Computers & Education 62 (2013) 8–17

Contents lists available at SciVerse ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Are you ready for knowledge sharing? An empirical study of virtual communities

Shiu-Wan Hung*, Min-Jhih Cheng

Department of Business Administration, National Central University, 320 Taiwan

你准备好知识共享了吗？关于虚拟社区的一个实证研究

本研究旨在探讨知识分享意图和虚拟社区的成员这些个体的技术用户的感知之间的关系。我们将用户对新的技术产品和服务分类，既包括了用户准备接受新技术的心理状态同时也包括作为能够影响技术接受的能力。我们采用正在应用的虚拟社区作为这篇实证研究的样本。为了探讨用户的技术感知，技术接受模型、技术准备指数，和兼容性的因素都将被整合起来。

ARTICLE INFO

Article history:
Received 15 October 2011
Received in revised form
8 September 2012
Accepted 8 September 2012

Keywords:
Computer-mediated communication
Distributed learning environments
Human–computer interface
Learning communities
Interactive learning environments

ABSTRACT

This study aimed to explore the relationship between knowledge sharing intentions and the perceptions of individual technology users who are members of virtual communities. We characterized learners' perceptions of new technological products or services by including both an individual's psychological state of readiness to accept technology and also compatibility as factors affecting technology acceptance. By adopting virtual communities as samples for this empirical study, the Technology Acceptance Model, Technology Readiness Index, and the factor of compatibility were integrated in order to explore users' perceptions of technology. We analyzed the responses of 218 participants from these virtual communities using structural equation modeling. The empirical results showed that an individual's positive attitude, such as optimism, toward the Technology Readiness Index positively affects acceptance of technology; an individual's negative perception of the Technology Readiness Index, such as discomfort, has a negative effect on his or her sense of the perceived ease of technology and compatibility in regard to prior experience and technology. A sense of insecurity toward the new technology also showed a significant effect on the individual's perceptions of the usefulness of technology. The results of this research demonstrated that improving an individual's degree of adaptability to technology could increase knowledge-sharing intentions in virtual communities. Meanwhile, the degree of the individual's discomfort with technology did not hinder knowledge-sharing intentions.

我们使用结构方程模型分析了这些虚拟社区中218位参与者。实证结果显示了用户主体的积极情绪，如对于技术准备指数的乐观积极的影响了技术接受；用户主体的消极情绪，如不适感，将会对技术的认知感和在首次经历和技术的能力有消极影响。实证还显示对于新兴技术的安全感对于个体对技术的有用性感知有着重要的影响。这项研究的结果也显示增加用户对技术的适应程度能够增加在虚拟社区中的知识分享意图。同时，用户对技术的不适程度不能阻挡知识分享的意图。

1. Introduction

The presence of virtual communities around the world broadens and clusters individual online activities. The flow of information in the virtual world provides users with a platform for creating and receiving knowledge through discussions and interactive sharing. This sharing of information and experience is the critical factor for individual acceptance of knowledge. Knowledge sharing based on interpersonal relationships has previously been explored (Chen & Hung, 2010; Davenport & Prusak, 1998; Hsu, Chang, & Yen, 2011; Kankanhalli, Tan, & Wei, 2005; Ma & Yuen, 2011). As technology continues to intervene in public life, however, a user's subjective acceptance or rejection of the technology becomes the key factor in technology-based knowledge sharing.

干预，干涉

Various models have been proposed to explain why users are willing to share their knowledge of technology in virtual communities. Davis (1989) proposed the Technology Acceptance Model (TAM) to discuss the intentions to use new technologies. The two dimensions of TAM, i.e. perceived usefulness and the perceived ease of use, are the most important individual factors affecting the degree of technology acceptance. Perceived usefulness indicates the user's subjective perception of new technology as an aid to improve job performance and future career prospects. Perceived ease of use refers to the user's perception of how easy it is to use the new technology. Perceived ease of use can strengthen the perceived usefulness of a technology; both influence an individual's acceptance of technology and his or her behaviors in reality. Scholars have applied or extended the TAM framework to include users' acceptance levels of information technology, which belongs to systematic and organizational aspects (Bock, Zmud, & Kim, 2005; Gwebu & Wang, 2010; Im, Kim, & Han, 2008; Karahanna, Straub, & Chervany, 1999; Liu, Li, & Carlsson, 2010; Sowe, Stamelos, & Angelis, 2008; Taylor & Todd, 1995; Venkatesh, Morris, Davis, & Davis, 2003).

* Corresponding author. Department of Business Administration, National Central University, 300, Jung-Da Road, Jung-Li City, Tao-Yuan 320, Taiwan. Tel.: +886 3 422 7151x66145; fax: +886 3 422 2891.
E-mail address: shiuwan@mgt.ncu.edu.tw (S.-W. Hung).

0360-1315/$ – see front matter © 2012 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.compedu.2012.09.017

Parasuraman (2000) proposed the Technology Readiness Index (TRI) to measure a person's propensity to embrace and use new technology to accomplish goals at home and at work. TRI comprises individual positive attributes such as optimism and innovativeness, and negative attributes such as discomfort and insecurity. Recent literature on the TRI has primarily tested and explained the technology adaptation behaviors of users (Caison, Bulman, Pai, & Neville, 2008; Lin, Shih, & Sher, 2007; Taylor, Pearson, Peterson, & Rodriguez, 2005; Tsikriktsis, 2004; Walczuch, Lemmink, & Streukens, 2007). Rogers (2003) stated that individual traits and experiences would influence the speed of a user's acceptance of new technology and subsequently affect the distribution of information or knowledge.

Previous research indicated that innovations or new technologies are more easily accepted and adopted when they are consistent with the present values, past experiences, and requirements of potential users. This means that a user's experience also influences his or her intentions to use new technology (Venkatesh & Davis, 2000; Venkatesh et al., 2003). Rogers (2003) suggested the concept of compatibility based on the Innovation Diffusion Theory; this refers to the level to which an individual perceives innovative ideas as being consistent with his or her values, past experiences, and potential requirements for use. The first step toward the acceptance of innovative technology or knowledge is making the public understand and adopt its innate values through continuous communication. Only through the enhancement of public attitudes toward the adoption of technology can innovative technology or knowledge become popularized, either commercially or theoretically. This further facilitates the intention to share; when the individual's perception of compatibility increases, so does his or her intention to adopt technology.

We believe that knowledge sharing in virtual communities is a complex issue that is influenced by a number of variables, and we proposed an integrated model that incorporates TAM, TRI, and compatibility. We explored the effect of an individual's level of technology perception on his/her future intention to share knowledge; it also emphasizes the impact of the individual's psychological level of readiness to use a technology. Technology acceptance behaviors are affected by users' intentions to use, which in turn is affected mainly by users' attitudes and perceptions of its usefulness (Davis, Bagozzi, & Warshaw, 1989). Individual differences are also significant determinants of consumer acceptance of new technology products and services (Agarwal & Prasad, 1999; Garbarino & Strahilevitz, 2004; Venkatesh & Davis, 2000; Venkatesh et al., 2003). On the other hand, new concepts are more easily adopted if they are consistent with the existing values, past experiences, and requirements of potential users (Rogers, 2003). Therefore, this research has attempted to create an integrated model that explores the effectiveness of knowledge sharing from personal perspectives.

2. Literature review

2.1. Knowledge sharing

Knowledge sharing is a process, an activity, or a behavior. Ryu, Ho, and Han (2003) proposed that knowledge sharing is a conveyance behavior, through which people acquire knowledge from others. Lee (2001) suggested that knowledge sharing is an activity in which individuals, groups, or organizations transmit or diffuse knowledge to others. Holthouse (1998) indicated that knowledge, as a flow concept, could be used for communication between knowledge possessors and receivers. In addition, Bock et al. (2005) suggested that knowledge sharing is the behavior of providing and conveying knowledge, while Wijnhoven (1998) noted that knowledge sharing through information media can result in knowledge transfer and that the receivers can integrate new knowledge into their existing knowledge.

With regards to learning, Senge (1997) suggested that the purpose of knowledge sharing is to improve an individual's or an organization's action capability, meaning that one becomes genuinely ready to help others, rather than only giving things to others or obtaining things from them. Therefore, it is believed that one needs to be in a similar learning context when sharing knowledge with others (Hendriks, 1999). The emergence of the Internet popularized interaction and information sharing between users by the way of virtual space. Users from all walks of life join virtual communities in order to share their knowledge related to common interests and topics. Virtual communities serve as storehouses of knowledge, in which people can absorb or share information. In addition, with the help of technology, knowledge can spread rapidly. This study adopted an integrated model that incorporates TAM, TRI, and compatibility to examine the effect of an individual's level of technology perception on his/her future intentions to share knowledge. This was accomplished by incorporating users' perceptions of technology, including perceived usefulness, perceived ease of use, and compatibility.

2.2. Technology acceptance model

Davis et al. (1989) proposed the TAM based on the Theory of Reasoned Action (Fishbein & Ajzen, 1975) to explain and predict the determinants of information technology users' acceptance or rejection of technology. They stated that technology acceptance behaviors are affected by users' intentions to use, which in turn is affected mainly by users' attitudes and perceptions of its usefulness. Many information-related application systems often conduct or extend empirical studies based on TAM with the purpose of testing TAM, including the examination of e-mails, v-mails, Word, Excel, Explorer, and personal digital assistants. All previous research results support the existence of a relationship between perceived ease of use and perceived usefulness, as well as intentions and behaviors related to TAM (Chau, 1996; Gefen & Straub, 1997; Hendrickson & Collins, 1996; Igbaria, Guimaraes, & Gordon, 1995; Morris & Dillon, 1997; Straub, Limayem, & Karahanna, 1995; Szajna, 1996; Taylor & Todd, 1995; Thompson, 1998; Yi, Jackson, Park, & Probst, 2006).

Although TAM has a perfect predictive ability and explanatory power, it ignores the impact of individual characteristics and the external environment. Moon and Kim (2001) incorporated perceptions of playfulness into their study of WWW network acceptance behaviors, while Teo, Lim, and Lai (2003) incorporated perceptions of enjoyment into their research. Both studies showed that the new model's explanatory power was greater than the power of the original TAM; they proved that a version of TAM that includes other environmental factors can better predict an individual's intentions to use information technology. This study thus explored the effect of an individual's level of technology perception on his/her future intentions to share knowledge.

2.3. Technology readiness index

Individual differences are always significant determinants of consumer acceptance of new information technology products and services (Agarwal & Prasad, 1999; Garbarino & Strahilevitz, 2004; Venkatesh & Davis, 2000; Venkatesh et al., 2003). The results of the empirical research conducted by Citrin, Sprott, Silverman, and Stem (2000) indicated that individual, domain-specific innovativeness has a moderating effect on the relationship between network use and online shopping. However, consumers are often frustrated by the use of information technology. Therefore, Parasuraman and Colby (1998) suggested the concept of TRI to extensively evaluate individual attitudes toward the acceptance and use of new technology. The TRI refers to the influence of personality traits when individuals fulfill their aims at work and in life, by adapting to and using new technology. It includes the four categories of: optimism, innovativeness, discomfort, and insecurity. Optimism indicates that people believe technology is beneficial to their own beliefs and that it can bring advantages and a higher level of control to their lives. Innovativeness refers to the idea that people are inclined to become pioneers and influencers. When individual preferences are consistent with the latest technology, it helps to stimulate innovative ideas and test the new technology. Discomfort is defined as the lack of a sense of control over technology, which means that individuals are unable to handle the technology and feel controlled by it. Discomfort encompasses an inclination toward being assisted. Insecurity is defined as having concerns about the security and privacy of the technology, a lack of confidence in technology, and doubts about a new technology's appropriate use in the workplace.

Presently, research on TRI is still limited (Colby & Parasuraman, 2003; Parasuraman, 2000; Tsikriktsis, 2004). Kleijnen, de Ruyter, and Wetzels (2004) explored the acceptance of wireless banking and created the Mobile Readiness Index from TRI. Walczuch et al. (2007) adopted TRI to explore the influence of individual traits when using technology. Lin et al. (2007) integrated the dimensions of TAM and TRI to investigate the impact of e-service systems. The results of both studies confirmed the correlation between TRI and technology acceptance. This study thus examined users' intentions to share knowledge in virtual communities by using an integrated model that incorporates TAM, TRI, and compatibility.

2.4. Compatibility

Scholars suggest that achieving perfect compatibility is worthwhile in knowledge-sharing activities within the workplace, as it promotes the generation of new ideas by employees (Hislop, 2003; Lai & Chen, 2011; Lin, Hung, & Chen, 2009; Lin & Lee, 2006). Moore and Benbasat (1991) studied the determinants of users' adoption of information technology and discovered that higher levels of compatibility led to higher levels of willingness to adopt information technology. Sun, Bhattacherjee, and Ma (2010) found that compatibility facilitates the implementation of Enterprise Resource Planning Systems for employees. It takes some time for people in virtual communities to accept new things. The concept of compatibility refers to the fact that new ideas are more easily adopted if they are consistent with the existing values, past experiences, and requirements of potential users (Rogers, 2003).

Based upon statistics from studies relating to the diffusion of innovations, Teng, Grover, and Guttler (2002) discovered that compatibility is the most significant and predictive determinant of this phenomenon (Hardgrave, Davis, & Riemenschneider, 2003; Sia, Teo, Tan, & Wei, 2004; Tornatzky & Klein, 1982). Rogers (2003) suggested that the compatibility of the members within a social system is positively correlated with the rate at which innovation is accepted. As a virtual community can be considered a social aggregation composed of a group of members sharing the same interests and topics, the sharing and diffusion of information relating to technology in a virtual community facilitate the acceptance of this technology. Moreover, a series of innovations is easier to promote if there are analog correlations among the innovations. Therefore, this study assumed that compatibility through sharing among members is likely to be the critical factor in the promotion of technology within virtual communities.

3. Research design

3.1. Samples and definition of variables

The samples in this study were comprised of virtual community users. We defined a virtual community as a social space based on electronic media, where members with different interests or aims are provided with ways to co-explore diverse topics. Consequently, this study adopted virtual community users as the research subjects. Web-based questionnaires were created through the My3q website for data collection. The questionnaire items and operational definitions were created using previous studies as a point of reference and were modified based on the context of virtual communities. In addition, a non-random sampling method was adopted when collecting the questionnaires. All the measurement items in the study were adapted from prior research including: optimism, innovativeness, discomfort, and insecurity (Parasuraman, 2000); perceived usefulness (Chin & Todd, 1995; Davis, 1989); perceived ease of use (Adams, Nelson, & Todd, 1992; Davis, 1989); perceived compatibility (Rogers, 2003); and knowledge sharing behavior intentions (Bock & Kim, 2002; Lin & Lee, 2006). Structural equation modeling (SEM) was used for the analysis. Table 1 lists the definitions of the constructs and related literature. TRI and perceptions of knowledge were explored using a six-point Likert scale: the respondents scored one point by choosing "completely disagree" and six points by choosing "completely agree".

3.2. Hypotheses

Following the work of Moon and Kim (2001), this study developed the following framework and hypotheses based on TAM (Fig. 1).

Perceived usefulness indicates users' perceptions of the helpfulness of the new technology in improving work performance and future career growth. Perceived ease of use refers to users' perceptions of how easy it is to use the new technology. Many of the empirical studies of TAM, as proposed by Davis et al. (1989), have indicated that behavioral intentions can be directly influenced by perceived usefulness and perceived ease of use (Chismar & Wiley-Patton, 2003; Hong, Hwang, Hsu, Wong, & Chen, 2011; Lee & Kwon, 2011; Lin, 2011; Venkatesh et al., 2003; Wu & Chen, 2005). Compatibility refers to the degree of consistency between an individual's perception of an innovative idea and his/

Table 1
Measurement items of personal technology readiness and technology acceptance model-related constructs.

Construct	Measures	References
Optimism	Convenient, not limited to hours, more control over their daily lives, to fit your own need.	Parasuraman (2000)
Innovativeness	Advice on new technologies, figure out new tech without help, have fewer problems than other people.	
Discomfort	Not designed by ordinary people, prefer feature, embarrassing when you have trouble, fail at the worst possible time.	
Insecurity	Safety, transfer information will be seen by other people, transaction confirmed	
Perceived usefulness	Quickness, increase productivity, effectiveness, useful, better decision	Davis (1989); Chin and Todd (1995)
Perceived ease of use	Ease of learn, ease of find, ease of use, understandable, mental effort	Davis (1989); Adams et al. (1992)
Perceived compatibility	Compatible with VC situation, policies, fit their style	Rogers (2003)
Knowledge-sharing intentions	Likely, acceptable, needed	Bock and Kim (2002); Lin and Lee (2006)

her existing values, past experiences, and potential requirements for use. If community users believe that knowledge sharing is highly compatible with the community's strategies, then they will be inclined to develop their knowledge sharing. These arguments lead to:

H1a. The level of community users' perceptions of the usefulness of technology has a positive effect on their intentions to engage in knowledge-sharing.

社区成员对技术的有用性感知水平对他们进行知识分享有着积极的影响。

H1b. The level of community users' ease in using technology has a positive effect on their intentions to engage in knowledge-sharing.

社区成员在使用技术的舒适度对他们知识分享有着积极的影响。

H1c. The level of compatibility of the community users with technology has a positive effect on their intentions to engage in knowledge-sharing.

社区成员对技术的兼容性对他们进行知识分享有着积极的影响。

Based on their studies of the intention to use online learning, Liu et al. (2010) and Sánchez and Hueros (2010) demonstrated that ease of use can also enhance the intention to use online learning through the perception of usefulness. The argument was further supported in terms of its explanatory ability and level of explicitness (Hong et al., 2011; Koufaris, 2002; Liu et al., 2010; Moon & Kim, 2001; Teo & Noyes, 2011). This leads to:

明确性

H2. The level of community users' ease of use of technology will have a positive effect on the level of technology usefulness.

社区成员在使用技术的舒适度对技术的有用性水平有着积极的影响。

Generally speaking, optimists hold positive beliefs regarding life (Scheier & Carver, 1992). As optimists seldom pay attention to negative effects, they are more inclined to adopt rather than avoid technology or to suffer from technology anxiety. As a result, optimists are more willing to utilize new technologies and knowledge (Scheier & Carver, 1987). People's perception of technology can influence their attitudes and willingness to adopt the new technology. For example, with a positive perception of technology, users will believe that technology can increase the efficiency of their daily lives (Parasuraman, 2000). By assessing the TRI of the adoption of self-service technology, Liljander, Gillberg, Gummerus, and Riel (2006) discovered that users with an optimistic inclination have the highest level of self-service technology acceptance. These arguments lead to the following hypothesis:

H3a. Community users with higher levels of optimism have increased perceptions of usefulness. 社区成员的高度乐观增加了有用性感知。

H3b. Community users with higher levels of optimism have increased perceptions of ease of use.社区成员的高度乐观增加了使用舒适度的感知。

H3c. Community users with higher levels of optimism have increased perceptions of compatibility.社区成员的高度乐观增加了兼容性的感知。

Karahanna et al. (1999) suggested that people with innovative traits, such as early adopters, seldom consider new technologies as complex or beyond their understanding. This type of individual may regret missing the opportunity to explore new things if he/she fails to try a new technology. These people hold a relatively positive attitude toward anything new and may share their views with the public in accordance with their previous experiences (DeSanctis & Monge, 1999; Fuller, Faullant, & Matzler, 2010; Glynn, Kazanjian, & Drazin, 2010; Walczuch et al., 2007). Innovation diffusion theory (IDT), proposed by Rogers (2003), indicates that innovative traits play a significant role in the process of innovation diffusion. IDT is commonly used in the study of e-commerce. Citrin et al. (2000) indicated that users within a specialized field with a higher level of innovative traits are apt to increase the level of network utilization. These arguments lead to:

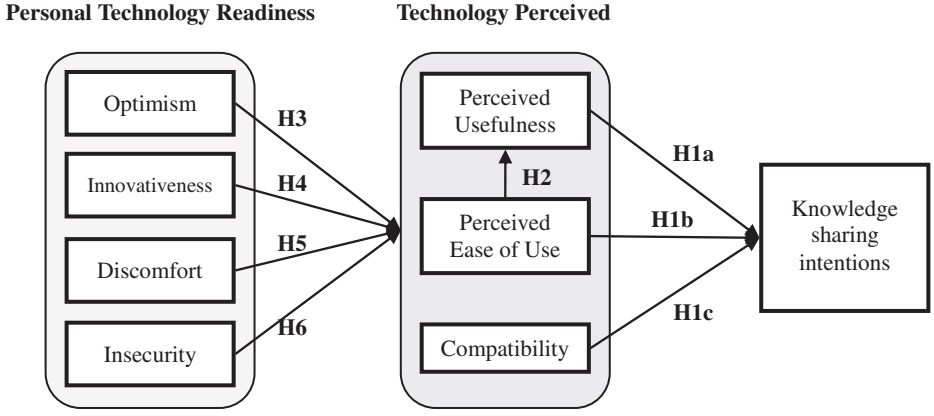

Fig. 1. Research model.

社区成员拥有越高的创新程度，他们对技术的的有用性感知越关注。

H4a. Community users with higher levels of innovation have stronger perceptions concerning the usefulness of technology.

H4b. Community users with higher levels of innovation have stronger perceptions concerning the ease of use of technology.

H4c. Community users with higher levels of innovation have stronger perceptions concerning the compatibility of technology.

By studying interpersonal behaviors, values, and attitudes, Triandis (1980) found that external obstacles might prevent individuals from taking action. For example, a person who is extremely unable to adapt to technology may suffer from anxiety because he/she regards the technology as uncontrollable or may feel controlled by it. Conversely, individuals who are more adaptable to technology can reduce discomfort by asking for help from others or by enhancing the ease of use (Dabholkar, 1996; Norman, 1998; Walczuch et al., 2007). Richard and Carla (2001) believed that advanced information technology enables knowledge sharing, but it is by no means the major determinant of the success of knowledge sharing, because unfamiliarity with technology may lead users to reject it. These arguments lead to the following hypotheses:

H5a. Community users with higher levels of discomfort have lower perceptions of the usefulness of technology.

社区成员的不适度越高，他们对技术的有用性感知越低。

H5b. Community users with higher levels of discomfort have lower perceptions of the ease of use of technology.

H5c. Community users with higher levels of discomfort have lower perceptions of the compatibility of technology.

Kwon and Chidambaram (2000) linked insecurity to the fact that the innate fear of technology may result in the mistrust of technology and the avoidance of computers. When individuals are in doubt about new technology, they are unwilling to conduct knowledge sharing in their networks. In extending the research on the TRI, Tsikriktsis (2004) suggested that users with different levels on the TRI have different uses and future use intentions in regard to information technologies. Chen, Gillenson, and Sherell (2002) adopted TAM in order to explore consumer behavior in virtual stores; they discovered that although the level of perceived usefulness has a positive effect on the intention to use virtual stores, people's intentions to buy in virtual stores may be reduced by their concerns regarding network security. Therefore, if individuals feel insecure about a virtual store, they tend to reject online shopping in these stores. These arguments lead to:

H6a. Community users with higher levels of insecurity have lower perceptions of the usefulness of technology.

社区成员的不安全感越高，他们对技术的有用性感知越低。

H6b. Community users with higher levels of insecurity have lower perceptions of the ease of use of technology.

H6c. Community users with higher levels of insecurity have lower perceptions of the compatibility of technology.

3.3. Methodology

因果关系

This study adopted structural equation modeling (SEM) to test the causal relationships between the variables in the measurement model and those of the structural model. Originating from the related concept devised in 1970s, SEM, one of the multivariate statistical methods, integrates two statistical methods (factor analysis and path analysis) in order to simultaneously test the relationships among manifest variables, latent variables, and moderators, as well as error variables. The basic equation is as follows (Jöreskog & Sörbom, 1982):

多元的 抽样 整合 要素分析 路径分析 同时 显性变量 潜变量

$$y = By + \Gamma x + \zeta \quad (1)$$

向量 内衍变量 依靠 回归分析 外生变量

where y is the vector of the endogenous variable as well as the dependent variable of the regression analysis; x is the vector of the exogenous variable, which explains or predicts the dependent variable; ζ is the vector of disturbance and is the part of the endogenous variables that can not be explained by the vector of the endogenous variables; and B and Γ are the coefficient matrix of the equation. Commercially available software AMOS 16.0 was employed for the analysis.

干扰 系数矩阵

4. Empirical analysis

4.1. Descriptive statistics 描述性统计

人口学的 侧面

Through the network questionnaire testing process, this study collected 218 valid samples. The number of demographic variables and the profile of the respondents are listed in detail in Table 2. According to the results of the survey, most people were willing, though not enthusiastic, about sharing their own knowledge. Furthermore, most of these people participated in web-based virtual communities. This demonstrates that people who frequently participate in communities also tend to search for web-based information.

Table 2
Sample characteristics (the number of subjects = 218).

Measure	Item	Frequency	Percentage (%)
Gender	Male	109	50.0
	Female	109	50.0
Age	Below 15	2	0.9
	16–25	157	72.0
	26–35	54	24.8
	Over 36	5	2.3
Occupation	Student	142	65.1
	Manufacturing	22	10.1
	Information & electronics	11	5.1
	Etc.	43	19.7
Frequency of knowledge sharing in VC	One time on 3 days	13	6.0
	One time in a week	10	4.6
	Irregular	174	79.8
	Never	21	9.6

4.2. Reliability and validity analysis 信效度分析

Following Bagozzi and Yi (1988), the reliability analysis of the individual items was conducted first, by judging whether or not the factor loading was over 0.5 (the acceptance level), and then measuring the squared multiple correlation of each variable. The factor loading of each observed variable and its SMC are listed in Table 3. Variables and their SMCs less than 0.5 were excluded, resulting in all individual items possessing good reliability (Table 4). 排除

The factor analysis of the model fit indicated that the p-value of x was below 0.05, and the Normed Fit Index (NFI = 0.883) was not higher than 0.9 (acceptance level). Moreover, all of the other indexes, such as the Goodness of Fit Index (GFI = 0.884), the Comparative Fit Index (CFI = 0.958), the Root Mean Square Error of Approximation (RMSEA = 0.047) and the Chi-square/degrees of freedom ratio (x^2/df = 1.477) reached the suggested acceptance level (Bagozzi & Yi, 1988; Hair, Anderson, Tatham, & Black, 1992; Hayduk, 1987; Scott, 1994). This suggests that the measurement model achieved the standards for acceptance.

Fornell and Larcker (1981) suggested that when measuring the composition of the latent construct and the composite reliability (CR), as well as the average variance extracted (AVE), a CR above 0.6 represents a good level of reliability. An AVE above 0.5 indicates high reliability and convergent validity of the latent construct. Table 3 shows the explanatory ability of each dimension that achieved the suggested acceptance level. Moreover, based on the measurements of Cronbach's α coefficients, this study discovered that the overall Cronbach's α (0.901) and that of each variable individually were all above the standard level (0.7). This indicates that the consistency of the internal research achieved high reliability. The measurements given above indicate that the overall measurement indices in this research questionnaire achieved a good level of reliability. Furthermore, the measurement of each dimension item was in accordance with the standard for discriminant validity (see Table 5). Based upon these measurements, this research questionnaire demonstrated good reliability and validity.

4.3. Hypotheses testing analysis

The results of the tests of the overall model in Fig. 2 supported that perceptions of the usefulness (H1a: $R^2 = 0.38$, $p < 0.01$) and the ease of use (H1b: $R^2 = 0.13$, $p < 0.1$) of technology facilitated technology-based knowledge-sharing intentions. H2 ($R^2 = 0.54$, $p < 0.01$), which states that a higher level of ease of use will lead to a higher level of perceived usefulness, was also supported. Knowledge sharing may not be carried out if users do not have significant requirements for the technology, or if their requirements can not be integrated with their past experience. If the compatibility of the technology and users' knowledge-sharing behavioral intentions failed to achieve the level of significance (H1c: $R^2 = 0.07$, $p > 0.1$), this meant that the users were willing to share the related information as a point of reference with other community members through virtual communities, if they could finish the task promptly with easily controllable technology. However, sharing intentions decrease greatly if the technology bears no relation to the individual's life or requirements. Compared with previous research on technology adoption intentions based on individual perceptions (Ahn, Brusilovsky, He, & Syn, 2007; Davis et al., 1989; Keat & Mohan, 2004; Petrocelli, Clarkson, Tormala, & Hendrix, 2010; Yi et al., 2006; Yun & Park, 2010), more users in this study formed their own perceptions toward technology through sharing third-party experiences or recommendations via the Internet. Virtual communities, which are full of rich content, enable their members to obtain varied pieces of information and numerous opinions. If members could exchange consumer information (such as the quality and price of products), this would help them decrease searching costs, increase the

Table 3
Test results of internal reliability and convergent validity.

Construct	Items	Internal reliability		Convergent validity		
		Cronbach α	Item-total correlation	Factor loading	Composite reliability	Variance extracted
Optimism	4	0.869	0.684	0.594	0.822	0.544
			0.745	0.655		
			0.748	0.701		
			0.707	0.949		
Innovativeness	3	0.839	0.645	0.842	0.796	0.569
			0.760	0.755		
			0.705	0.653		
Discomfort	2	0.703	0.507	0.601	0.714	0.563
			0.507	0.875		
Insecurity	3	0.770	0.608	0.760	0.776	0.539
			0.661	0.795		
			0.550	0.637		
Perceived usefulness	5	0.896	0.771	0.821	0.896	0.634
			0.770	0.856		
			0.750	0.752		
			0.740	0.753		
			0.691	0.794		
Perceived ease of use	5	0.870	0.691	0.716	0.896	0.635
			0.733	0.764		
			0.681	0.751		
			0.732	0.817		
			0.641	0.921		
Perceived compatibility	2	0.798	0.667	0.921	0.817	0.696
			0.667	0.737		
Knowledge-sharing intentions	3	0.821	0.701	0.816	0.785	0.554
			0.771	0.796		
			0.568	0.601		

Table 4
Fit indices of the structural model.

Fit index	CFA model	Research model	Recommended cut-off values
Absolute fit measures			
Minimum fit function chi-square (x^2)	410.70	14.641	The lower, the better
x^2/d.f.	1.48	1.22	<5
Goodness-of-fit index (GFI)	0.88	0.98	>0.80
Root mean square error of approximation (RMSEA)	0.05	0.03	<0.05
Incremental fit measures			
Adjusted goodness-of-fit index (AGFI)	0.84	0.95	>0.80
Tucker–Lewis index (TLI) or (NNFI)	0.95	0.99	>0.90
Normed fit index (NFI)	0.88	0.97	>0.90
Comparative fit index (CFI)	0.96	0.99	>0.90

傾向

purchasing inclination of customers, and improve the value-added features of products and services. As well, the marketing ability of enterprises in targeting customers would be strengthened (Chen, 2011; Hagel & Armstrong, 1997; Lee, Ahn, & Han, 2007).

Results regarding the positive inclination on the TRI supported the hypothesis that community users with an optimistic inclination possess positive perceptions of the usefulness (H3a: $R^2 = 0.17$, $p < 0.01$), ease of use (H3b: $R^2 = 0.40$, $p < 0.01$), and compatibility (H3c: $R^2 = 0.25$, $p < 0.01$) of the technology. This suggests that users with an optimistic inclination believed that the technology would bring more benefits and convenience to their lives. Regarding an inclination toward innovation, this was proven to be significantly positively associated with the ease of use (H4b: $R^2 = 0.22$, $p < 0.01$) and compatibility (H4c: $R^2 = 0.24$, $p < 0.01$) of the technology, meaning that those who enjoyed trying new technologies for the first time could build up professional knowledge through frequent use of the technology. They could form perceptions of the new technology more quickly, meaning that their perceptions of the ease of use and compatibility of the technology were comparatively higher. It was also easier for them to make personal judgments of the information found in the virtual communities based upon their own professional knowledge. Moreover, their judgment criteria were stricter. Therefore, innovativeness and perceived usefulness were negatively correlated (H4a: $R^2 = -0.05$, $p > 0.1$). The test results was insignificant, meaning that H4a was not supported (community users with higher levels of innovation have stronger perceptions concerning the usefulness of technology).

In examining the negative inclination on the TRI, this study determined that the negative correlation between discomfort and perceived usefulness (H5a: $R^2 = -0.03$, $p > 0.1$) is insignificant. The fact that discomfort was positively and significantly correlated to perceived ease of use (H5b: $R^2 = 0.11$, $p < 0.05$) and compatibility (H5c: $R^2 = 0.19$, $p < 0.01$) contradicted the expected symbol (positive or negative), meaning that H5 was not supported. This may have been because users unable to adapt to the technology were computer novices and only used the technological equipment outside their workplaces. In this sense, they had to learn how to use the technology through some method in order to finally overcome their discomfort and adopt the equipment. This insecurity was significantly and positively correlated with the perceived usefulness of technology, but contradicted the expected symbol (H6a: $R^2 = 0.12$, $p < 0.05$). Perceived ease of use and compatibility had no significant correlation, meaning that H6 was not supported. This was because the users attached special importance to the security of technology with the premise of protecting personal information. In addition, the new technology ensured security at the cost of operational convenience, meaning that users had to adapt to the secure technology, thereby decreasing the compatibility of this same technology.

The research results outlined above indicate that TRI inclinations (positive or negative) had different levels of positive and significant effects on users' knowledge-sharing behavioral intentions. Users with differential TRI scores shared their views and comments in different ways, due to a variety of personal considerations. Out of all the community users, optimists possessed the strongest explanatory ability with regard to knowledge-sharing behavior. This indicated that the more optimistic users in virtual communities found it more helpful to share and promote knowledge exchange and to attract more people with knowledge requirements to the community. Innovative community users shared more of their professional knowledge and experience, thereby helping to promote the expertise of the community and establish word of mouth results. Furthermore, enterprises could discover users' attitudes toward products and make improvements based upon suggestions shared in word of mouth virtual communities. Those community users who find it hard to adapt or who feel insecure about technology could adopt the practice of discussing knowledge with other community members to gradually lessen their avoidance of technology and increase their willingness to share.

廃止

5. Conclusion and suggestions for future studies

This study has explored the relationship between knowledge sharing intentions and the perceptions of individual members of virtual communities who are also technology users. We characterized learners' perceptions of new technological products or services by including

Table 5
Comparison of squared correlation and variance extracted.

	1	2	3	4	5	6	7	8
1. Optimism	(0.544)							
2. Innovativeness	0.351	(0.569)						
3. Discomfort	0.256	0.301	(0.563)					
4. Insecurity	0.297	0.345	0.316	(0.539)				
5. Perceived usefulness	0.328	0.289	0.217	0.260	(0.634)			
6. Perceived ease of use	0.322	0.296	0.254	0.261	0.338	(0.635)		
7. Compatibility	0.284	0.345	0.377	0.334	0.250	0.274	(0.696)	
8. Knowledge-sharing intentions	0.321	0.370	0.304	0.344	0.293	0.286	0.340	(0.554)

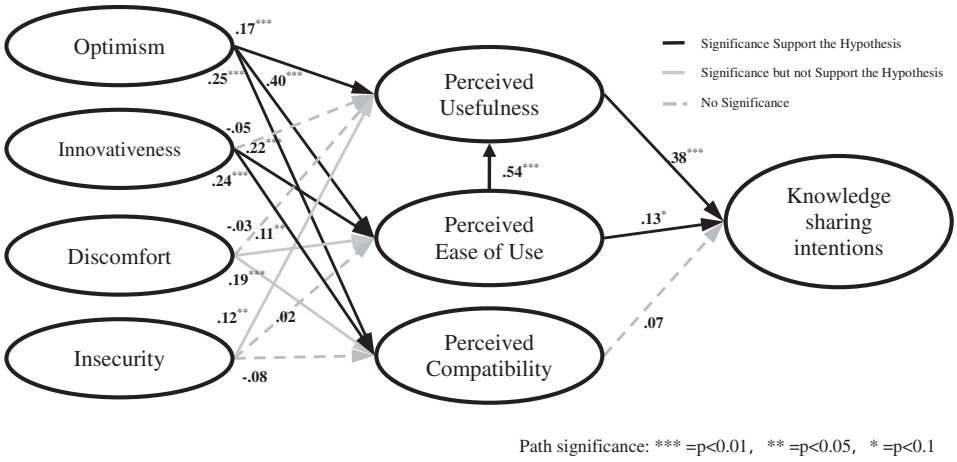

Fig. 2. Results of the research model.

both an individual's psychological state of readiness to accept technology and compatibility as factors affecting technology acceptance. The empirical results showed that an individual's positive attitude, such as optimism, toward TRI positively affects acceptance of technology; an individual's negative perception of TRI, such as discomfort, has a positive effect on his or her sense of the perceived ease of technology and compatibility in regard to prior experience and technology. A sense of insecurity also showed a significant effect on the individual's perceptions of the usefulness of technology. The results of this research demonstrated that improving an individual's degree of adaptability to technology could increase knowledge-sharing intentions in virtual communities. Meanwhile, the degree of the individual's discomfort with technology did not hinder knowledge-sharing intentions.

This study was based on network questionnaires publicized in only a few virtual communities. Although the network questionnaire was free from temporal and spatial limitations, problems associated with random sampling may have been present and the external validity of this research may therefore have been reduced. Therefore, it is suggested that researchers find a typical community population and conduct a sampling inspection and long-term observation. In addition, this study only explored knowledge-sharing behavioral intentions within virtual communities, and not knowledge-sharing behavior. This study noted that knowledge-sharing behavior, as an output of a learning process, is a long-term process which starts when learning begins and ends with its practical application. There are numerous moderating factors, however, in this process which this study could not clarify due to time limitations. These will be addressed in future research.

Acknowledgment

The National Science Council of Taiwan, R.O.C. under the grant NSC 99-2410-H-008-046-MY3, has supported this work financially.

References

Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information. *MIS Quarterly, 16*(2), 227–247.
Agarwal, R., & Prasad, J. (1999). Are individual differences germane to the acceptance of new information technologies? *Decision Sciences, 30*(2), 361–391.
Ahn, J. S., Brusilovsky, P., He, D., & Syn, S. Y. (2007). Open user profiles for adaptive news systems: help or harm? 8–12 May 2007, Alberta, Canada *Proceedings of the 16th international conference on World Wide Web (WWW'07)* (pp. 11–20).
Bagozzi, R. P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science, 16*(1), 74–94.
Bock, G. W., & Kim, Y. G. (2002). Breaking the myths of reward: an exploratory study of attitudes about knowledge sharing. *Information Resource Management Journal, 15*(2), 14–21.
Bock, G. W., Zmud, R. W., & Kim, Y. G. (2005). Behavioral intention formation in knowledge sharing: examining the roles of extrinsic motivators, social-psychology forces, and organizational climate. *MIS Quarterly, 29*(1), 87–111.
Caison, A. L., Bulman, D., Pai, S., & Neville, D. (2008). Exploring the technology readiness of nursing and medical students at a Canadian University. *Journal of Interprofessional Care, 22*(3), 283–294.
Chau, P. Y. K. (1996). An empirical assessment of a modified technology acceptance model. *Journal of Management Information Systems, 13*, 185–204.
Chen, Y. J. (2011). Ontology–based empirical knowledge verification for professional virtual community. *Behaviour & Information Technology, 30*(5), 555–586.
Chen, L., Gillenson, M. L., & Sherell, D. L. (2002). Enticing online consumers: an extended technology acceptance perspective. *Information & Management, 39*(8), 705–719.
Chen, C. J., & Hung, S. W. (2010). To give or to receive? Factors influencing members' knowledge sharing and community promotion in professional virtual communities. *Information & Management, 47*(4), 226–236.
Chin, W. W., & Todd, P. A. (1995). On the use, usefulness, and ease of use of structural equation modeling in MIS research: a note of caution. *MIS Quarterly, 19*(2), 237–246.
Chismar, W. G., & Wiley-Patton, S. (2003). Does the extended technology acceptance model apply to physicians? 6–9 January 2003, Big Island, Hawaii *Proceedings of the 36th annual Hawaii International Conference on System Sciences (HICSS'03)* (pp. 160–167).
Citrin, A. V., Sprott, D. E., Silverman, S. N., & Stem, D. E. (2000). Adoption of internet shopping: the role of consumer innovativeness. *Industrial Management & Data Systems, 100*(7), 294–300.
Colby, B. L., & Parasuraman, A. (2003). Technology still matters. *Marketing Management, 12*(4), 28–33.
Dabholkar, P. A. (1996). Consumer evaluations of new technology–based self–service options: an investigation of alternative models of service quality. *International Journal of Research in Marketing, 13*(1), 29–51.
Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know.* Boston, MA: Harvard Business School Press.
Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.
Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science, 35*(8), 982–1003.
DeSanctis, G., & Monge, P. (1999). Introduction to the special issue: communication processes for virtual organizations. *Organization Science, 10*(6), 693–703.
Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison–Wesley.
Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation model with unobservable and measurement error. *Journal of Marketing Research, 18*(3), 39–50.

Fuller, J., Faullant, R., & Matzler, K. (2010). Triggers for virtual customer integration in the development of medical equipment – from a manufacturer and a user's perspective. *Industrial Marketing Management, 39*(8), 1376–1383.
Garbarino, E., & Strahilevitz, M. (2004). Gender differences in the perceived risk of buying online and the effects of receiving a site recommendation from a friend. *Journal of Business Research, 57*(7), 768–776.
Gefen, D., & Straub, D. W. (1997). Gender differences in the perception and use of e-mail: an extension to the technology acceptance model. *MIS Quarterly, 21*(4), 389–400.
Glynn, M. A., Kazanjian, R., & Drazin, R. (2010). Fostering innovation in complex product development settings: the role of team member identity and interteam interdependence. *Journal of Product Innovation Management, 27*(7), 1082–1095.
Gwebu, K. L., & Wang, J. (2010). Seeing eye to eye? An exploratory study of free open source software users' perceptions. *Journal of Systems and Software, 83*(11), 2287–2296.
Hagel, J., III, & Armstrong, A. G. (1997). *Net gain: Expanding markets through virtual communities*. Boston, MA: Harvard Business School Press.
Hair, J. F., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1992). *Multivariate data analysis with reading* (3rd ed.). New York: Macmillan Publishing Company.
Hardgrave, B. C., Davis, F. D., & Riemenschneider, C. K. (2003). Investigating determinants of software developers' intentions to follow methodologies. *Journal of Management Information Systems, 20*(1), 123–151.
Hayduk, L. A. (1987). *Structural equation modeling with LISREL*. Baltimore, MD: John Hopkins University Press.
Hendrickson, A. R., & Collins, M. R. (1996). An assessment of structure and causation of IS usage. *Data Base for Advances in Information Systems, 27*(2), 61–67.
Hendriks, P. (1999). Why share knowledge? The influence of ICT on motivation for knowledge sharing. *Knowledge and Process Management, 6*(2), 91–100.
Hislop, D. (2003). Linking human resource management and knowledge management via commitment. *Employee Relations, 25*(2), 182–202.
Holthouse, D. (1998). Knowledge research issues. *California Management Review, 43*(3), 277–280.
Hong, J. C., Hwang, M. Y., Hsu, H. F., Wong, W. T., & Chen, M. Y. (2011). Applying the technology acceptance model in a study of the factors affecting usage of the Taiwan digital archives system. *Computers & Education, 57*(3), 2086–2094.
Hsu, M. H., Chang, C. M., & Yen, C. H. (2011). Exploring the antecedents of trust in virtual communities. *Behaviour & Information Technology, 30*(5), 587–601.
Igbaria, M., Guimaraes, T., & Gordon, G. B. (1995). Testing the determinants of microcomputer usage via a structural equation model. *Journal of Management Information Systems, 11*(4), 87–114.
Im, I., Kim, Y. B., & Han, H. J. (2008). The effects of perceived risk and technology type on users' acceptance of technologies. *Information & Management, 45*, 1–9.
Jöreskog, K. G., & Sörbom, D. (1982). Recent developments in structural equation modeling. *Journal of Marketing Research, 19*(4), 404–416.
Kankanhalli, A., Tan, C. Y. B., & Wei, K. K. (2005). Contributing knowledge to electronic knowledge repositories: an empirical investigation. *MIS Quarterly, 29*(1), 113–143.
Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly, 23*(2), 183–213.
Keat, T. K., & Mohan, A. (2004). Integration of TAM based electronic commerce models for trust. *The Journal of American Academy of Business, 5*(1), 404–410.
Kleijnen, M., de Ruyter, K., & Wetzels, M. (2004). Consumer adoption of wireless services: discovering the rules, while playing the game. *Journal of Interactive Marketing, 18*(2), 51–61.
Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. *Information Systems Research, 13*(2), 205–224.
Kwon, H. S., & Chidambaram, L. (2000). A test of the technology acceptance model: The case of cellular telephone adoption. In *Proceedings of the 33rd Hawaii International Conference (on System Sciences)*.
Lai, H. M., & Chen, C. P. (2011). Factors influencing secondary school teachers' adoption of teaching blogs. *Computers & Education, 56*(4), 948–960.
Lee, J. N. (2001). The impact of knowledge sharing, organizational capacity and partnership quality on IS outsourcing success. *Information & Management, 38*, 323–335.
Lee, H. Y., Ahn, H., & Han, I. (2007). VCR: virtual community recommender using the technology acceptance model and the user's needs type. *Expert Systems with Applications, 33*(4), 984–995.
Lee, Y., & Kwon, O. (2011). Intimacy, familiarity and continuance intention: an extended expectation–confirmation model in web–based services. *Electronic Commerce Research and Applications, 10*(3), 342–357.
Liljander, V., Gillberg, F., Gummerus, J., & Riel, A. V. (2006). Technology readiness and the evaluation and adoption of self-service technologies. *Journal of Retailing and Consumer Services, 13*(3), 177–191.
Lin, K. M. (2011). E-Learning continuance intention: moderating effects of user e–learning experience. *Computers & Education, 56*(2), 515–526.
Lin, M. J. J., Hung, S. W., & Chen, C. J. (2009). Fostering the determinants of knowledge sharing in professional virtual communities. *Computers in Human Behavior, 25*(4), 929–939.
Lin, H. F., & Lee, G. G. (2006). Effects of socio-technical factors on organizational intention to encourage knowledge sharing. *Management Decision, 44*(1), 108–125.
Lin, C. H., Shih, H. Y., & Sher, P. J. (2007). Integrating technology readiness into technology acceptance: the TRAM model. *Psychology and Marketing, 24*(7), 641–657.
Liu, Y., Li, H. X., & Carlsson, C. (2010). Factors driving the adoption of m-learning: an empirical study. *Computers & Education, 55*(3), 1211–1219.
Ma, W. W. K., & Yuen, A. H. K. (2011). Understanding online knowledge sharing: an interpersonal relationship perspective. *Computers & Education, 56*(1), 210–219.
Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a world–wide–web context. *Information & Management, 38*(4), 217–230.
Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*(3), 192–222.
Morris, M. G., & Dillon, A. (1997). How user perceptions influence software use. *IEEE Software, 14*(4), 58–65.
Norman, D. A. (1998). *The invisible computer: Why good products can fail, the personal computer is so complex, and information appliances are the solution* (1st ed.). Cambridge, London: MIT Press.
Parasuraman, A. (2000). Technology readiness index (TRI): a multiple-item scale to measure readiness to embrace new technologies. *Journal of Service Research, 2*(4), 307–320.
Parasuraman, A., & Colby, C. (1998). *A scale for measuring customers' technology readiness: Replication, refinement and implications for service organisations*. Paper presented at the 1998 Frontiers in Services Conference, Nashville, TN.
Petrocelli, J. V., Clarkson, J. J., Tormala, Z. L., & Hendrix, K. S. (2010). Perceiving stability as a means to attitude certainty: the role of implicit theories of attitudes. *Journal of Experimental Social Psychology, 46*(6), 874–883.
Richard, M., & Carla, O. (2001). Overcoming cultural barriers to sharing knowledge. *Journal of Knowledge Management, 5*(1), 76–85.
Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.
Ryu, S., Ho, S. H., & Han, I. (2003). Knowledge sharing behavior of physicians in hospitals. *Expert Systems with Applications, 25*, 113–122.
Sánchez, R. A., & Hueros, A. D. (2010). Motivational factors that influence the acceptance of Moodle using TAM. *Computer in Human Behavior, 26*(6), 1632–1640.
Scheier, M. F., & Carver, C. S. (1987). Dispositional optimism, and physical well-being: the influence of generalized outcome expectancies on health. *Journal of Personality and Social Psychology, 55*, 169–210.
Scheier, M. F., & Carver, C. S. (1992). Effect of optimism on psychological and physical well–being: theoretical overview and empirical update. *Cognitive Therapy and Research, 16*, 201–228.
Scott, J. E. (1994). The measurement of information systems effectiveness: Evaluating a measuring instrument. 14–17 December 1994, Vancouver, British, Columbia *Proceedings of the fifteenth international conference on Information Systems* (pp. 111–128).
Senge, P. (1997). Sharing knowledge. *Executive Excellence, 14*(11), 17–18.
Sia, C. L., Teo, H. H., Tan, B. C. Y., & Wei, K. K. (2004). Effect of environmental uncertainty on organizational intention to adopt distributed work arrangements. *IEEE Transaction on Engineering Management, 51*(3), 253–267.
Sowe, S. K., Stamelos, I., & Angelis, L. (2008). Understanding knowledge sharing activities in free/open source software projects: an empirical study. *Journal of Systems and Software, 81*(3), 431–446.
Straub, D., Limayem, M., & Karahanna, E. (1995). Measuring system usage: Implications for IS theory testing. *Management Science, 41*(8), 1328–1342.
Sun, Y., Bhattacherjee, A., & Ma, Q. G. (2010). Extending technology usage to work settings: the role of perceived work compatibility in ERP implementation. *Information & Management, 46*(6), 351–356.
Szajna, B. (1996). Empirical evaluation of the revised technology acceptance model. *Management Science, 42*(1), 85–92.
Taylor, B. M., Pearson, P. D., Peterson, D. S., & Rodriguez, M. C. (2005). The CIERA school change framework: an evidenced-based approach to professional development and school reading improvement. *Reading Research Quarterly, 40*(1), 40–69.
Taylor, S., & Todd, P. (1995). Understanding information technology usage: a test of competing models. *Information Systems Research, 6*(2), 144–176.
Teng, J. T. C., Grover, V., & Guttler, W. (2002). Information technology innovations: general diffusion patterns and it's relationships to innovation characteristics. *IEEE Transactions on Engineering Management, 49*(1), 13–27.
Teo, T. S. H., Lim, V. K. G., & Lai, R. Y. C. (2003). Intrinsic and extrinsic motivation in Internet usage. *Omega–The International Journal of Management Science, 27*, 25–37.

Teo, T., & Noyes, J. (2011). An assessment of the influence of perceived enjoyment and attitude on the intention to use technology among pre–service teachers: a structural equation modeling approach. *Computers & Education, 57*(2), 1645–1653.
Thompson, R. (1998). Extending the technology acceptance model with motivation and social factors. In *Proceedings of association for information systems annual conference* (pp. 757–759).
Tornatzky, L. G., & Klein, R. J. (1982). Innovation characteristics and innovation adoption-implementation: a meta-analysis of findings. *IEEE Transactions on Engineering Management, 29*, 28–45.
Triandis, H. C. (1980). Values, attitudes, and interpersonal behavior. In H. Howe, & M. Page (Eds.), *Nebraska symposium on Motivation, 1979* (pp. 195–260). Lincoln, NE: University of Nebraska Press.
Tsikriktsis, N. (2004). A technology readiness-based taxonomy of customers: a replication and extension. *Journal of Service Research, 7*(1), 42–52.
Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science, 46*(2), 186–204.
Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: toward a unified view. *MIS Quarterly, 27*(3), 425–478.
Walczuch, R., Lemmink, J., & Streukens, S. (2007). The effect of service employees' technology readiness on technology acceptance. *Information & Management, 44*, 206–215.
Wijnhoven, F. (1998). Knowledge logistic in business contexts: analyzing and diagnosing knowledge sharing by logistics concepts. *Knowledge and Process Management, 5*, 143–157.
Wu, I. L., & Chen, J. L. (2005). An extension of trust and TAM model with TPB in the initial adoption of on-line tax: a empirical study. *International Journal of Human–computer Studies, 62*, 784–808.
Yi, M. Y., Jackson, J. D., Park, J. S., & Probst, J. C. (2006). Understand information technology acceptance by individual professionals: toward an integrative view. *Information & Management, 43*, 350–363.
Yun, E. K., & Park, H. A. (2010). Consumers' disease information–seeking behaviour on the Internet in Korea. *Journal of Clinical Nursing, 19*(19–20), 2860–2868.