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# A Web-Based Database System for Managing Construction Project Knowledge

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**Abstract**

Knowledge management is a critical issue among construction firms. Since acquiring, sharing, and using knowledge in construction are crucial, knowledge management is considered to be one of the key sources of success for the construction projects. However, project-based nature of construction is among the most important barriers to organizational learning. Nevertheless, project information is one of the main assets of contractors and should be institutionalized. An effective means of knowledge management across construction sites and headquarters is information systems. The major objective of this study is to propose a web-based database system to aid construction companies in capturing, storing, sharing, and using project and corporate information. In this respect, a tool named WEB-CONS is developed and tested within a construction company. The main advantage of this system is to create organizational memory and to assist companies in terms of their project management activities. This tool is expected to increase the organizational learning competence of construction companies and to help create organizational memory.



*Keywords:* Construction projects; Knowledge management; Web-based database system

## 1. Introduction

Organizational memory (OM) is a corporate asset which is gained by the integration of knowledge into the organizational activities. Organizations develop their corporate memories by capturing, organizing, disseminating and reusing knowledge by the knowledge created by their individuals. Stein and Zwass (1995) define OM as the

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extraction of knowledge from the past to transfer to present activities which result in the increased levels of effectiveness for the organizations. The OM structure which is developed by Walsh and Ungson (1991) consists of acquisition, retention and retrieval. Cross and Baird (2000) brings a different approach to OM by listing the components of OM as individual memory, personal relationships, databases, work processes, support systems, products and services.

In general, the concept of OM can be expressed as the storage of useful information and retrieval of it at a later point in time. As Huber (1991) states, OM is a way of storing knowledge for future use of the organizations. Managerial decisions do not mainly depend on the codified formal knowledge; they also rely on the knowledge in the form of know-how and experience. However, the sharing of such knowledge by company members is a difficult task since those members may not want to disclose valuable information since they are anxious about losing their individual competitive advantages. All those facts necessitate the need for information systems (IS) to retrieve such important knowledge in order to store the tacit knowledge and increase the level of organizational learning (OL) in the organization. Therefore, technological means play an important role in the composition of OL.

Robey et al. (2000) consider that IT systems provide an infrastructure to store, access and revise some elements of OM because of their importance as an input when designing learning for organizations. IS may affect the OL in terms of contextual factors such as structure and environment which, in turn, influence learning. Huber (1991) implies that IS have the primary role of directly serving OM. However, IS can also serve knowledge acquisition, information distribution and information interpretation.

Ji and Salvendry (2000) propose a form of an information infrastructure namely organizational memory information system (OMIS) to support and integrate OL systematically. IT such as databases, knowledge bases, social networks and electronic bulletin boards are the facilitators to best understand an OMIS structure.

The major objective of this study was to develop a web-based database system for construction companies to effectively manage construction project knowledge. In this respect, a tool named WEB-CONS was generated by using past and on-going project information as well as corporate information of a construction firm. The system was tested by the employees of the firm and found satisfactory. It is expected that this tool will help the contractor increase its OL competence and enhance strategic decisions for future projects.

## 2. Knowledge Management In Construction Companies

The project-related activities are the main sources for learning since they constitute the own experiences of construction companies due to the nature of construction works. Kasvi et al. (2003) state that the technical knowledge is integrated into the project knowledge considering the production and use of the product, and organizational knowledge considering communication and collaboration between work teams.

Hansen et al. (1999) define two fundamental strategies for knowledge management. The first one is the codification strategy based on codifying and storing the knowledge in artifacts or databases where it can be accessed. The other one is the personalization strategy where the knowledge is connected to people who develop and share that by personal interaction.

Each construction project has its own characteristics. Therefore, there are discontinuities in the flow of personnel, material and information which cause to the difficulty of implementing patterns in order to maximize project knowledge flow and capture the useful learning. However, as Schindler and Eppler (2003) state, the systematic integration of knowledge and experiences into the organizational knowledge base turns out to be a challenge for most of the construction companies. Therefore, project learning leads the companies to a continuous competitive advantage along with the contribution of organizational discipline, motivation and debriefing skills.

Web-based database systems may be used to enhance the control of knowledge flow and make better decisions because those systems are considered to increase OL based on the acquisition of data, storage of useful information in databases and retrieval of knowledge when needed. Additionally, web-based databases systems assist construction companies in solving managerial problems and stimulate learning activities.