A Semi-Structured Methodology for ERP System Selection Based on MACBETH and Choquet Integral Applied to Small and Medium Sized Enterprises

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ABSTRACT

Historically, Enterprise Resource Planning (ERP) systems were initially destined to large companies in order to standardize and streamline their key business processes. Recently, they have been increasingly adopted by Small and Medium Enterprises (SMEs). However, making strategic tradeoffs among the various marketplace solutions is a troublesome balance task for SMEs without the rescue of systematic multicriteria decision approaches. This paper addresses the question of how to choose an ERP solution that best suits a given SME. It serves twofold objectives; firstly it defines a set of selection criteria related to SMEs’ context. Secondly, it presents a selection methodology based on the construction of an induced decision model through capturing the decision maker’s preferences. The key contribution of this paper is the introduction of a new iterative learning based approach destined to make enlightened decisions through the consideration of interdependencies among the adopted selection criteria thanks to the Choquet Integral.

Keywords: Choquet Integral, Enterprise Resource Planning (ERP), Fuzzy Measures, Interaction Indices, MACBETH, MCDA, Shapley Indices, Small and Medium Enterprises (SMEs)

INTRODUCTION

An Enterprise Resource Planning (ERP) system is a set of integrated software packages that encompasses a large spectrum of business areas (e.g., finance, production, human resources, etc.). Numerous organizations acquire this kind of software due to its ability to embed the world wide best practices adopted in different management domains. In addition, this packaged software is destined to streamline business processes, cut costs, raise quality,
receive pertinent timely information, increase flexibility and improve customers’ satisfaction. In this regard, the enterprises are now aware of the strategic benefits that could be gained from a high level of interaction with their business partners if the implementation is successfully done. However, it should be noted that not all ERP implementations have given satisfactory results. Actually, since the dawn of ERP projects, it has been widely reported that many of them fail to yield the expected payoffs (Themistocleous, Irani, & O’Keefe, 2001; Willcocks, Petherbridge, & Olson, 2002). Hence, the success rate is at alarmingly low level and these projects tend to be a very heavy burden on the organizations’ budgets. Nevertheless, a big part of the academic literature has dealt exclusively with ERP implementation issues, ignoring the way decisions are taken and their appropriateness regarding the acquisition of ERP systems. But recently, given the cost of the investment required to acquire, implement and operate an ERP system, the interest expressed by academics and practitioners concerning the selection of measures and the evaluation techniques of ERP systems is highly justifiable.

The major purpose of ERP selection and evaluation techniques is to identify the best alternative that would cover the business requirements. Nonetheless, it should be also noted that no ideal ERP solution exists. In fact, many requirements would remain uncovered and several specific adjustments should take place whichever the chosen ERP system. Certainly, some solutions are more suitable than the others, but this depends on the organization, its activity sector, and its current functional, operational and information technology models (Tomas, 2002).

Sehab, Sharp, and Supramaniam (2004) mentioned that the selection process should take into account the different key actors’ points of view. Hence, the selection criteria should go beyond technical aspects to encompass strategic, operational and functional ones. Moreover, it should be noted that the mission-critical processes in an organization are also decisive elements that must be considered when selecting an ERP system. With this in mind, the chosen solution will be inappropriate if the business process’s requirements are not fulfilled.

Muscatello, Michael, and Chen (2003) report that a great deal of the information about the success of such projects is based on the implementation reports coming from large companies. Historically, ERP systems were destined to large organizations that were willing and able to spend tens or hundreds of millions of dollars on an integrated software system (Malie, Duffy, & Rensburg, 2008). However, over the past few years, the ERP market has shown signs of saturation as large companies almost completed their significant ERP implementations. The time was ripe for the main vendors to steadily hold the challenge of Small and Medium Enterprises (SMEs). On the one hand, the vendors have started turning their marketing sights on the mid-market and redesigning their strategies to match its requirements. On the other hand, SMEs would unfavorably disrupt their business activities if they failed to upgrade their information systems to communicate with their supply chain partners or with their corporate headquarters ones (Chalmers, 1999).

Winkelmann and Klose (2008) state that while large companies have the necessary financial and technical resources to be engaged in such large-scale investments, the case of smaller sized enterprises is far to be identical. In fact, SMEs have only limited budgets and experiences to address and overcome these matters (Adam & O’Doherty, 2003). To tackle this issue, a great deal of importance should be attached to the selection stage related to the purchasing process. Indeed, integrated enterprise software’s selection (e.g., ERP systems) has become a crucial step whenever an enterprise is faced with the prospect of acquiring a solution in order to support its management activities. Nevertheless, according to Sen, Baraceli, and Sen (2009), the evaluation and selection of enterprise software has become increasingly difficult for the decision makers due the hundreds of software products available in the marketplace. Malie, Duffy, and Rensburg (2008) argue that methodologies developed for ERP selection for big installations “may not all be applicable..."
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