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The assimilation of enterprise information system: An interpretation systems perspective

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ABSTRACT

This research addresses the question of why enterprise-wide information systems are so difficult to assimilate. Conceptualizing organizations as interpretation systems, we posit that the internal scanning of emerging organizational needs will have a direct positive effect on a firm's level of enterprise IT assimilation, moderated by the extent of technology evaluation activities. In this model, we introduce the concept of information systems (IS) mindfulness, an elevated state of collective alertness toward IS clients' needs. Our findings suggest that the presence of IS mindfulness increases an IS unit's ability to identify and interpret opportunities to assimilate enterprise-wide IT within a firm.

1. Introduction

When investing significant capital in enterprise IT, firms can fail to realize the expected payoffs for many reasons, ranging from holding unrealistic expectations to underestimating the technical difficulties associated with IT deployment [8,44]. While technology failures, user resistance, and vendor problems can contribute to enterprise IT deployment failures, significant business risk also arises from the difficulties that organizations face when attempting to move beyond the initial deployment of enterprise systems and realize their full benefits by using them effectively to support, shape, and enable business strategies and value chain activities [28,66]. Even in situations in which an enterprise technology is successfully deployed, individual firms differ in their ability to *assimilate* the technology; that is, firms may or may not incorporate the technology into business practices in a way that effectively supports and enables their business goals, activities, and strategies [4,10,49].

One arena that clearly illustrates the challenges of enterprise IT assimilation is ERP implementation [21]. Enterprise resource planning systems are commercially available software packages that enable the integration of transaction-oriented data and business processes throughout an enterprise's supply chain [48]. ERP technologies constitute one of the most complex information technologies in the market today and are deployed by many organizations as a foundation for efforts to improve overall performance and competitiveness [50,75]. However, organizations vary significantly in their ability to assimilate these technologies, with many ERP deployments failing to achieve the expected financial and operational impacts [1,71,91]. Despite these difficulties, there is still evidence that effectively assimilated ERP systems constitute an important source of competitive advantage [33,75], leading ERP technologies to be embraced by many large and medium-sized companies [10,11,74].

Why are ERP technologies so difficult to assimilate? One important reason is that realizing the benefits of these systems involves more than simply implementing software and hardware. Assimilating enterprise technologies, such as ERP systems, requires extensive adaptation of both the technology and the organization [4,34,40]. Although some of these changes can occur during the design and initial implementation of the system, ensuring effective ERP assimilation also requires that firms engage in ongoing adaptation of both the ERP software and the

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organization long after initial deployment has occurred [48,49]. However, despite the recognized need to support ERP assimilation, a significant portion of firms fail to meet this need, and hence, many of the benefits of adopting ERP technologies are unrealized [15,31,68]. These missed opportunities suggest a need for a new perspective on how effective IS units manage the evolution of enterprise technologies and a need for additional research to better understand previously overlooked factors underlying the outcomes of efforts to facilitate IT assimilation [5,35,43].

In this study, we argue that ERP assimilation specifically and enterprise IT assimilation more generally are facilitated by an IS management function that identifies, evaluates, and acts upon specific adaption opportunities in the post-deployment phase of a system's life cycle. Using Daft and Weick's [25] model of organizations as interpretation systems as the theoretical base, we focus on the scanning and evaluation of enterprise IT adaptation opportunities as key management activities for promoting ERP assimilation. Augmenting Daft and Weick's [25] work with discussions of organizational cognition in the IS literature [12,80], we also propose that the level of *IS*, conceptualized here as the degree of collective alertness of the IS function, relative to the needs of the IS function's clients is a significant moderating factor in effective efforts to support ERP assimilation. In the next section, the prior literature on IT assimilation is reviewed. A theoretical framework for the proposed model is then presented, and specific hypotheses are developed. The subsequent section describes our research method, followed by a description of the analysis and results. Finally, the findings and their implications for IS managers and researchers are discussed, suggestions for future research are offered, and conclusions are drawn.

2. An interpretation system model of ERP assimilation

Enterprise resource planning systems are a particularly complex class of systems that many organizations have found difficult to assimilate [43,59]. ERP technologies include a variety of software, hardware, and infrastructure components, all of which must be integrated into an efficient, high-reliability system if they are to provide a useful platform for supporting critical business activities [21]. Equally important are the challenges that arise from the deep and wide-ranging consequences that ERP systems can have for organizational processes, structures, and even cultures [69]. Effective assimilation of ERP technologies is further complicated by the ever-evolving nature of both organizational needs and the capabilities of the underlying software and hardware. All of these features combine to make assimilating ERP a "wicked problem" [14]. However, it is exactly this problem that firms choosing to invest in ERP technologies must address if they are to achieve the desired financial and organizational benefits.

The successful assimilation of any information technology requires the mutual adaptation of both the technology and organizational practices [42]. Although some of this adaptation can occur during the initial design and implementation of the system, the complexity of ERP technologies and the breadth of their potential impact within organizations mean that ERP assimilation is always an ongoing, incremental process that continues long after initial technology deployment [48,49]. New organizational needs develop or are discovered. Strategies and priorities change. Organizational units are restructured. Processes are redesigned. Lines of business are created or discontinued. ERP vendors develop new features and capabilities. Third-party software firms create add-ons that can be used in conjunction with the core ERP technology to analyze and disseminate operational data to business decision makers in new ways.

Together, emerging organizational needs and evolving technological capabilities create numerous opportunities to adapt an ERP system to better support business activities and objectives. *ERP assimilation is achieved by taking advantage of these opportunities to refine the match between a firm's needs and the available ERP features and capabilities* [78]. Without effective, ongoing management of emerging ERP adaption opportunities, many aspects of ERP technology are likely to be overlooked, necessary changes to how the technology is used within the business will not be made, and the ERP system will not be effectively assimilated by the organization [32,43,59].

The ERP assimilation process therefore depends on an organization's ability to act on combinations of emerging ERP-related needs and new technologies, which create the conditions needed to advance the mutual adaptation of the system and the organization [34]. Learning to identify and take advantage of these adaptation opportunities is a difficult process [48]. Although existing work [7,65] suggests that IT managers can significantly influence IT assimilation through their actions, it is unclear what practices and structures may be implemented within the IS function to facilitate ERP assimilation.

In their discussion of organizations as interpretation systems, Daft and Weick [25] argue that organizations must interpret events detected in their environment to be able to take proper action. Organizational activity is described in terms of three stages: scanning, interpretation, and learning. *Scanning*, which involves monitoring an environment and providing managers with appropriate data, can occur through formal or informal data collection systems. Organizational interpretation, or *evaluation*, is the process of translating events to the local context and developing a shared understanding of the potential action among organizational members. Evaluation includes the identification of events as significant, recognition of phenomena as important, evaluation of possibilities as either desirable or undesirable, and determination of their worth or significance. Learning or *action*, the last stage, involves responding to or taking action based on the previous scanning and evaluation of identified opportunities [3]. Daft and Weick [25] also suggested that a strict linear sequencing of scanning and interpretive evaluation may be an over-simplification because scanning may interact with interpretive evaluation (instead of simply preceding it) to affect learning and actions.

3. Research model and hypothesis

3.1. ERP need scanning and assimilation

Daft and Weick's [25] interpretation system view of organizations is grounded in specific premises about the nature, purpose, and consequences of information gathering and use within organizations [25]. The first premise is that organizations are open systems that must process information from and about their environments [73]. The environment is monitored to identify events that require a response from the organization [16,41]. This observation implies that scanning the environment for information about changes that are likely to affect the organization is a foundational activity that underlies organizational activity and performance.

IT assimilation and, more specifically, ERP assimilation can be understood in terms of effectively managing emerging opportunities to adapt the ERP system and the organization [34,42,48]. ERP adaptation opportunities can arise from changes in a firm or in a firm's environment [26,43,59]. At the same time, vendors may develop new ERP features [56,89]. Together, the evolving ERP-related needs of an organization, along with its technological capabilities and innovations, create opportunities for advancing