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Automation in Construction 16 (2007) 787 – 796

AUTOMATION IN CONSTRUCTION

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Selection of an ERP system for a construction firm in Taiwan: A case study

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Accepted 7 February 2007

Abstract

The primary functions of Enterprise Resource Planning (ERP) are to integrate the inter-departmental operation procedures and Management Information System (MIS) modules, and to reallocate the resources of a company. How to successfully implement an ERP system in an organization is always a hot research topic for researchers as well as a pending problem for an organization that wants to implement it. This research is a case study on the selection of system suppliers and contract negotiation during the ERP implementation of a local construction company in Taiwan. After reviewing the common key success factors discussed in the literature, this study discussed seven issues: coding system, working process reengineering, priority of ERP functionality implementation, customization, participant roles, consultant role and performance level of subcontractor, which also affected the implementation. Lessons learned from the case study in discussed seven issues are valuable for a construction company in deciding to implement an ERP system. This research suggests that additional case studies are necessary for the successful application of ERP systems in the construction industry.
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Keywords: Case study; Enterprise resource planning; Supplier evaluation; Contract negotiation; Contractor

1. Introduction

Enterprise Resource Planning (ERP) is a system for the seamless integration of all the information flowing through the company such as finances, accounting, human resources, supply chain, and customer information [1]. Recently, ERP has become a strategic and survival weapon for most firms in which Information Technology (IT) is widely used. Implementing an ERP system requires an enormous investment for a firm in terms of time, cost and resources. Thus the decision to implement ERP must be considered carefully. Additionally, an ERP system will be the IT backbone of an enterprise [2]. A firm must address the culture and general practice of the business in order to achieve its expected implementation objectives [3]. The range of functionality of ERP systems has further expanded in recent years to include more front-office, back-office and even strategic functions. Detailed function descriptions and discussions are out of the scope of this study, but can be found elsewhere [3–6]. Although there are many world famous ERP providers, including SAP, Oracle (integrated with PeopleSoft and J.D. Edwards) and IFS, no system specifically designed for the construction industry is yet available. Construction companies wishing to implement an ERP system must generally select a general ERP system mentioned above. However, the construction industry has some uniqueness, which should be considered by the ERP vendor, and is a highly fragmented one with specialized segments requiring specialized systems and driven by projects [7,8].

Recently, ERP systems have been used in construction-related companies because of their benefits in improving responsiveness in relation to customers, strengthening supply chain partnerships, carrying out remote procurements and inventory management, enhancing organizational flexibility, improving decision-making capabilities, reducing project completion time, analyzing accurate business profile and lowering costs [8,9]. However, there are very few studies conducted concerning the implementation of ERP systems in the construction industry, particularly for the construction contractors. Successfully implementing an ERP system in a firm is extremely difficult. Many studies have provided numerous success factors [10–14]. The standard and best

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doi:10.1016/j.autcon.2007.02.001

methodology for implementation of an ERP system still does not exist [7]. O'Connor and Dodd recommended that it is beneficial to develop a case study on how a contractor implements an ERP system [15]. This study aims to fulfill this need.

Commercial ERP packages cannot provide a once-and-for-all business model for all processes in all industries. Thus, no single ERP packaged software can meet all firm functionalities or all special business requirements [10–14]. Therefore, firms must choose a flexible ERP system and a co-operative vendor that effectively responds to customer requirements. So far, none of the construction management modules provided by software suppliers have been found to be suitable for construction firms. Moreover, some companies that introduced ERP were unsuccessful or even went bankrupt eventually. These failures occurred because the level of application of IT of construction companies is comparatively low and thus, considerable attention needs to be paid and caution in advocating ERP systems.

However, previous studies have also suggested that language, culture, politics, government regulations, management style, and labor skills affect various ERP implementation practices in different countries [16,17]. Language differences (the common language used in Taiwan's IT software is traditional Chinese) and the entry barrier of using an English-based ERP system for a general contractor in Taiwan (or other non-native-speaking English areas) must be carefully considered.

The construction industry is a localized industry. In Taiwan, successful ERP implementation is still rare in the construction industry. Researches performed in Taiwan regarding ERP mainly focused on the procedures of application and software system functionalities, respectively. On the contrary, only a few studies have been related to the selection of system suppliers and the content of the ERP contract and specifications. This study aims to remedy the lack of discussion of the above issues.

In sum, this study focuses on the early stage of ERP system implementation for a general contractor in Taiwan. A detailed discussion of the costs and benefits of system implementation, that is confidential information of studied company, is beyond the scope of this study. The rest of this paper is organized as follows. Section 2 presents the research method, case study method, and why this method was chosen. Section 3 then reviews the literature on ERP implementation. Next, Section 4 describes the case information concerning ERP implementation. Subsequently, Section 5 discusses seven issues that affect successful ERP implementation. Conclusions are finally drawn in Section 6, along with future research directions recommended as well.

2. Research method

There are three factors that distinguish research method selection [18]: (1) the type of research question being asked; (2) the control a researcher has over actual behavioural events; and (3) the degree of focus on temporary as opposed to historical events. Historical methods are useful when a researcher has no control over the sources of data. Experiments are the preferred method if the researcher can manipulate behavior directly, precisely and systematically. As the research conducted is examining contemporary events, but the relevant behavior cannot be manipulated, and the use of the case study method is the preferred method for answering the research questions. Generally, the case study method is a preferred strategy when "how" and "why" questions are being posed, and the researcher has little control over events [18].

The case study method, a qualitative and descriptive research method, looks intensely at an individual or small participants, drawing conclusions only about that participants or group and only in that specific context [18]. The case study method is an ideal methodology when a holistic, in-depth investigation is required [19]. The case study method has been used in various domains, particularly in sociological investigations. The case study research is not sampling research [18–20]. However, selecting suitable cases must be done so as to maximize what can be learned in the period of time available for the study [21].

There are three types of case study method: exploratory, explanatory and descriptive [18]. The research questions used in this research are explanatory types of question (e.g., why the studied company did not select a localized ERP system in evaluation), which are most likely to require the use of the case study method, because such questions deal with operational links that need to be traced by involved persons.

The case study is known as a triangulated research strategy [18,21,22]. The protocols that are used to ensure accuracy and alternative explanations are termed triangulation [20]. Triangulation (sometimes known as triangulation) encourages a researcher to collect information from multiple sources but aims at corroborating the same fact or phenomenon. The need for triangulation arises from the ethical need to confirm the validity of the processes [21,22]. In the case study methodology, triangulation could be done using multiple sources of data [18]. This study interviewed the project managers who are from the studied company and ERP implementation consultant respectively to improve the accuracy of the study findings.

The case study method has been proven a useful tool in investigating the problems of ERP implementation [16,23–25]. Such a fact is also fit for this study. Based on the above discussions, this study used the case study method as a data collection method and then used participant interviews and comparison with the literature to validate the findings from the case study.

3. Literature review

The ERP system is an increasingly popular management tool to reshape a business or organization. The ERP system was developed and derived from the previous MRP (Materials Requirement Planning) system and MRPII (Manufacturing Resource Planning) system. Modern ERP system encompasses all integrated information systems that can be used across an organization [26]. The key idea of ERP is using IT to achieve the capability to plan and integrate enterprise-wide resources [27]. ERP has become a necessary tool of a progressive firm

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