

Chapter 12

An Analytical Model to Measure IS–Enabled Organizational Effectiveness

Chun Meng Tang
Multimedia University, Malaysia

Govindan Marthandan
Multimedia University, Malaysia

ABSTRACT

When business managers are considering whether to invest in an enterprise resource planning (ERP) system, they ask the question: “What are the returns on investment?” When the ERP system is implemented and in operation, business managers ask another question: “How successful is the system?” To answer these questions, clues can be found by examining organizational effectiveness improvements as a result of ERP system implementation. This paper suggests that being able to identify the dimensions of organizational effectiveness is enabled by ERP systems. Together with positive organizational effectiveness improvements, the business value of ERP systems can be demonstrated. To provide the evidence needed to support the notion, a confirmatory factor analysis (CFA) was conducted. Analyses reveal that the construct of IS-enabled organizational effectiveness can be modeled, at a higher-order abstraction level, as a third-order construct manifested by three second-order constructs and ten first-order constructs.

INTRODUCTION

Return on investment has been identified as one of the key ERP research topics (Botta-Genoulaz et al., 2005). Some major areas related to the return on investment topic are: successful and failed implementation, ERP and competitiveness, performance measurement, investment evaluation, and implementation benchmarking (Al-Mashari,

2003). To justify capital expenditure, business managers, IS researchers, and ERP vendors have attempted to prove the business value of ERP systems. This paper suggests that examining organizational effectiveness improvements enabled by ERP systems can provide clues to the business value question. However, to understand the impact of ERP systems on organizational effectiveness can be a difficult task for several reasons: (1) explicit conclusion is not available; (2) inconsistent and conflicting findings; (3) lack

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of empirical research; (4) complexity of ERP systems; and (5) measurement of effectiveness is difficult (Hedman & Borell, 2002).

Ex-ante evaluation of ERP systems can be challenging for small and medium-sized enterprises (SMEs) as they have no evaluation model to follow, coupled with the difficulties in identifying and quantifying intangible benefits. An evaluation model is particularly critical for SMEs which are trying to reduce uncertainty when making a major IS investment decision (Bernroider & Koch, 2002). In addition to ex-ante evaluation, ex-post evaluation is equally important to assess success of ERP systems (Adam & Sammon, 2004). Nicolaou (2004) discusses the importance of post-implementation review which aims to understand if an ERP system is successful and if there are further improvements that need to be made to either the system itself or the implementation process. As ERP system investment is an expensive undertaking, a post-implementation review becomes even more important in this context. He concludes that a high quality post-implementation review should examine five dimensions: (1) review of overall project scope and planning; (2) review of driving principles for project development; (3) effectiveness of misfit resolution strategies; (4) evaluation of attained benefits; and (5) evaluation of learning. To reap the full benefits of ERP systems, he stresses that a post-implementation review provides valuable insight into the organizational changes that need to be made.

Although ERP benefits have been largely reported in case studies or qualitative discussions, however, more statistical evidence is needed to prove the claimed benefits (Hitt et al., 2002). Past ERP studies did not provide a satisfactory answer on the dimensions of organizational performance as enabled by ERP systems. In past studies of ERP benefits, some provided descriptive statistics without evidence of scale reliability and construct validity. Some attempted advanced statistic analyses, e.g. factor analysis. However, these studies suffered from a lack of theoretical

underpinning. Some used limited scale items that were included rather superficially. Some did follow a theoretical model, but scale reliability and construct validity were again an issue. Murphy and Simon (2001) highlight that in searching for ERP benefits, although ERP brings long-term strategic benefits as well, evaluation normally focuses on operational benefits. Comparing with short-term infrastructure or operational benefits, it is more difficult to quantify long-term managerial, organizational, and strategic benefits.

Responding to the calls for a validated measurement scale in ex-ante and ex-post evaluation of the business value of ERP systems, this paper further refines the measurement scale developed by Marthandan and Tang (2010). In the earlier work, an exploratory factor analysis (EFA) has been performed to validate the scale. This paper aims to follow up the scale development process with a confirmatory factor analysis (CFA). As advised by Gerbing and Anderson (1988), EFA is useful for initial scale development, while CFA can be useful for further scale refinement. Gerbing and Anderson (1988) and Segars (1997) point out the importance of assessing scale unidimensionality, i.e. the scale items are indeed defining the intended scale. As EFA does not prove unidimensionality, CFA is necessary to confirm unidimensionality of individual scales.

Next section provides a summary of past ERP benefits studies. Subsequent sections explain the research model, describe the research methodology, present the CFA results, and conclude the paper respectively.

CONCEPTUAL BACKGROUND

ERP Systems

The term ERP refers to a concept describing enterprise-wide, cross-functional capabilities that support decision-making, enable data sharing, improve efficiency and effectiveness, and facili-

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