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A lessons-learned system for construction project management: a preliminary application

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Abstract

Construction companies are project-based organizations, since much of their knowledge is generated on site, from projects they carry out. In fact, projects are an important source of expert know-how and organizational knowledge, but lessons-learned from them are not systematically incorporated into subsequent projects, evidencing a lack of knowledge management and learning culture in local construction companies. This article describes a research effort that addressed this situation and developed a lessons-learned system to help construction companies to overcome these limitations. A multiple case-study methodology was applied to understand the knowledge and learning realities and needs of three Chilean construction companies. Based on these results, a mobile cloud-shared workspace to support knowledge management was developed. Results show that major concerns of users are associated with how the system acknowledges the particularities of construction projects and how it will be incorporated into daily activities. Main conclusions indicate that (1) companies acknowledge the need to develop a culture of innovation within the organization, (2) users consider the system as a tool that could really contribute to improve the construction project management process, and (3) the system needs improvements regarding database search and the Internet support before being fully implemented in the company as a project management tool.

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Keywords: construction industry; group decision support; mobile shared workspaces; cloud workspaces; loosely-coupled mobile work; design guidelines

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1. Introduction

The construction industry is a knowledge-based industry: It relies heavily on knowledge input by the different participants in a project team (Forcada, Fuertes, Gangolells, Casals, & MacArulla, 2013). In fact, as construction is a project-based industry, most of its knowledge is generated in projects (Tan, Carrillo, & Anumba, 2011). Then, capturing, sharing, and utilizing the combined knowledge of the current workforce is essential to avoid losing vital corporate knowledge assets (Caldas, Gibson, Weerasooriya, & Yohe, 2009). This means construction companies need to capitalize what it is learned in each project to continuously improve organizational performance (Almeida & Soares, 2014). But, despite the efforts made, progress in improving the learning from projects appears to be slight (Hartmann & Dorée, 2014), as organizations consistently repeat mistakes, fail to learn from projects and fail to transfer lessons from one project to another (Swan, Scarbrough, & Newell, 2010).

In this regard, construction companies need to develop techniques and use tools in their projects that facilitate the capture and sharing of lessons learned throughout the project's lifecycle (Paranagamage, Carrillo, Ruikar, & Fuller, 2012). In fact, every construction organization should have a proper lessons learned database, because using it, project team individuals can acquire and assimilate more knowledge through organizations and, further, organizations should also not rely heavily on individuals (Senaratne & Malewana, 2011). Also, many organizations in the construction industry have recognized the importance of a lesson learned program as a vital asset for knowledge management (Caldas et al., 2009). Based on this need, we envision that shared workspaces emerge as a possible solution to knowledge management within construction companies. This paper proposes a Mobile Cloud Shared Workspace (MCSW) which allows recording, representing and distributing organizational knowledge during the construction project management process. The platform intends to improve the decision-making and coordination processes among project managers, project supervisors, quality chief, operations manager and other construction professionals. This article presents the results of an evaluation of a prototype of the mobile cloud shared workspace. The next sections include a literature review on the main topics related to the study, the research methodology, and the prototype system and their evaluation by users, followed by the main conclusions of the study.

2. Lessons-learned

Lessons –learned (LL) are elements of both organizational learning and knowledge management (Carrillo, 2005). A lesson learned is defined as knowledge gained from experience, successful or otherwise, for the purpose of improving future performance (Construction Industry Institute, 2007). In this regard, having LL programs have become critical for construction companies, given the globalization of project execution, and the fact that a considerable number of employees are approaching retirement (Caldas et al., 2009). In this regard, what has motivated construction companies to conduct LLs is (Paranagamage et al., 2012): (1) to learn from similar past projects to avoid repeating mistakes, (2) to ensure that past successes are replicated in future projects, (3) to gain competitive edge over companies, (4) to avoid corporate "brain drain", and (5) to encourage innovation. About lessons recorded by construction professionals, there are three important phenomena to considered (Fong & Yip, 2006): (1) professionals sometimes record good/bad practices during the running of projects and upon their completion; (2) the frequency of recording bad practices or failures is much lower than that of recording good ones; and (3) most of the recorded good/bad practices are for individual use, but not for the team or organizational use. The leading reasons for this behavior are lack of employees' time, lack of management support, and lack of incentives, resources or guidelines (Williams, 2008).

Most Construction Industry Institute organizations that already have a LL program use a searchable, web based database with some degree of security (Construction Industry Institute, 2007). A problem with lessons-learned databases is that they are not widely used because the documents that existed tended to focus very much on what had been achieved by a project team (product knowledge) rather than how this had been achieved and/or why it either worked or did not work (process knowledge) (Newell, Bresnen, Edelman, Scarbrough, & Swan, 2006). The same authors indicated that what might be more useful is knowledge about the process since this has potentially much wider relevance across different projects (Newell et al., 2006). Even though construction companies have taking positive steps regarding lessons learned capture, the benefits of learning are not realized (Paranagamage et al., 2012).