Chapter 16
Using a Knowledge-Based Approach to Foster the Use of Risk Management in Construction

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ABSTRACT

Knowledge is a key factor in carrying out and improving risk management in construction projects. Even so, it has been found that this management is done inadequately often mainly due to the lack of knowledge available for its execution. Thus, a knowledge-based system for addressing the problems of risk management in construction projects is proposed and described in this chapter. This is a web-based system that aims to supporting risk management for construction projects in an industry environment where risk management is not well valued yet. The system includes a tool that uses a maturity model for the assessment of risk management capabilities of contractors and owners, a module to propose improvements according to the existing gaps reported by the maturity evaluation module, and a knowledge base that supports a project's risk management and has the ability to acquire knowledge from experiences obtained during the implementation of different construction projects.

INTRODUCTION

Today every organization faces uncertain events that occur in different environments and with different characteristics and impacts. These uncertain events can generate more or less severe consequences for the organization (Aven, 2011). Uncertain events with negative impacts are called risks. The construction industry is no exception in being exposed to these uncertainties, which are complex and diverse risks (Zhao et al., 2013).

Recent preliminary research results in Chile have shown that companies that hire construction services on a recurring basis do not apply risk management (RM) practices systematically in projects, which has resulted in negative consequences for the performance of these projects (Howard and Serpell, 2012; Wolbers, 2009). Additionally, a study by Palma (2007) on claims and contract disputes in a number of construction projects reflected the occurrence of a number of risks that were not well analyzed or integrated by either the parties, customers, or contractors, and that the risks were some of the main causes of some of those claims.

To make project RM effective, it is necessary to have a proper and systematic methodology and also, very importantly, various types of knowledge and experience (Serpell et al., 2015). Knowledge of unforeseen events that may occur during the execution of a project, actions that work well or not when one of these events happens, and ways to assess a risk or estimate the likelihood of its occurrence are just a few examples of useful RM knowledge. Therefore, knowledge can be considered a key factor in realizing and improving RM in construction projects, both from the standpoint of the client and of the contractor.

A two-year research effort was carried out with the aim of developing a RM system based on knowledge to support the improvement of the RM capabilities of construction organizations. The system was built with the idea of providing means to evaluate the existing situation of the RM capabilities of an organization, to provide a report on this evaluation, and to propose recommendations for improving the RM based on a database of best practices. In addition, the system can be used as a knowledge repository tool for RM that is able of acquiring knowledge from experiences obtained in the implementation of different construction projects.

The novelty of this approach is first that it addresses the RM function from a knowledge-based perspective, which does not exist in most of construction organizations and companies; second, that it provides a best-practices database that can be used as a benchmark for evaluation and improvement; and third, that it offers an instrument for evaluating current RM capabilities by applying a maturity model. It is expected that this RM system will be the basis for the development of effective RM systems in construction organizations and companies that adopt this approach. At the same time, the knowledge available in the system will help companies that already have a formalized RM function to evaluate and improve it by using the RM model obtained from best practices as guidance.

In the next sections, a brief background on RM, maturity models, and knowledge management is presented. This is followed by a description of the process of constructing the knowledge-based RM system and its main features. The paper ends with a description of the system and the main conclusions of this work.

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