

Identification of Service Elements Affecting Customer Satisfaction in Hospital Inpatient Unit Using Fault Tree Analysis and Kano Model

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Abstract— Inpatient unit is considered as one of the important units in a hospital where improvement in its services may be needed by the hospital to remain competitive. This study represents an attempt to identify elements that may affect inpatients satisfaction. Fault Tree Analysis (FTA) and Kano Model were performed on answers to survey questions posed to several respondents in some units of hospital. The result showed that there were 14 service elements affecting 60% of overall customer satisfaction. Based on FTA, a systematic structure and influence of elements to overall inpatients satisfaction could be determined, while using Kano model, the customer needs could be identified. This study also indicates whether determining the most influencing elements to improve hospital as a distinct example of service industry based on customer satisfaction is no longer impossible.

Keywords— customer satisfaction, Fault Tree Analysis (FTA), hospital, Kano Model.

I. INTRODUCTION

THE rising of consumer demand on hospital service quality causes people involved in this business keep creating continuous of improvement. In delivering services, inpatient unit is considered as one of the important units in a hospital where improvement in its services may be needed by the hospital to remain competitive.

In service management, it is important to get customers involvement in service operations. Customer needs must be able to be translated in the service process. On the other hand, service companies are faced with the limitations of quantitative analysis tools used to systematically describe the service process. Moreover, it is necessary to use an analytical tool which can translate customer perspectives into a systematic structure, so the management could know the service elements giving great influence in the company service system that can

be used as consideration to improve the quality of service and gain customer satisfaction. In this case, FTA and Kano model were performed to identify them.

II. METHODS

A. Fault Tree Analysis

FTA is a method to analyze system failures from combination of several subsystems and sublevels and also the failure of its components. The fault tree illustrates the relationship between basic event (the root of the incident that cause the top event occurs) and top event (event that occur). Basic event could have environmental conditions, human error, or the specific component failure. The results of this analysis are:

1. list of possible failures; and
2. the probability of events that will occur within a certain time.

FTA symbols commonly used can be seen in Figure 1. Here are the steps commonly performed in FTA:

1. defining failure / risk occurred;
2. constructing the fault tree;
3. identifying *minimal cut set* (MCS);
4. performing qualitative analysis; and
5. performing quantitative analysis. Critical event that will be analyzed is usually called the *top event*.

There are two kinds of analysis in FTA, i.e.: qualitative and quantitative analysis. *Qualitative analysis* is the analysis which is done by making the formation of *logic expressions series* where *the top event is coupled with basic events*. Logic expressions series will form *MCSs* as output of the qualitative analysis. *Quantitative analysis* is the analysis of event probability that occurred. By the existence of the cut set (a series of basic events that cause the top event occurs), the probability of top event can be calculated based on the probability of each event which is obtained by using historical data or engineering judgments when there is no historical data.

[1]

In *OR gate*, if event A and B are the inputs of the output Q, then:

$$\begin{aligned} \Pr(Q) &= \Pr(A) + \Pr(B) - \Pr(A \cap B) = \Pr(A) + \Pr(B) - \\ &\Pr(A)\Pr(B|A) = \Pr(A)\Pr(B) - \Pr(B)\Pr(A|B) \end{aligned} \quad (1)$$

In this condition, note that if A and B are independent then

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