Integration of Knowledge Management and Quality Engineering Approaches for Intelligent Project Risk Management

ABSTRACT

The first most point of Risk Management agenda nowadays is "Create value- let the gain should exceed the pain" and this has been a must for organizations to achieve sustainability and growth in the market. To achieve value different kind of fusions are being tried and tested with project management strategies and tools. The "Automation" and "Reformation" have been most fascinating terms of this century because of the growth of Information and Communication Technology (ICT) and its fruitful uses in the industry. Automation of all processes and rapid access to process knowledge are two steps which have become a necessity for just in time delivery of products, precision of products and services, and customer satisfaction.

Failure Mode and Effect Analysis (FMEA) is considered an inevitable addition to project risk management due to its ease of understanding, proper structure, and well-known format. It has shown its success in many industries while assessing the risk and mitigating it before it could cause any harm to a product or process. But unfortunately for small sized and scarce resourced organizations its implementation is mere a dream as it is both time and cost consuming method. This dream gave rise to experiments of its fusion with different ICT tools, but journey ended upon its storage in files on disks. Structured storage and reusability of this knowledge is still a challenge to deal with for many organizations desiring to cut cost and add value for their sustainable growth.

Recent research emphasizes on FMEA fusion with Knowledge Management (KM) activities as it can provide a structure to available knowledge and support of Artificial Intelligence (AI) techniques to handle reusability challenge. This research work is also a part in the chain of attempts to make FMEA as beneficial for organizations as it could be.

Main purpose of this research is to integrate FMEA method with KM activities to support reusability of its knowledge in order to speed up its execution time and reduce cost spent on its over and over repetition. The problem is very easy to understand that FMEA knowledge that lies in organizational repositories is generated after spending huge cost, time, and effort. This knowledge is either unstructured or semi-structured and its reusability is a hectic job. Digging and fetching information from unstructured repositories, communication and understanding difficulties of concerned experts, delocalization of them, natural language description of knowledge, and integration of past records with newly designed systems are all those issues which are playing the role of hindrances for reusability of FMEA knowledge.

This work contributes in developing a Knowledge Management System (KMS) that supports reusability of FMEA knowledge. Proposed KMS is based on the ontology that provides a proper structure for FMEA knowledge and is associated with an inferable knowledge repository that stores all past experiences of experts. This repository is easy to access and query; and upon querying it provides requested knowledge in FMEA familiar format. To integrate previous and new knowledge an algorithm has been designed that transforms FMEA knowledge from Comma Separated Vector (CSV) files to ontology instances.

Proposed work has been evaluated for its completeness, time and cost efficiency, and for its ease of understanding and use. On evaluation we found that it provides its users with sufficient knowledge to make risk assessment decisions using FMEA, and it helps accelerating FMEA process which in turn reduces cost and adds value to the concerned organization.