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A systematic approach for diagnosing service failure: Service-specific FMEA and grey relational analysis approach

Youngjung Geum, Yangrae Cho, Yongtae Park*

Department of Industrial Engineering, School of Engineering, Seoul National University, San 56-1, Shillim-Dong, Kwanak-Gu, Seoul 151-742, Republic of Korea

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ABSTRACT

In any organization, the importance of failure management cannot be mentioned by a single word. However, most failure analysis is dominated by the manufacturing sector, despite the increasing importance of the service sector. In response, this paper proposes a systematic approach for identifying and evaluating potential failures using a service-specific failure mode and effect analysis (service-specific FMEA) and grey relational analysis. The proposed approach consists of two stages: construction of service-specific FMEA and application of grey relational analysis. The first stage, construction of service-specific FMEA, aims at incorporating the service specific characteristics to the traditional FMEA, providing 3 dimensions and 19 sub-dimensions, encompassing the service characteristics. At the second stage, grey relational analysis is applied to calculate the risk priority of each failure mode to deal with the necessities of a flexible evaluation framework under these interrelated multi-dimensions. The proposed approach is expected to help the service managers to manage the service failure within the systematic framework. This paper contributes to the field in that it incorporates the service-specific characteristics to the traditional FMEA, as well as providing the appropriate evaluation framework using grey relational analysis.

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1. Introduction

In any organization, failures in a system should be identified, evaluated, and improved under a well-defined framework. Traditionally management of system failure is linked to the solution of an existing problem. However, the paradigm has now changed; the major concern of failure analysis is to emphasize the prevention of problems linked to the proactive treatment of the system [1], rather than finding a solution after the failure happens. This is particularly true of service industries where many dissatisfied customers silently switch providers or initiate a negative word of mouth rather than express dissatisfaction following a service failure [2–4]. Failures in a service system are directly linked to loyalty destruction [5], customer dissatisfaction [6–8], customer defection [6,9,10], and negative word of mouth [6–8], which implies that the prevention of service failures should be treated as the first and foremost issue. With this consideration proactive failure management is extremely imperative in a service setting.

The most notable methodology dealing with this issue is the failure mode and effect analysis (FMEA). It is a dominant and systematic process for identifying potential failures before they occur, with the intent to minimize the risk associated with them [11]. It has been widely used in the various manufacturing areas as a solution to many reliability problems [12–14]. However, the significant body of literature regarding FMEA still places value on manufacturing areas, neglecting the increasing importance of service areas. In line with this necessity, the scope of FMEA has been recently extended to some applications in services [1,15], proposing some generic guidelines required to apply for the service setting [1] or applying FMEA to the service setting [15].

^{*} Corresponding author. Tel.: +82 2 880 8358; fax: +82 2 878 3511. E-mail addresses: ksleeper@snu.ac.kr (Y. Geum), nihil03@snu.ac.kr (Y. Cho), parkyt@cybernet.snu.ac.kr (Y. Park).

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