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User continuance intention to use cloud storage service

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ABSTRACT

Cloud computing is a huge and important change in the field of network application in recent years to provide users with a completely different IT service and delivery mode. Among various cloud services, cloud storage is a service most closely related to web users' need because it involves the storage of users' all important data and backup files. In this study, a sample survey was conducted in Taiwan, and key factors influencing individual users' adoption of the cloud storage service were analyzed and discussed based on Task-Technology Fit theory. The research results indicate that "cloud storage service", "unstructured task", "cloud storage self-efficacy" and "opinion of reference groups" all have significant positive influences on the "perceived usefulness", which further has influence on users' continuance intention to use the cloud storage service. The findings also support that the privacy protection risk and the lack of privacy-policy risk in the cloud storage service produce negative moderating effects on the perceived usefulness and the continuance intention.

1. Introduction

While the network technology quickly develops, information technology (IT) companies encounter many difficulties and challenges, forcing them to change their IT infrastructure and operation modes (Yu & Tao, 2009). After the change of the mainframe computer to the client/server network in the 1980s, cloud computing is another huge and important change in the field of network application in recent years to provide users with a completely different IT service and delivery modes (Park & Ryoo, 2013). The cloud computing is the user in an Internet-accessible environment can quickly share or access network resources (e.g., remote servers, storage spaces and network service applications) and interact with service providers through some easy operating interfaces and management modes. IT companies have provided effective and efficient infrastructure deployment, with which users can make use of various cloud services directly via networks (Kim, 2009; Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011) without the need of purchasing expensive software or hardware.

Cloud computing provides users with a new business service mode, which assure the storage of important data in a network storage space (Yang & Jia, 2012). Traditionally, most users might use their computers or mobile devices to edit documents, play audio/video files and share data with others, and all these files must be stored in the users' own hardware devices. By storing files in this manner, the users could not access or share the files in an urgent condition. Further, since many of the users' data change frequently, inconsistency of data might occur when editing these data on different computer devices (Wang, Wang, Ren, Cao, & Lou, 2012). In addition, data backup would be also a very important issue to many users (Zhang, Feng, & Qin, 2013). Nowadays, it is possible to mitigate the above problems by using cloud storage service (CSS).

In 2012, the survey conducted by Gartner Group indicated that about 19% of organizations are using the cloud for production computing, while 20% are using cloud storage services.[1] It means there is a pretty good potential market for the cloud storage. About the application of cloud storage service, Techtarget pointed out in their cloud pulse survey in 2013 that most popular applications of cloud storage include data backup (56%), file sharing (51%) and disaster recovery (36%).[2] Pursuing these new business opportunities, many IT firms have provided cloud storage services, such as Amazon S3, Google Drive, SkyDrive and Dropbox.

However, information technological products are characterized in their high replacement rates and short service life circles (Moore & Benbasat, 1991). Whenever a new product is introduced into the market, it is necessary for the users to perceive the usefulness of the product in their daily task performance (DeLone & McLean, 1992, 2003). In addition, consumers are also concerned about risk

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[1] Gartner Group, http://www.gartner.com/newsroom/id/2220715, 2014.
[2] TechTarget, http://www.computerweekly.com/resources/Storage, 2014.

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of using products (Cox & Rich, 1964). Furthermore, being a type of network application service, cloud storage would carry more perceived risk than other physical products (Biswas & Biswas, 2004). TwinStrata carried out a survey about cloud storage adoption in 2014, and asked participators about their objection to using cloud storage. More than 62% of the respondents selected privacy security and loss of control as the biggest barriers and concerns for adoption cloud storage (62%).[3] InformationWeek also conducted an online questionnaire in 2014, and the survey result revealed more than 86% of the respondents had worries about the private security problem, and 52% of the respondents suspected the reliability and availability of using cloud storage.[4] These survey results implied privacy protection mechanism and policy are very important factors to users in determining whether to use the cloud storage service. Currently, most users still tend to doubt the privacy protection in the cloud environment; they think there must be some risk in using the CSS and hesitate to store important or confidential data in the cloud space. The above concerns would largely limit the benefits and advantages of cloud service that were expected to achieve and become the challenge to IT providers.

On the academic side, cloud computing has been getting increasing attention and represents nowadays one of most important research topics in computing science (Stantchev, Colomo-Palacios, Soto-Acosta, & Misra, 2014). However, most of the researches emphasized on the theoretical discussion (Marston et al., 2011) or technological development (Tsai & Hung, 2014), while few of them are directed to the factors that are considered by users before they decide to use the CSS. In addition, most of the relevant studies having been conducted in recent years are aimed mainly at the analysis of the advantages/disadvantages and the benefits of business-level cloud computing technology (Ghormley, 2012), while few of the related literature are directed to the study of individual users' intention of using the cloud services (Obeidat & Turgay, 2013). Therefore, the major purpose of this study is to identify the key factors influencing individual users' adoption of the CSS.

2. Literature and hypotheses

Regarding how the IT helps individuals in their daily life and contributes to individuals' good performance in their tasks, the core of two theories, namely, Technology Acceptance Model (TAM) and Task-Technology Fit (TTF) are important in understanding why individuals use one technology in carrying out their tasks (Klopping & McKinney, 2004; Yen, Wu, Cheng, & Huang, 2010). Based on the context and properties of CSS, we adopt two theories as the basis of the research model. We consider "*Unstructured Task*" as the "task" variable, and consider "*Cloud Storage Service Support*" as the "technology" variable in TTF. Further, since CSS is a high-technology service, it becomes important to consider "*Cloud Service Self-efficacy*", the "individual" variable in TTF. Based on the TTF theory, it is expected that CSS can help an individual in completing a task or job in his/her daily life. Moreover, in the existing society, word-of-mouth and risk consideration would also be important to user's decision on adopting or continuing to use the CSS. Therefore, we also add two other variables, "*Opinion of Reference Groups*" and "*Privacy Risk*", as the factors that would influence a user's intention to use the CSS. The following paragraphs explain how our hypotheses are inferred.

TTF proposed by Goodhue & Thompson in 1995 interprets the mutual dependency among task, technology and individuals. Goodhue (1995) defined the task characteristic as all activities carried out by individuals in turning inputs into outputs, and deemed the technology characteristics as tools used by individuals in carrying out their tasks. Mathieson and Keil (1998) mentioned that when the IT is able to support a user in his/her task, the user's perceived usefulness of IT would increase, which in turn increases the intention to use IT. Dishaw and Strong (1999) conducted an investigation on the program analysts in three enterprises for their software maintenance task; and also found that the services that can be provided by the software and the task being undertaken by the user have significant positive correlation with perceived usefulness. Seddon (1997) and Rai, Lang, and Welker (2002) pointed out that when the information or help provided by a system to users is able to increase the users' task performance, the users' perceived usefulness of the system will be significantly positively influenced. Yen et al. (2010) also pointed out that there are increasing daily tasks conducted through mobile devices and wireless technology, and the usefulness coming along with the technology characteristics of IT can be perceived by the users. However, when the IT fails to provide services to the user or fails to support the user's task, the user will doubt and lose trust in the extent to which the task performance can be upgraded with the help of IT (Jarupathirun & Zahedi, 2007; Larsen, Sørebø, & Sørebø, 2009; Lee, Cheng, & Cheng, 2007).

Further, many other studies on perceived usefulness also mentioned that the services provided by IT and the daily tasks undertaken by users will also directly influence the task performance brought by IT and the users' perceived usefulness of IT, which in turn influences the individuals' usage intention and behavior (Goodhue, 1998; Pagani, 2006), especially when the characteristic of work/task is unstructured. Unstructured tasks are ill-defined, ambiguous, non-routine task which lack for completely specified goals for the problem, lead to a greater number of undefined alternatives, and do not have established procedures for the worker to follow (Harris & Brightman, 1985; Abdolmohammadi & Wright, 1987; Jonassen, 1997). When an individual encounters this kind of works/tasks, he or she may normally be asked to handle and execute the tasks through teamwork (Langan-Fox, Wirth, Code, Langfield-Smith, & Wirth, 2001). Moreover, some unexpected conditions, such as unscheduled meetings, casual requests from boss or client and the like, tend to occur during work and necessitate the individual worker to access important data at any time and any place in response to such unexpected conditions (Nievelstein, Van Gog, Van Dijck, & Boshuizen, 2013). Via Internet, CSS can provide users many powerful functions that are quite different from the conventional ways of using data, such as online editing, data synchronization and sharing, automatic file backup, and so on (Spillner, Müller, & Schill, 2013). With the support from these powerful functions, the individual worker would perceive that CSS is able to effectively support and upgrade his or her performance in handling the unstructured work/task, and accordingly has the continuance intention to use CSS. Based on the above discussion and viewpoints, we put forward the first H1 hypothesis and the second hypothesis H2.

H1. The cloud storage service support has significant positive influence on users' perceived usefulness of cloud storage service.

H2. The unstructured task has significant positive influence on users' perceived usefulness of cloud storage service.

The concept of self-efficacy defined in Bandura's social cognitive theory (SCT) has important influence on human behavior (Bandura, 1977). Self-efficacy is the extent or strength of one's belief in one's own ability to complete a task (Bandura, 1982). Meanwhile, computer self-efficacy has been identified as a key determinant of computer-related ability and use of computers (Hasan, 2003).

[3] Twinstrata, http://www.twinstrata.com/snapshot-cloud-storage-adoption/, 2014.
[4] Information Week, http://reports.informationweek.com/abstract/24/12015/Storage-Server/Research:-2014-State-of-Storage, 2014.