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TITLE: FAILURE MODE AND EFFECTS ANALYSIS WITH FUZZY LOGIC APPROACH AT QUALITY IMPROVEMENT PROCESS AND APPLICATION SAMPLE

ABSTRACT

The survival of the companies by differentiating themselves in a competitive market is only possible by tending the issues such as creation, protection, development and improvement of the quality. That requires the quality to be measured and analyzed. For that purpose, many quality improvement methods have been developed. Failure Mode and Effects Analysis (FMEA) are the most important of these methods. FMEA is a method that determines current or possible failure modes in the product, the process or the system as well as the causes, the effects and the occurrence frequency of these failure modes. FMEA also ranks the failure modes according to their risks as a result of these determinations. Some drawbacks have emerged as a result of its increasing industrial applications of FMEA. The failure of distinguishing exactly between the kinds of failure modes, inability of modeling the qualitative data applied during evaluation period as well as the ambiguity of expert judgements used in the case of inadequate historical data regarding the product and process under examination, are the main drawbacks. In order to eliminate these drawbacks, the FMEA has been combined with fuzzy logic and fuzzy set theory and organized as fuzzy FMEA in the literature.

In this study, the fuzzy FMEA has been used together with Quality Function Deployment (QFD) which is one of the quality improvement methods. As an application sample, a product of a cable company operating in the Denizli district has been developed using the fuzzy QFD and potential failure modes which might occur during the production process have been determined and ordered using fuzzy FMEA. The decision makers in the cable company have used linguistic variables during evaluation process. So the difficulties like the lack of enough information during the product development process or problems regarding the non-assignment of precise values for the risk factors concerning failure modes have been eliminated via fuzzy logic approach.

KEYWORDS
Quality Improvement, Failure, Failure Mode and Effects Analysis (FMEA), Quality Function Deployment (QFD), Fuzzy Logic, Fuzzy Set, Fuzzy FMEA, Fuzzy QFD