

## Chapter 3

# Measuring Utilization of ERP Systems Usage in SMEs

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### ABSTRACT

*Since deployment of Enterprise Systems (ES) such as Enterprise Resource Planning systems (ERPs) within enterprises, both Large Enterprises (LEs) as well as Small and Medium-sized Enterprises (SMEs) have increased and continue to increase, making it increasingly desirable to measure the degree of utilization of ERP systems in enterprises. One reason for this interest is that no benefits are realized if the systems are not used; since ERPs are massive investments, they need to show benefits, or at least be able to measure the benefits. However, to be able to do so, there is a need to explain ERP systems utilization and the factors that influence ERP utilization. This chapter provides an explanation of factors influencing ERP systems utilization by testing a research model building on four dimensions: volume, breadth, diversity, and depth. The contributions of the research are: First, it provides support for the notion of diffusion found in the theory of network externalities where a critical mass is necessary to achieve benefits. This can be used to better understand failures in ERP projects. Second, the use of volume, breadth and depth provide insights for use as a construct and the need to treat it more rigorously. Third, the study contributes to our understanding of the many aspects of use of IT, such as ERPs, and potentially contributes to value and firm performance from ERP utilization.*

### INTRODUCTION

Enterprise Resource Planning (ERPs) systems have constituted one of the most important developments in corporate information systems (IS) during the last decade (Davenport, 1998; Hitt et

al., 2002; Upton & McAfee, 2000). The business interest in ERP Systems can be explained from descriptions of benefits associated with implementation and utilization of ERPs (Robey et al., 2002), of which there are several studies on inspiring success (Davenport, 2000). There are, however, also considerable failures (Larsen & Myers, 1998; Scott & Vessey, 2000). Benefits of

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ERPs are only partly related to technology, most of these stemming from organizational changes such as new business processes, organizational structure, work procedures, integration of administrative and operative activities, and global standardization of work practices, all of which lead to organizational improvements which the technology supports (Hedman & Borell, 2003). It can definitely be said that implementation of ERP systems is a difficult and costly organizational experiment (Robey et al., 2002; Santhanam et al., 2009). Davenport (1996) describes the implementation of ERP systems as “perhaps the world’s largest experiment in business change” and for most organizations “the largest change project in cost and time that they have undertaken in their history.” The implementation is a necessary but insufficient prerequisite for benefits and value, and business value can only be derived from an efficient and effective utilization of information technology resources. (Agarwal et al., 2000). The management of ERP system utilization is thus of critical importance, and involves development and implementation, as well as usage of resources (Balakrishnan & Das, 2009; Kalling, 1999).

Although many benefits of ERP systems have been identified and studied (Shang & Seddon, 2002), past research has focused on defining success factors (Robey et al., 2002), such as top management involvement and support, rather than investigating how ERP systems utilization relates to benefits. One possible explanation for this is that in previous ERP research on benefits and success, the state of go-alive in the implementation of ERPs is often equivalent to use, i.e., that benefits are directly and causally related to the first day of use. The predominant view of utilization is “use” in different forms e.g., intention of use, or user satisfaction, etc. (DeLone & McLean, 1992). DeLone and McLean (2003) claim that there are deficiencies related to the ‘use’ construct, emphasizing that ‘use’ as a construct is too simplistic and needs to be developed. A potential elaboration which this paper takes is that ERP

systems utilization should be explored from an organizational perspective as well as from a system perspective. To this end, we introduce utilization of ERP systems as a measure of use, and develop a model of ERP utilization which we relate to and describe as internal diffusion of ERP systems in organizations. The underlying hypotheses for using diffusion of ERP as a measure is that it is not until ERP is diffused and integrated with a large part of an organization that benefits will be received, i.e., a critical mass is reached. This also means that internal diffusion of the ERP is necessary before ERP utilization in an organization is a fact.

The purpose of this research is to increase knowledge of the relationship between utilization of ERP system and benefits. This will be done through a theoretical and empirical investigation of ERP utilization. In addition, the paper provides input into the complex matter of the dependent variable “use.” It does so by providing an alternative way of investigating the “use” concept which goes beyond use and user satisfaction or intention to use.

This chapter is structured as follows. In the next section we present previous research useful for developing a model for measurement of ERP utilization, focusing on measuring use of ERPs in small and medium-sized enterprises (SMEs). Thereafter, we introduce our methodological approach and the survey context. We then present and discuss our measurement tool of ERP utilization. Finally, we address the usefulness of the measurement tool, both from a practical and a theoretical perspective.

## **MEASURING USE OF ERP SYSTEMS IN SMEs**

In order to do research on ERP utilization, there is a need to define concepts such as: ERPs, SMEs, Measurement, and Use. Starting with defining ERPs, it can be said that relatively often ERPs are strongly connected to the system that SAP AG

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