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A lessons learned database structure for construction companies

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Abstract

Knowledge management in project based industries is critical as in the case of construction industry. Besides being a project based industry, factors specific to construction projects also make it harder to capture knowledge. Construction projects are held in dispersed locations, by different parties involved, with variable objectives; all of which make capturing the information more difficult and knowledge management process more complex. This study presents a database structure and an information system that can be used to capture dispersed information in the form of “lessons learned” as they accumulate during a construction project. In this paper, both the database structure will be proposed as well as the process that “lessons learned” can be utilized in forthcoming projects. A prototype database is created and retrieval capabilities provided within the structure are tested with entry of cases from hypothetical projects. This process reinforced the suitability of the proposed structure for codification and retrieval of “lessons learned” from a construction project. Possible use of the database is exemplified with “lessons learned” extracted from the hypothetical projects. This structure is aimed to base an information system where capture and dissemination of “lessons learned” from projects will be improved by its use, and planning and decision making processes for forthcoming projects will be facilitated.

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1. Introduction

Knowledge is critical for construction companies for success and maximization of value through enhancing competencies, confidence, effectiveness, competitiveness, and sustainability [1-10]. Tools and techniques have been underway for establishment of effective knowledge management, however efforts have not provided a best solution

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for capture and dissemination of the knowledge yet [3-6,8-11]. Knowledge management can prevent re-invention of the wheel, facilitate innovation; and lead increased agility, efficiency, flexibility, quality, learning, better decision making, better teamwork and supply chain integration, improved project performance, higher client satisfaction, and organizational growth [3,4,11]. Construction industry is knowledge intensive and also project-based with characteristics of multi-disciplinary teams with different notions of value, unstable nature, heavy reliance on previous experience/heuristics, conflicting objectives, unique projects, tight schedules, limited budgets, etc. that all make knowledge difficult to handle [1,5,8-12]. Besides these; pressures of globalization of the market, increased competition and demands, requirement of new technologies and highly skilled workforce make knowledge management critical [3,12,13]. However knowledge is lost due to fragmented nature of the industry [1,14]. As Kamara et al. (2003) [4] stated; even if projects differ in macro terms; namely in terms of site, context, client requirements, etc.; they are similar in micro terms as in structure of teams, processes, tools, skills, etc. Thus, lessons learned in projects should be captured and reused in the forthcoming ones through use of a manageable format to manipulate, and a mechanism to capture and disseminate the verified knowledge [4,12]. Generally problems solved in one project stays in it and they re-occur in the other ones since nothing is done for their elimination, so this endeavor may remediate a common problem of construction projects [1].

The easily expressed and codified part of knowledge constitutes the explicit knowledge; whereas, the other part, which is extremely rooted in individuals' minds and experiences, constitutes the tacit knowledge [2,3,5,7,8,11,13,14]. However most of the knowledge is tacit in construction industry, and successful codification of this knowledge has the potential to make the difference [2,3,5,8,11]. Knowledge management literature consists of studies that focus on use of information systems and the others which are more focused on development and retention of intellectual capital. Information systems may be successful in codification of explicit knowledge, however people centered solutions are required for codification of tacit knowledge [2]. Thus, capture of the tacit knowledge with help of information technology and making it explicit during whole life cycle of a project through in-project and post-project evaluations is needed [1,3,5,7,13,14]. Different parties in a project may encounter different problems due to same situation; thus, holistic capture of the knowledge from all parties is essential [1]. Most of the time; lessons learned are lost in excessive details due to lack of structures to collect, organize and disseminate this knowledge [10]. Organizational optimization of knowledge is required to eliminate "knowledge wastage" and overload. It would be much better if live capture can be achieved in a format that would facilitate its reuse since knowledge is valuable as long as it is usable and accessible [3,4,8].

Information systems are generally based on information technologies (MsProject, Outlook, PDA, notepad, FrontPage, PowerPoint, Excel, intranet, internet, etc.) in modern construction companies [1,8,11]. Information technology may facilitate information understanding and sharing effectively, it may provide enhancement of construction knowledge; however the work has done so far is not enough for an effective solution [3,5,6,9,10]. Practicality of methods and inexpensiveness of solutions may also be required to make the small companies be able to adopt these solutions [3,9-12]. The failure of the industry lies in the lack of these mechanisms, processes, more specifically databases that provide a formal structure/strategic framework for capture of knowledge, namely presenting the huge data and information in a way to be used in construction processes [1,8,9,11,13,15]. Besides information systems, support of organizational culture is also required to establish an effective knowledge management system rather than reliance only on information systems [3-5,11,12]. Throughout the supply chain, the notion of sharing learning focused reviews and embedment of this knowledge in this culture should be imposed and organizational learning should be at core [8,10,13,14]. Circulation of the lessons learned should be achieved through direct use of the system through training, or interactive meetings, or notification of new lessons learned [12]. Achieving this, provides a positive change and a culture where every individual knows what to do, when, and how. Thus the captured data should be accessed, evaluated and used; hence specific project knowledge may be turned into generic construction knowledge with the help of individuals taking part in projects/organization [1,6,8,15]. In light of these, this paper presents a formal database structure that provides fields to capture lessons learned for a construction company and a possible information system including the database for dissemination and reuse of the knowledge to be captured.

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