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A Combined Fuzzy Method for Evaluating Criteria in Enterprise Resource Planning Implementation

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ABSTRACT

Enterprise resource planning (ERP) system is an information system that supports and integrates many facets of a business, sales, and marketing. ERP system success depends on the rigor of the ERP Implementation processes. Scope creep, inadequate allocation of human resources over time, and vendor management are some common problems associated with the implementation of an enterprise system. This paper evaluates critical elements of ERP system that contributed to the success of the ERP implementation. For those organizations adopting ERP, the findings provide a roadmap to follow in order to avoid making critical, ERP Implementation mistakes. In this study, the combined fuzzy method is applied to assess ERP implementation factors. The combined fuzzy method is also capable of taking into consideration both tangible and intangible criteria. This method not only leads to a logical result but also visualizes the impact of various criteria on the final result. Applying the characteristics of dependence and feedback to combined fuzzy method could result in assessments that are more precise than those possible with other multiple criteria decision making approaches. The combined fuzzy method provides a useful assessment approach to this study. The benefits of using the combined fuzzy method for evaluating the ERP implementation come from the clear priority weights between alternatives. Also, a real case study from Iran is also presented to demonstrate efficiency of this method in practice.

KEYWORDS

Combined Fuzzy Method, Enterprise Resource Planning, Evaluating Criteria, Implementation, Information Systems

1. INTRODUCTION

Enterprise resource planning represents an ideology of planning and managing the resources of an entire organisation in an efficient, productive and profitable manner, and is manifested in the form of configurable information system packages (Wei, & Wang, 2004).

ERP systems were introduced into companies to solve various organizational problems and to provide an integrated frame as an information technology (Onut, & Efendigil, 2010). An Enterprise resource planning system is an integrated software package composed by a set of standard functional modules developed or integrated by the vendor that can be adapted to the specific needs of each customer (Estevez, & Pastor, 2000).

While decision makers decide on how to implement ERP, the best e-business strategy may be determined by choosing from different e-business models (Papiernik, 2001). Enterprise resource planning vendors use diversity software is only compatible with some companies' databases. An enterprise resource planning system helps different departments of an organization to share data and

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knowledge, reduce costs, and improve the management of business processes. Enterprise resource planning selection is one of the most important decision making for organizations. Many researchers have contributed methods to select of ERP systems. To select an ERP product is a time consuming task due to the limitations in available resources, the complexity of enterprise resource planning software, and the diversity of alternatives (Wei, & Wang, 2004). Thus, the enterprise resource planning project should regard as a large project implementing and devote full participation in it. A comprehensively systematic selection policy for ERP system is crucial to the success of ERP project. The implementation of enterprise resource planning systems in organizations is an enormously complex undertaking. Enterprise resource planning systems can affect nearly every aspect of organizational performance; hence, measures of their success must reflect this fact in the real world ((Lozinsky, 1998). When an organization plans to introduce an enterprise resource planning system, the goal, the implementation method, and the Business Process Reengineering should be considered first (Blackwell et al., 2006).

Successful enterprise resource planning implementation can achieve operational improvements, including reduction of time to market, reduction in cycle time, product development time, improvement in operation, reduction of inventory cost (Stein, 1999) and higher customer satisfaction level (Al-Mashari, 2002). Reaction time to competitive pressures and market opportunities could also be improved by technology (Badawy, 2009). However, these success examples are only minority. To implement a system, decision makers need to consider various aspects such as the corporate requirements, the role of social and intellectual capital in achieving competitive advantages by system (Lengnick-Hall et al., 2004), system performance and infrastructure (Hicks et al., 2010), capability of the vendors (Badawy, 2003), adequacy of training and consultancy.

The deals of vital factors are involved in determining a company's readiness for enterprise resource planning implementation (Cebeci, 2009). Since most of these factors are qualitative and relations between them are very complicated, determining their values by exact quantity is quiet difficult. Therefore, using fuzzy logic can be helpful to simplify the calculations and finally leads to a more precise result to determine qualitative problems like in such readiness of a company for enterprise resource planning implementation. Multi-criteria decision-making problems in the real world rarely can be rep-resented by crisp numbers; they typically take place in a fuzzy environment where the information is imprecise or uncertain (Yazgan et al., 2009; Sangaiah et al., 2015; Gopal et al., 2015). Multi-criteria decision-making information is hard to come by, and it is often unclear, particularly in private companies (Chang et al., 2008). The thinking and perceptions of people are often vague; although the scales in the questionnaires are equal, the interpretations of the respondents would still be different (O¨ zogul et al., 2009). The real problem can be represented in a better way using fuzzy numbers instead of crisp numbers to evaluate the related factors (Kim and Sanders, 2002; Sangaiah et al., 2015). In reality, human thought is vague and cannot be expressed precisely. Perceptions and feelings which are often expressed by natural language in experts are vague. For example, some words do not have precise measurement; likewise, human perspectives for assessing the risks in ERP implementation are also different (Yuan, 2009). The paper is organized as follows: Section 2 presents a review of previous works on the selection of ERP systems. In Section 3, the fuzzy AHP method is explained. In Section 4, an AHP framework for ERP selection and proposed methodology for the selection of ERP system are introduced. The application of the assessment framework using a real case study and the obtained results are discussed in section 5. The section 6 is discussed the advantages and disadvantages. Conclusion and future work are given in Section 7.

2. LITERATURE REVIEW

The research literature that reports on ERP systems is quite large and rather fragmented; while many have dealt with the pre-adoption problems, many more have studied problems during and after the adoption of ERP systems. Few have tried to build simple taxonomies to better understand the extant literature on ERP system studies. For instance, when implementing an ERP project, price and time