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Behavioral aspects of enterprise systems adoption: An empirical study on cultural factors

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ABSTRACT

Recently, behavioral aspects of enterprise systems have been called to investigate further in the information systems (IS) community. The purpose of this paper is to apply individual-level measurement of cultural orientation, such as power distance and uncertainty avoidance, to the recent findings of computer self-efficacy and ERP adoption belief, such as perceived ease of use, based on the survey of 101 ERP system experts. An online survey methodology is used to gather data from the various industrial fields. The research model is constructed based on the findings of the previous studies in IS, management, and cultural psychology. The results indicate that low power distance and high uncertainty avoidance cultural orientation influence general CSE. In addition, uncertainty avoidance positively influences ease of use of ERP systems. As expected, general CSE positively influences ease of use of ERP systems. Training and managerial interventions through communication to improve these cultural orientations would be effective for the successful ERP systems project. The findings of this research would be helpful to the project managers, IS researchers, and ERP practitioners who want to understand the behavioral aspects of ERP systems adoption in the organization.

1. Introduction

Behavioral and cultural issues are important topics to information systems (IS) managers and researchers, since digital economy and globalization has become a new trend in the world, (Arnold, 2006; Hofstede, 2003; House, Javidan, Hanges, & Dorfman, 2002). Enterprise Resource Planning (ERP) systems, popular enterprise systems focusing on the integration of data and communication in the organization, diffusion and international outsourcing have been emphasized in organizational strategy for the financial and business process reengineering (Bradford & Florin, 2003; Calisir, Gumussoy, & Bayram, 2009; Tarafdar & Roy, 2003). Thus, cultural issue of ERP systems adoption is an interesting topic to the IS community. ERP systems represent a completely different class of Information Technology (IT) applications as compared with traditional and simple IT (Amoako-Gyampah & Salam, 2004; Bradley, 2008). However, most cultural studies of ERP adoption are based on case studies in a particular country or on comparative tests at the national level, rather than providing a more generalizable model with a detailed explanation of system adoption.

Several IS researchers have called for the IS research based on the behavioral aspects of enterprise systems based on the empirical findings (e.g., Arnold, 2006; Sutton, 2006). As these IS researchers commented, the behavioral aspects of enterprise systems adoption and implementation should be investigated further based on the broad and generalized research methodology such as survey based or quantitative analysis in addition to the case based methodology. Furthermore, psychological and cultural aspects for the ERP systems adoption would be important research issues for IS community since these aspects are the core of the behavioral aspects of enterprise systems adoption by the individual users and project participants.

The cultural differences among organizations or individuals rather than countries are consistently supported in the recent studies of ERP adoption in the broad IS literature (Hanseth, Ciborra, & Braa, 2001; Liang, Xue, Boulton, & Byrd, 2004; Martinsons, 2004). Martinsons (2004) showed that there are clear differences between state-owned enterprise and private ventures in China in adopting ERP systems. She found that hands-on leadership mainly demonstrates commitment in private ventures, whereas state enterprises show a tendency to delegate ERP responsibilities, even though these companies are in the same country. Liang et al. (2004) also argued based on the ERP adoption cases that ERP strategies must address cultural differences and localized strategies. There are also several studies of European cases in ERP adoption that emphasize

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globalization and cultural dimensions with respect in adoption. For example, Hanseth et al. (2001) showed that ERP adoption should be interpreted as globalization rather than tight control by technologies, using the case of the introduction of Systems Applications and Products (SAP) in a large Norwegian company.

Enterprise systems are usually large systems involving different types of stakeholders as end users in the organization, which makes this understanding difficult and complex (Akkermans & van Helden, 2002). Furthermore, given the implementation environment of enterprise systems with globalization involving Europe (Hanseth et al., 2001) and Asia (Martinsons, 2004), the complexity of system adoption becomes an important issue for both academic researchers and practitioners. To help reduce the IT project failure rate, the adoption of stakeholders in enterprise systems implementation should be further investigated and, ideally, more efficiently guided. Although the direct influence of enterprise systems on firm performance has been debated in the IS community for a long time (Ash & Burn, 2003; Irani & Love, 2002; Stefanou, 2001), the importance of systems adoption by the end users is consistently emphasized for the successful implementation of enterprise systems (Davison, 2002). Venkatesh (2006) also called for research that aims to understand employee adoption and impacts of the more complex technology solutions, such as ERP systems, by theorizing richly not only about technology characteristics and relevant outcomes. Venkatesh (2006) recognizes the maturity of individual-level technology-adoption research and suggests three broad future research directions for complex systems implementation, such as business process change and process standards, supply-chain technologies, and services. These are not meant to be exhaustive but rather potential directions that can result in a theoretical contribution to individual-level technology-adoption research and the specific topic area such as ERP systems adoption at the individual-level of analysis.

Recently, the Technology Acceptance Model (TAM) has been applied to ERP systems to explain the complex implementation and adoption issues of stakeholders and end users (Gefen, 2004; Amoako-Gympah and Salam, 2003). TAM is a widely applied IS model to explain end user adoption of IT (Davis, 1989) based on relationships among perceived ease of use (PEOU), perceived usefulness (PU), and intention to use. Amoako-Gyampah and Salam (2004) also found that the use of managerial interventions, such as training and communication, to influence the acceptance of ERP systems were supported, since ERP adoption beliefs contributed to intention to use ERP systems. The application of TAM to enterprise systems adoption is complex, since enterprise systems need an organizational viewpoint as well as the individual perspective. Amoako-Gyampah and Salam (2004) showed an extension of the TAM in an ERP implementation environment and empirical supports of TAM in ERP systems adoption. They argued that the use of an ERP system incorporates both mandatory and discretionary usage. Mandatory usage represents a base level needed to perform minimal job functions, but usage beyond that – where the real value of ERP system lies – might become voluntary. Even if usage were mandatory, effective usage leads to organizational benefits, not just selective benefits. Gefen (2004) also recently found the positive effect of PEOU on PU in the ERP context, based on TAM. Thus, a more complete understanding and integration of the end users' cultural dimensions and the end users' ERP adoption beliefs are important issues for practitioners and researchers to make enterprise systems work successfully.

From an academic and theoretical perspective, the effects of culture on IT diffusion have been studied by IS researchers (e.g., Kettinger, Lee, & Lee, 1995; Straub, 1994; Straub, Keil, & Brenner, 1997) primarily based on Hofstede's (1980) cultural construct. However, Hofstede (1980) specifies that his original instrument cannot be used to test individual-level relationships, and should be used only at the national level. Individuals will have different cultural orientations regardless of their nationality. McCoy, Galletta, and King (2005) also argued that it might be not appropriate to assume that the culture score of the entire country under investigation is the same score of the people within the same sample; individuals might have drastically different cultural outlooks, even within the same country. Straub, Loch, Evaristo, Karahanna, and Srite (2002) suggested that social identity theory (Tajfel, 1972) is a theoretical approach to studying culture at an individual-level in IS research. Tajfel (1972, p. 292) defines social identity as "the individual's knowledge that he belongs to certain social groups together with some emotional and value significance to him of this group membership." Social identity has been found to have a strong effect on human behavior, especially on the behavior of employees in organizations (e.g., Hogg & Terry, 2000; Marques, Abrams, Paez, & Martinez, 1998). Individuals will identify themselves as part of multiple types of cultures at different levels (e.g., some ethnic, some national, and some organizational), and specific cultures will be more salient to the individual at certain times (Ford, Connelly, & Meister, 2003). Straub et al. (2002) argued that individuals may or may not identify with the national culture, and they can show a different cultural orientation even though they are in the same country. Thus, social identity theory enables IS researchers to have a theoretical framework for studying issues at an individual-level with a complimentary research perspective.

This study posits that an individual's perception of his or her cultural orientation, a belief or knowledge of group membership in different cultural dimensions, is an important antecedent to an individual's IT adoption factors. Cultural orientation, in addition to self-identity traits such as self-efficacy, will influence IT adoption belief. While the various motivational antecedents of IT adoption behaviors (e.g., Davis, 1989) and computer self-efficacy (CSE), defined as an individual judgment of one's capability to use new information systems (Compeau & Higgins, 1995; Compeau, Higgins, & Huff, 1999), have been widely explained, individual-level measurement of culture is a relatively new phenomenon and should be tested in order to develop a more complete understanding of IT adoption. Furthermore, the direct connection between individual-level cultural orientation and ERP adoption beliefs, such as PEOU, has not been investigated. Both the cultural psychology literature (e.g., Howard, 2000; Sussman, 2000; Tyler, Lind, & Huo, 2000) and current IS literature (e.g., Srite & Karahanna, 2006; Karahanna, Evaristo, & Srite, 2005; Straub et al., 2002) strongly suggest the potential advantage of using measurement of culture at the individual-levels of analysis. Thus, the current study investigates these potential linkages based on the previous literature and proposes the following comprehensive research model.

2. Research model and hypotheses

There have been several studies on the ERP systems based on the behavioral and empirical approach in IS domain. For example, Poston and Grabski (2001), Nicolaou and Bhattacharya (2006) provide an empirical archival view on the impact of enterprise systems on organizational effectiveness. Nicolaou (2004) similarly uses a multiple case methodology, providing a construct for measuring post-implementation review that can be applied in other future studies. Bradford and Florin (2003) use a questionnaire based methodology to enhance the understanding regarding the diffusion of ERP systems and user perceptions on the success of implementation. Several other behavioral research (e.g., Dunn & Gerard, 2001; Dunn, Gerard, & Grabski, 2005; Dunn & Grabski, 2000) focuses on the enterprise systems in IS domain.

Based on these behavioral aspects of ERP systems in IS, Fig. 1 presents the proposed research model. Lewis, Agarwal, and Sambamurthy (2003) recently showed that institutional and