Assessing the impact of enterprise systems technological characteristics on user continuance behavior: An empirical study in China

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ARTICLE INFO

ABSTRACT

Enterprise systems (ES) have changed the way organizations process their information, yet limited research has been conducted to investigate users' post-adoption perceptions of these sophisticated technologies. Drawing on the IS-continuance theory and the IS success model, this research attempts to fill this gap in the literature by examining the influence of technological characteristics of ES, represented by information and system quality, on users' satisfaction and perceived usefulness, which in turn, affect continuance intention of ES. Furthermore, this study proposes that both satisfaction and continuance intention influence continuance behavior. A research model was developed and empirically examined with data collected from 275 users of ES in China.

1. Introduction

Organizations are now realizing that integration, which will enable their information to be available to their stakeholders anyplace and anytime, is essential for them to maintain a competitive advantage [1]. This integration has been achieved mainly through the implementation of enterprise systems (ES) by vendors such as SAP, Oracle and PeopleSoft. An ES is an integrated set of software packages that help organizations integrate their information flow and business processes by using a single database that collects and stores data with a standardized user interface [2,3]. Companies are investing in different types of enterprise systems, such as enterprise resource planning (ERP) systems, customer relationship management (CRM) systems, and supply chain management (SCM) systems to enable the integration of different functions and to restructure the relationships (e.g. employees within the organization or business partners) in and across organizations [2–10].

Although there have been numerous studies related to ES, much of the literature has mainly been directed to issues encountered during the selection or the implementation stage [11–15] with less emphasis on the operational stage or the post-implementation phase, despite the fact that the success of ES to a great extent occurs during the operational phase [16]. Furthermore, limited research has investigated the influence of different ES characteristics on user continuance intention during the post-implementation phase [16]. This scarcity of ES research during the operational phase and the recent interest in investigating the influence of technological characteristics of ES [16–18] on user's decisions to continue or discontinue usage of ES [19–21] has motivated this present study to explore different technological characteristics of ES which influence continuance intention and consequently continuance behavior among users.

In this study, we have adopted the label "technological characteristics" which includes different characteristics of ES as suggested by several previous studies [7,16,18]. For example, technological characteristics of ERP systems according to Chang et al. [18] include complexity and compatibility, while system and technological characteristics according to Sternad et al. [16] include ERP data quality, system functionality, system functionality, and user manual helpfulness. Also, according to Ramdani et al. [7] technological characteristics of ES include relative advantage, compatibility, complexity, trialability, and observability. In this study, technological characteristics include the different ES characteristics which are associated with the interaction between

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the system and the user, including the information features (the quality of outputs the information system produces), and the system features (the quality of the information system processing itself) [22].

More specifically, this study focuses on user perceptions of ES. Hence, this study examines the impact of different technological characteristics of ES on user's continuance behavior by integrating the constructs of system quality and information quality perceptions from DeLone and McLean model [23] with the perceptions of usefulness, satisfaction and continuance intention from the IS-continuance theory [24]. Although DeLone and McLean model contains constructs related to IS use, we believe that by integrating constructs from another model, namely the IS-continuance theory, our study will provide new insights of the factors influencing usage of ES. Past studies have revealed that researchers have adapted and selected different constructs from either the DeLone and McLean model or the IS-continuance theory [25–27]. In this study, the constructs of the two models have been selected based on their widespread use and relevance to the ES context. We consider that our study echoes the notion that technological characteristics can influence perceived usefulness and satisfaction which eventually motivate ES continuance intentions and continuance behavior.

Furthermore, to investigate in depth the effect of different technological characteristics of ES, this study considers system quality and information quality characteristics as a multidimensional measure, investigating the distinct role of each construct, because we believe that it is important to determine which characteristics are significant to organizations to help managers in developing effective technological improvement strategies. Previous studies have grouped the characteristics of IS and investigated them as a single construct [16,22,28–30] which has provided limited managerial implications. By measuring the importance and effect of each constructs of ES characteristics to explain usage behavior, this study can provide a more developed understanding of the role of each construct within the proposed model. To test our model, we have conducted an empirical study of ES users from different firms in China, where the ES market has shown significant growth in recent years.

It is important for corporate managers, IS researchers and ES vendors to understand how to improve users' continued use of ES to ensure successful usage behavior. Hence, the objectives of our study are to: (1) to assist organizations to identify the influential technological characteristics that contribute to the users' feeling of perceived usefulness and satisfaction which consequently shape continued usage toward ES; and (2) to compare the impact of these widely investigated characteristics with those less investigated while important ES technological characteristics.

The remainder of this study proceeds as follows. Section 2 provides a theoretical background of the study. In Section 3 we provide a detailed description of the proposed characteristics of ES, and discuss research hypotheses of the study. In Section 4 we explain our research method. Data analysis and results are discussed in Section 5. The proposed model and hypotheses testing was conducted using partial least squares (PLS) to evaluate the strength of the hypothesized relationship. A discussion of the results of the research is presented in Section 6. The study concludes in Section 7 by presenting the practical implications, the limitations and directions for further research.

2. Theoretical background

2.1. IS success model

DeLone and McLean [23] have developed an IS success model containing the following six constructs: system quality, information

quality, use, user satisfaction, individual impact, and organization impact. They have updated their model in 2003 to include service quality, intention to use, and net benefits constructs. Although DeLone and McLean [23,31] model has been validated by many IS researchers [22,32–34], limited studies have applied the model to investigate user continuance intentions toward ES. Furthermore, to the best of our knowledge no empirical study has applied the constructs of system quality and information quality from the IS success model as a multidimensional measure.

For example, Ifinedo et al. [35] have examined the relationship between information quality, system quality, service quality, individual impact, workgroup impact, and organizational impact to investigate ERP post-implementation success in organizational contexts. They have found that both system quality and service quality positively influence individual impact, with the exception of information quality. Tsai et al. [36] have developed a conceptual framework to investigate the influence of ERP selection criteria on the implementation success by applying an updated model of DeLone and McLean [31] and the balanced scorecard (BSC) technique. Their findings reveal that most organizations do not consider all the proposed criteria when implementing ERP systems, suggesting the enhancement of system quality and service quality to increase user perspective and ERP success. Ifinedo [37] has applied the constructs of systems quality and information quality from DeLone and McLean [23] model to investigate the influences of external expertise, in-house computer/IT knowledge and business employees' computer skills on ERP system success. His findings indicate that the external expertise and internal computer/IT knowledge are essential to the success of ERP system.

As evidenced by these studies, the different quality constructs of the IS success model [23] has been investigated as a composite measure, which does not show the effect of each technological characteristic within each construct on user continuance intention and behavior. In this study we attempt to fill this gap by considering the constructs of system quality and information quality as a multidimensional measure to investigate user continuance intentions toward ES usage which will lead to usage.

2.2. IS-continuance theory

Bhattacherjee [24] has proposed the IS-continuance theory to investigate IS continuance based on the expectation confirmation theory [38]. The IS-continuance theory focuses mainly on post-adoption environment postulating that an individual's intention to continue using a specific IS directly depends on the following two variables: the user's level of satisfaction with the IS and perceived usefulness.

The IS-continuance theory has been investigated and validated by many researchers. Some studies have extended the IS-continuance theory by adding new constructs, while others have integrated the IS-continuance theory with other theories or models to explain users' continuance intentions regarding IS. For example, Kim [39] has extended the IS-continuance theory with the constructs of habit and enjoyment to investigate actual usage of mobile data services and applications. Thong et al. [40] have extended the IS-continuance theory with the constructs of perceived ease of use and perceived enjoyment to examine continuance intentions toward mobile Internet services. Lee and Kwon [41] have investigated the influence of familiarity and intimacy on continuance intentions toward Web-based services. Lee [42] has developed a model which combines the IS-continuance theory with the TAM, the theory of planned behavior (TPB) and flow theory, to predict users' intentions to continue using e-learning. Similarly, Lin and Wang [26] integrate the task-technology fit (TTF) model with the IS success model to investigate