences in the real market conditions. Thus, numerous researchers have suggested that Kano model is useful in compensate this defect. The Kano model able to overcomes the defect in the Quality Function Deployment by defining the different factors of the quality for sustainability and the impact of factors on the sustainability in the healthcare services. The combination of the Kano model and QFD was a useful framework to improve the consumer satisfaction and improve the competitive advantage in order to achieve sustainability (Vazifehdust & Farokhian, 2011).

In this study, integration of Kano Model and QFD is employed as research methodology for determine the determinants factors in order to attain the quality for sustainability in healthcare services. New approaches which study the determinants factors of healthcare services sustainability through integrates the Kano Model and QFD is suggested in this paper in order to gain the success factors to achieve healthcare quality for sustainability.

## 3. LITERATURE REVIEW

3.1 Quality for Sustainability

Sustainability is the action of continuous applying and using of new ways which able to results in desired outcome for a long period of time (Ament & Gillissen, 2012). Clancy et al. (2013) defined sustainability as collective actions taken by an organization in order to meet the current needs without consider the future capacity (Clancy & Froling, 2013). Other researcher defined sustainability as the life support system including set of resources and services to benefits the human kind (Leiserowitz & Kates, 2006). Faulkner and Bardurdeen (2013) stated that sustainability refers to the organization's ability to maintain shareholders' desired profits, produce environmental friendly product or service and enhance the stakeholder's life quality.

4. NON-LINEAR ASSUMPTIONS

$$\text{Satisfaction Index (SS)} = \frac{(A+O)}{(A+O+M+I)} \tag{1}$$

$$\text{Dissatisfaction Index (SD)} = -\frac{(M+O)}{(A+O+M+I)} \tag{2}$$

5. RESULTS
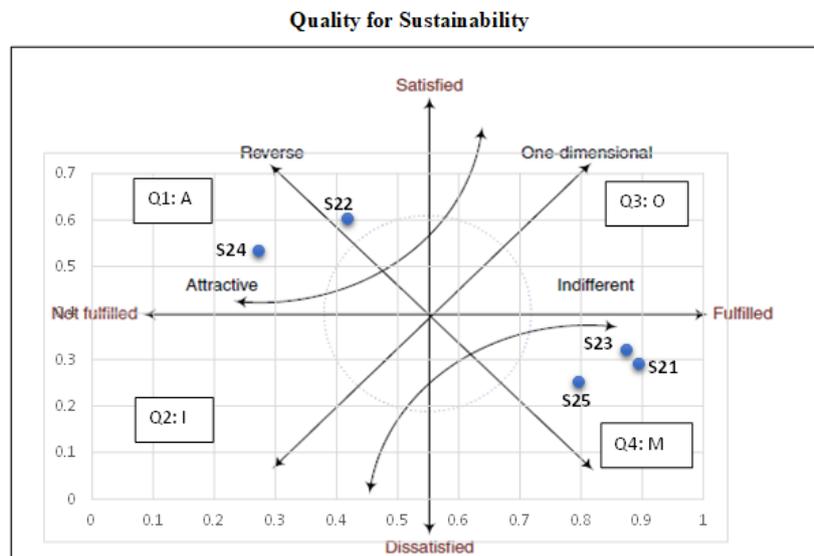
Figure 1. Kano grid mapping for quality for sustainability.

Q4 which is Must-be (M) attribute. All of these three elements including S21 (Improvement in operational efficiency), S23 (Improvement in quality of indoor environment) and S25 (Enhancement in patient safety quality). This indicates that healthcare service must have these elements in order to retain patient satisfaction in order to achieve quality for sustainability. The patients think that to achieve the quality for sustainability in the healthcare service, the healthcare services provider should enhance their operation efficiency to enhance patient flow and waiting time in order to improve their service quality. Besides that, the healthcare service

also must improve their indoor environment for staff, patients and families to improve the ambient in the hospital so that the patients and staff able to stay comfortable while visit the healthcare institute.

PATIENTS VOICES	SS	SD	Effective operational planning	Organization towards common goal	Improve hospital atmosphere and layout	Effective strategy planning	Improve healthcare staff skill and knowledge	Importance Rating (PSS)	Percentage (%) (PSS)	Top Rank (PSS)	Importance Rating (PSD)	Percentage (%) (PSD)	Top Rank (PSD)
							TECHNICAL ATTRIBUTES						
Improve operational efficiency	0.2913	0.8932	3	1	1	1	1	3.0391	15.33	4	6.2524	27.79	1
Consistence mission	0.6019	0.4175	1	3	1	1	1	5.2133	26.30	1	2.9225	12.99	4
Improve indoor environment	0.3204	0.8738	1	1	3	1	1	4.6020	23.21	2	6.1166	27.19	2
Clear vision and strategy	0.5340	0.2718	1	1	1	2	1	4.2040	21.21	3	1.6308	7.25	5
Enhance patient safety and quality	0.2524	0.7961	1	1	1	1	3	2.7668	13.96	5	5.5727	24.77	3
Importance Rating (TSS)			2.5826	3.2038	2.6408	2.534	2.5048						
Percentage (%) (TSS)			19.18	23.79	19.61	18.82	18.6						
Top Rank (TSS)			3	1	2	4	5						
Importance Rating (TSD)			5.0388	4.0874	4.0622	3.5242	4.8446						
Percentage (%) (TSD)			23.37	18.96	18.84	16.35	22.47						
Top Rank (TSD)			1	3	4	5	2						

Figure 2. Kano-QFD Integration of Quality for Sustainability in Healthcare Services (HOQ).

6. CONCLUSION

In conclusion, the main purpose to carry out this study is to identify the determinant factors towards the quality for sustainability in healthcare service in order to enhance the competitive advantage of the healthcare services institute in the healthcare industry. The findings from this study able to benefits the healthcare service provider to design and formulate the strategy to achieve the quality for sustainability in the healthcare industry while in the same time attain the patient satisfaction. The integration approach of Kano Model and Quality Function Deployment (QFD) was purposed in order to study the impact of each determinant factors towards the quality for sustainability in the healthcare services. The research findings from this study would benefits the healthcare service provider by identify the prioritize elements based on the patients voice and technical attributes by satisfaction index (SS) and dissatisfaction index (SD). Hence, the research findings from this study had achieved the research objective and research questions which had successful identify the importance determinant factors towards the quality for sustainability in healthcare service.

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