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Understanding SaaS adoption from the perspective of organizational users: A tripod readiness model

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ABSTRACT

As an innovation that revolutionizes application delivery based on cloud-computing, software-as-a-service (SaaS) has seen a tremendous growth during the last few years. However, its diffusion is not evenly distributed: some organizational users are open to SaaS but others are still hesitant despite the huge cost saving it may bring. The behavioral impacts of SaaS are far-reaching and the new socio-technical phenomenon deserves a close look. Based on the literature review, this study proposes a tripod model of SaaS Readiness that suggests that organizational users need to get prepared from technological, organizational and environmental aspects for the adoption of SaaS. The empirical results support that all three aspects are important for SaaS adoption yet their influences vary across psychological and overt outcome variables.

1. Introduction

Software-as-a-service (SaaS) emerges as an innovative approach to deliver software applications based on cloud-computing technology (Chou & Chou, 2007). In this model, SaaS providers deploy software applications on cloud servers for users to order based on their needs and pay for the services according to actual usage (Armbrust et al., 2010). This "on-demand" service delivery approach is similar to utility service mode: a user just subscribes an application without the need to buy, install and maintain the software, like getting power from the grid rather than one's own generator. In addition, SaaS enhances the quality of software services through automatic application upgrade and data backup (Xin & Levina, 2008).

SaaS allows organizations to outsource many of their applications, including generic tools (e.g. anti-virus software, e-mail, office package) and business applications (e.g. accounting, customer relationship management – CRM, enterprise resource planning – ERP). Based on cloud computing, organizations can also outsource their IT infrastructures (e.g. storage, backup and computing) in form of Infrastructure as a Service (IaaS) as well as IT platforms (e.g. database and business intelligence) in form of Platform as a Service (PaaS) (Vaquero, Rodero-merino, Caceres, & Lindner, 2009). Among the three, SaaS is considered the most promising as it gives business clients various tangible benefits, such as reduced IT costs and improved IT performance (Catteddu, 2010; Wu, 2011).

Through cloud computing, SaaS providers allocate IT resources and capacities among subscribers based on their real-time demands. Such an approach of dynamic instance and data partition management is conducive to the economies of scale. As organizations do not need to worry about acquiring and maintaining their own software applications, they can save tremendous cost and focus on productivity.

Despite the fact that more and more organizations adopt SaaS, however, its diffusion is still far from full potential due to issues like security concerns, fear of losing control, and organizational resistance (Benlian & Hess, 2011; Lee, Hoon, & Min, 2013). The outsourcing of IT functions often brings significant organizational changes, leading to the overhaul of business processes and management structures (Clark, Zmud, & McCray, 1995). Most employees are hesitant to go through such changes unless they are well prepared and motivated (Walden & Hoffman, 2007).

Thus the general incentive in terms of cost saving is not sufficient to explain SaaS adoption decisions. Rather, the behavioral impacts of SaaS that revolutionize how people acquire and use software need to be taken into account. Organizations are not likely to implement SaaS unless relevant personnel get ready. These people include users at different levels such as employees

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who use computers in their daily jobs, IT specialists who provide technical support, and managers who make decisions based on the information obtained, and they are generally referred to as organizational users (Klein, Conn, & Sorra, 2001). This study will examine the key factors that make differences in their psychological tendency to adopt the SaaS innovation.

2. Literature review

2.1. Factors relevant to SaaS adoption

Among the existing studies on SaaS adoption, Xin and Levina (2008) qualitatively assessed the influence of IT infrastructure maturity and outcome uncertainties. Similarly, Wu, Lan, and Lee (2011) found that organizations evaluate the long-term impacts of SaaS adoption, especially foreseeable and unforeseeable risks. Benlian, Hess, and Buxmann (2009) quantitatively examined the importance of perceived values, uncertainties and impacts to the attitude toward SaaS adoption. Also using the attitude toward the innovation as the dependent variable, Wu (2011) identified the significant effects of relative advantage, ease-of-use, security and trust. Benlian and Hess (2011), on the other hand, collected observations on perceived cost advantage and security concerns and recognized their impacts the decision-making related to SaaS adoption.

SaaS is built upon the cloud-computing technology, and their diffusions are closely related. There have been more empirical studies on cloud-computing adoption and their findings provide useful hints on more systematic investigation of SaaS adoption (Cegielski, Jones-Farmer, Wu, & Hazen, 2012; Lin & Chen, 2012; Low, Chen, & Wu, 2011; Park & Ryoo, 2013; Stantchev, Colomo-Palacios, Soto-Acosta, & Misra, 2014). As the literature review indicates, there are many factors that may influence the diffusion of cloud computing. Some factors are related to the innovation itself, such as relative advantage, ease of use, compatibility. Yet others are related to organization, including IT infrastructure and top management support, and external factors, such as competitor and partner pressures.

Thus an important research question is: "how different types of factors affect user adoption of SaaS". Existing studies focus on different sets of factors based on the theoretical frameworks that they employ. For instance, the studies on technology-related factors may include relative advantage and compatibility based on Rogers' (1995) innovation diffusion theory (IDT), and perceived usefulness and ease-of-use based on Davis's (1989) technology acceptance model (TAM). The use of different sets of predictors makes it hard to reconcile the findings. Also, leaving out important variables leads to incomplete results that lessen the value of a study in terms of its theoretical and practical implications. Therefore, a higher-level analytical framework is needed to organize the variables from different studies together for the systematic investigation of the factors that influence SaaS adoption.

2.2. Technology–organization–environment framework

Tornatzky et al.'s (1990) technology–organization–environment (TOE) framework is appropriate for this purpose. It emphasizes the role that contextual factors play in the process of innovation adoption, and classifies them into three categories: technology on the innovation side, organization on the adopter side, and environment in which adoption occurs. Unlike most other theories and models in the information systems field, the TOE framework is a generic theory that only suggests different sources of influence without specifying the variables in each (Zhu & Kraemer, 2005). Researchers may choose different technological, organizational and environmental factors for different IT innovations, making TOE framework highly adaptable and broadly applicable (Baker, 2012).

Despite its flexibility, the TOE framework is built upon a solid theoretical foundation and consistently supported by empirical results (Oliveira & Martins, 2011). To the best knowledge of the authors, however, the TOE framework has not yet been used in the investigation of SaaS adoption. Based on the TOE framework, Table 1 classified the significant variables identified in previous empirical studies on enterprise adoption of SaaS and cloud computing. General variables such as uncertainties and impacts are not included because they can be related to more than one category. Variables that are conceptually similar are combined.

There are more variables and studies in the technology and organization categories than the environment category. This is consistent with what other researchers have found in IT innovation adoption studies using the TOE framework (Yoon & George, 2013). Yet, does it mean that environmental factors are not as important as the technological and organizational factors? Questions like this are interesting to both researchers and practitioners who want to find out what make more differences in SaaS adoption. The TOE framework, rather than offering competitive explanations to existing theories, is able to integrate different types of variables into a holistic model (Oliveira & Martins, 2011). This makes it possible to compare the effects of different factors on SaaS adoption, leading to the insights on organizations' primary concerns about SaaS.

3. Research model

The TOE framework presumes the importance of all three types of factors related to technology, organization and environment to innovation adoption. Yet it is up to researchers to select variables and specify relationships. Most of the existing studies that adopt this framework examine the effects of different types of factors on technology adoption separately (Low et al., 2011). Such individual modeling of relationships, however, does not reflect the basic premise of the TOE framework that different sources of influences need to be examined together.

To integrate the impacts of technological, organizational and environmental factors on SaaS adoption, there is a need for a formative construct that captures their overall effect. Compared with general considerations such as cost and security, these three types of factors make differences in how people are prepared and willing to adopt the innovation, or "SaaS Readiness". That is, potential users in different organizations have different considerations related to technology, organization and environment, which largely determine how ready they are to adopt SaaS.

Researchers have adopted behavioral models to study user adoption of IT, and the most influential is the aforementioned TAM which is based on the Theory of Reasoned Action (Fishbein & Ajzen, 1975). Most technology adoption studies are based on TAM and derived models, such as the unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003). The main TAM constructs include perceived usefulness and perceived ease-of-use to predict behavioral intention.

The adoption of IT innovations like SaaS and cloud-computing involves the considerations more than user perceptions of the technologies. Organizational factors such as IT assets/capabilities/resources may be more prominent in adoption decision-making (Bharadwaj, 2000). In addition, SaaS allows organizations to outsource their IT applications, and a provider may serve hundreds or even thousands organizations at the same time. Compared with the traditional in-house model, the new IT service delivery model makes it possible for business partners to process and share transactional data on a common IT platform. Thus, SaaS adoption must