Incorporating Technology Acceptance and IS Success Frameworks into a System Dynamics Conceptual Model: A Case Study in the ERP Post-Implementation Environment

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ABSTRACT

Like any IT project, the intricacy of Enterprise Resource Planning (ERP) implementations brings with it high risks to the organization because of high upfront costs and low success rates. ERP implementations are not simply software installations but a radical integration and transformation of an organization's business practices. System acceptance and perceptions of success weight heavily on non-technical forces such as people, processes, policies, and organizational culture. This study employs system dynamics techniques to elicit perceptions regarding system acceptance and success in an ERP post-implementation case study setting. A conceptual model was developed based on various literature streams and structure validation was conducted with ERP experts via semi-structured interviews. The resulting model includes technology acceptance and information system success model concepts as well as theories from related literature. Interview findings and methodology reflections are also discussed in this paper.

Keywords: Enterprise Resource Planning, Enterprise Systems, Information Systems, Information System (IS) Success, System Dynamics, System Implementation, Technology Acceptance, Technology Acceptance Models (TAM), Trust

INTRODUCTION

Enterprise Resource Planning (ERP) systems emerged in the 1990s as a way in which to integrate data across the organization and improve the efficiency of business processes (Davenport, 1998, 2000; Sammon & Adam, 2005). ERP implementations force the unification of disparate organizational data and functions from diverse departments (Dodds & Spencer, 2007; Rashid, 2005; Sammon & Adam, 2005) and as such require significant planning and change management to implement successfully (Dong, 2000; Somers & Nelson, 2001).
Not only are ERPs exceptionally complex but their scope is enormous because the system is enterprise-wide and impacts all departments in the organization (Bansal & Negi, 2008; O’Brien & Marakas, 2006).

While there is a reasonable amount of research dealing with ERP implementation success, there is a need to explore the post-implementation phase of ERP (Al-Mashari, 2003; Ifinedo, 2007). Some research has been conducted more recently focusing on user satisfaction and ERP success factors in the post-implementation environment (Ifinedo, 2007; Ifinedo & Nahar, 2009; Ifinedo, Udo, & Ifinedo, 2010; Wu & Wang, 2006, 2007). This study extends this work by using system dynamics techniques to study system acceptance and perceptions of success in the maintenance phase of an ERP lifecycle.

**LITERATURE REVIEW**

There are unique implications to technology acceptance and information system (IS) success concepts in the ERP environment because the software is implemented by a team comprised of both technical and functional participants (Frantz, Southerland, & Johnson, 2002). Since ERP systems are very different from homegrown legacy information systems and they have their own unique challenges with regard to user acceptance and IS success. Unlike information systems of the past, ERP requires technical and functional communication, collaboration, and active project participation (Appleton, 1997).

**Technology Acceptance Models**

The basic concept behind user acceptance frameworks is that user perceptions about information technology influence their intention to use and ultimately their actual use of information technology. In addition, the actual use of an information technology system has a feedback relationship with user perceptions. Technology Acceptance Models (TAM) have typically been used to explain why technology is or is not successful by studying the antecedents “perceived usefulness” and “perceived ease of use” and their impact on intention to use technology (Davis, 1989). Empirical studies of TAM have consistently found that perceived usefulness is a strong determinant of intention to use (Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003). Research has also found that perceived usefulness is a predictor of attitudes toward using technology both before implementation and in the post-implementation environment (Marler, Fisher, & Ke, 2009).

The original TAM models assumed voluntary use of technology and not an organizationally mandated system such as ERP. However, Amoako-Gyampah (1999, p. 805) explains, “...that effective usage of technology is what leads to organizational benefits, not just selective usage. Even in situations where usage is mandatory, the participation of the users can be effective if the users are made to believe that they have some control over the outcome of the implementation.” Venkatesh and Davis (2000) developed TAM2 by extending TAM to include social (subjective norm, voluntariness and image) and cognitive (job relevance, output quality, result demonstrability and perceived ease of use) constructs. TAM2 specifically explores the acceptance of technology initiatives in a mandatory setting, such as an ERP environment. There have also been several extensions of the TAM model to apply to the unique characteristics of ERP (Amoako-Gyampah, 1999, 2004, 2007; Amoako-Gyampah & Salam, 2004; Bueno & Salmeron, 2008; Gefen, 2004).

Trusting relationships have also been shown to have positive effects on technology acceptance by improving the perceived usefulness of an ERP (Gefen, 2004). Gefen’s (2004) ERP TAM influenced model clearly points out the relationship between “Client Trust” and its effect on “Perceived Ease of Use.” However, ERP implementations require more than user acceptance of the system. The users need to be knowledgeable about their existing business processes as well as the ERP software functionality (Soh, Kien, & Tay-Yap, 2000). Users can no longer “…be passive functional experts as in the traditional systems develop-
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