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Determinants of knowledge seeking in professional virtual communities

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As knowledge management systems within organisations, professional virtual communities (PVCs) are popular knowledge-seeking tools, which bring together geographically dispersed members from outside of the organisations. An increasing number of employees use PVCs for knowledge seeking, knowledge exchange and problem solving at work. Why do members choose to receive knowledge from other community members in PVCs needs to be understood. This paper extends Ajzen's [1991. The theory of planned behaviour. *Organizational Behavior and Human Decision Processes*, 50 (2), 179–211] theory of planned behaviour to elicit external beliefs in terms of personal motivation, as well as technological and social factors, and to examine the relative importance of these factors. According to this study's online survey of 323 members in three PVCs, the results show that the significance of beliefs, such as system quality, compatibility, trust, knowledge growth and knowledge quality, in creating positive attitudes towards knowledge seeking. Community identification is shown as a salient belief for the subjective norms of knowledge seeking. System quality and resource availability are revealed as important determinants for perceived behavioural control of knowledge seeking. Knowledge-seeking intention is based on the attitude towards knowledge seeking and the subjective norm of knowledge seeking, whereas knowledge-seeking behaviour is solely determined by knowledge-seeking intention. Implications for research and practice are discussed.

Keywords: knowledge management; knowledge seeking; professional virtual communities; theory of planned behaviour

1. Introduction

The growing use of the Internet has led to the emergence of professional virtual communities (PVCs). As a knowledge management systems (KMSs) within organisations, PVCs are popular knowledge-seeking tools, which bring together geographically dispersed members from outside of the organisation (Chen and Hung 2010). An increasing number of employees use PVCs for knowledge seeking, knowledge exchange and problem solving at work (Chiu *et al.* 2006, Kim *et al.* 2011). Consisting of members with diverse backgrounds, virtual communities can provide an effective platform for people to diversify their sources of information (Park *et al.* 2010). The PVCs are beneficial to individuals, communities and organisations (Preece 2004), given that they combine the advantages of virtual and professional communities by enabling members to interact virtually via the Internet (Hsu *et al.* 2007). The participation of online members involves knowledge contribution and seeking (Phang *et al.* 2009). However, many communities fail, as they cannot sustain these activities (Koh *et al.* 2007, Phang *et al.* 2009); a lack of either one would render the knowledge-sharing process ineffective (i.e. high demand but no supply, or high supply but no demand). Existing research has mainly studied the motivation for knowledge contribution (Wasko and Faraj 2005, Chiu *et al.* 2006, Hsu *et al.* 2007, Lin *et al.* 2009, Marett and Joshi 2009, Tseng and Kuo 2010), while only a few researchers have investigated the motivations for visiting and seeking knowledge for reuse in virtual communities (Phang *et al.* 2009, Chen and Hung 2010, Park *et al.* 2010). Thus, a thorough comprehension of knowledge-seeking behaviour (KSB) necessitates developing an integrative model and acquiring information on the relative importance of influencing factors. This study extends the theory of planned behaviour (TPB) to explain and predict KSB in PVCs.

Grounded on social psychology, TPB is a well-defined model that has been used to predict human behaviours across various settings (Pavlou and Fygenson 2006). Hence, a TPB-based model is assumed to be effective for explaining KSB in PVCs. Online communities can be considered socio-technical systems, whose technical and social components (Phang *et al.* 2009) have contributed to the success of virtual communities (Lin 2008). We therefore identify the main attitudinal, normative and control beliefs and categorise them into personal, technological and social factors. These factors are then integrated in a TPB model. This study aims to elucidate why members choose to receive knowledge from other community

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members to ensure the sustainability of PVCs for their intended purposes.

This study contributes to current theories by providing an integrative model for understanding the formation of KSB in PVCs and allowing us to understand the relative importance of influencing factors. Practitioners, such as community managers, can also use the results of this study to forecast and understand the KSB of community members and adjust relevant policies accordingly.

2. Theoretical background and literature review

2.1. *Theory of planned behaviour*

The TPB is one of the most influential and comprehensive psychological theories in applied human behaviour research (Pavlou and Fygenson 2006). According to TPB, an individual's behaviour is controlled by his/her intention, and his/her intention is decided by his/her attitude, subjective norm (SN) and perceived behavioural control (PBC). Thus, an individual's attitude towards a certain behaviour is subject to his/her attitudinal beliefs, whereas his/her SN is determined by his/her normative beliefs. In addition, the PBC is subject to his/her control beliefs (Ajzen 1991). Attitudinal beliefs are assessments about the likelihood of the behaviour's consequences; normative beliefs are assessments about what important others might think of the behaviour; control beliefs are assessments about the presence of factors that may facilitate or impede performance of the behaviour.

2.2. *Professional virtual community*

A community is regarded as a virtual community 'when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationship in cyberspace' (Rheingold 1993, p. 5). Hagel and Armstrong (1997) define virtual communities as those that revolve around aggregating people. People are drawn to the virtual community because they provide an engaging environment in which to connect with other people – sometimes only once, but more often in an ongoing series of interactions that create an atmosphere of trust and real insight (p. 18).

On the basis of member characteristics, Adler and Christopher (1999) classify virtual communities into three types: (1) a demographic community, which is comprised individuals with a shared identity or background (e.g. classroom bulletin board); (2) a professional community, which is intended for discussions on certain areas of expertise (e.g. programming, database maintenance, biotechnology) and (3) a personal interest community, whose members share hobbies or interests (e.g. forums for Major League Baseball fans, forums for providing information about beauty and make-up). A PVC can be considered an extended community of practice (Wenger 1998), and can also be recognised as a virtual community of interest that may facilitate sharing of expertise and experience with regard to specific themes (Armstrong and Hagel 1996).

2.3. *Knowledge seeking and influencing factors*

This section reviews the literature on KMS usage for knowledge seeking, including studies on organisational KMSs and online communities, to identify influencing factors. Previous research has considered how knowledge seeking is affected by personal, technological and contextual factors.

Regarding personal factors, knowledge seekers can be motivated by benefit and demotivated by cost considerations. Researchers note personal benefit factors, such as organisational reward (He and Wei 2009), knowledge growth (Bock *et al.* 2006, He and Wei 2009), learning orientation (Gray and Durcikova 2005), intellectual demands (Gray and Durcikova 2005), knowledge self-efficacy (Quigley *et al.* 2007, Chen and Hung 2010), perceived relative advantage (Chen and Hung 2010) and perceived compatibility (Chen and Hung 2010), which thereafter promote KSB; whereas cost-related factors, such as seeking effort (He and Wei 2009, He *et al.* 2009) and future obligation (Bock *et al.* 2006), may deter knowledge seekers from using KMSs.

Concerning technological factors, knowledge seekers may be affected by the virtual community system itself. These factors include perceived usefulness (Bock *et al.* 2006, He *et al.* 2009, He and Wei 2009), perceived ease of use (Kankanhalli *et al.* 2005b, Bock *et al.* 2006, Watson and Hewett 2006, Phang *et al.* 2009), perceived output quality (Kankanhalli *et al.* 2005b), system reliability (Phang *et al.* 2009), Perceived KMS capability (Kankanhalli *et al.* 2011) and knowledge-tracking fulfilment (Phang *et al.* 2009), which thereafter promote KSB.

With reference to contextual factors, knowledge seekers may be affected by the surrounding environment. These factors include social relationship (He and Wei 2009), management influence (He and Wei 2009), perceived trust (Watson and Hewett 2006, Quigley *et al.* 2007, He *et al.* 2009, Chen and Hung 2010), norm of reciprocity (Chen and Hung 2010), norm of knowledge sharing (Kankanhalli *et al.* 2005b), social interactivity (Phang *et al.* 2009), perception of moderator (Phang *et al.* 2009), time pressure (Gray and Durcikova 2005), task tacitness (Lin and Huang 2008), task interdependence (Lin and Huang 2008), resource availability (Kankanhalli *et al.* 2005b, Bock *et al.* 2006) and incentive availability (Kankanhalli *et al.* 2005b).

Table 1 summarises the studies that emphasise the influencing factors of knowledge seeking or combined knowledge seeking and contribution in KMSs. Few researchers have investigated influencing factors from seeker perspectives in PVCs, limiting our understanding of why members choose to receive knowledge from other community

Table 1. The influencing factors on knowledge seeking studied in prior KM research.

	KMS			
	Organisation	Online community	Other	Focus on
Kankanhalli *et al.* (2011)	◎			Seeking (reuse)
Chen and Hung (2010)		◎		Collecting and contribution
Phang *et al.* (2009)		◎		Seeking and contribution
He *et al.* (2009)	◎			Seeking
He and Wei (2009)	◎			Seeking and contribution
Lin and Huang (2008)	◎			Usage (seeking and contribution)
Quigley *et al.* (2007)			◎ (School)	Seeking and contribution
Watson and Hewett (2006)	◎			Seeking (reuse) and contribution
Bock *et al.* (2006)	◎			Seeking
Kankanhalli *et al.* (2005b)	◎			Seeking
Gray and Durcikova (2005)	◎			Seeking

members in such communities. Accordingly, this study extends TPB to explain KSB and to derive a set of important external beliefs.

3. Research model and hypotheses

3.1. *Eliciting external beliefs*

TPB includes three categories of external beliefs: attitudinal, normative and control beliefs. To elicit these external beliefs, we conducted a study in which an open-ended questionnaire (Table 2) was distributed to respondents, following Pavlou and Fygenson (2006). By convenience sampling, we selected 20 community members from each of the PVCs considered (i.e. JavaWorld, BlueShop and Flash forum). Of the 60 community members selected, 58 responded. The results were ranked based on the overall importance of scores derived by using the data from 58 members (Table 3). The proposed variables with a frequency of over 20% was the selection criterion in this study; this selection method has been used in previous research (Pavlou and Fygenson 2006). The most important attitudinal, normative and control beliefs were then identified and categorised as personal, technological or social factors. Personal factors refer to extrinsic and intrinsic motivations; technological factors pertain to those in the virtual community system itself that may affect users and social factors include external forces that may influence users. The proposed research model is shown in Figure 1.

Table 2. Questionnaire for eliciting external salient beliefs.

Attitudinal beliefs	1. What do you believe are the advantages of using this PVC for knowledge seeking? 2. What do you believe are the disadvantages of using this PVC for knowledge seeking? 3. Is there anything else that can be associated with your use of this PVC for knowledge seeking?
Normative beliefs	1. Which people/group is important to you so that you would like to use this PVC for knowledge seeking? 2. Are there any other factors encouraging you to use this PVC for knowledge seeking?
Control beliefs	1. What factors or circumstances would urge you to use this PVC for knowledge seeking? 2. What difficult factors or circumstances would affect your use of this PVC for knowledge seeking? 3. Are there any other issues (barriers or facilitating conditions) that come to mind when you use this PVC for knowledge seeking?

3.2. *Personal motivation*

3.2.1. *Task needs*

Individuals use KMSs for knowledge seeking to facilitate task completion. Users can seek knowledge from diverse sources, such as peers, databases or official documents (Gray and Durcikova 2005), thereby working more effectively (Alavi and Leidner 1999). Community members participate in PVCs to obtain the specialised knowledge needed for solving problems or for innovating at work (Chen and Hung 2010); such participation is intended to fill the gap between knowledge states and task execution capability (Shih 2004). As the task needs of PVC members increase, their positive attitudes towards knowledge seeking also increase. On this basis, we formulated the hypothesis:

> H1: Task needs positively affect a member's attitude towards knowledge seeking in PVCs.

3.2.2. *Knowledge growth*

Knowledge growth represents members' perceived benefits of enhancing their learning and keeping current on new innovations and issues (Wasko and Faraj 2000). Knowledge seekers are likely to upgrade their expertise (Bock

Table 3. Frequency of elicited beliefs (sample = 58).

Attitudinal beliefs	Frequency (%)	Normative beliefs	Frequency (%)	Control beliefs	Frequency (%)
System quality/ searchability/ease of use	**38 (66%)**	**Community identification**	**34 (59%)**	**System quality/ searchability/ease of use**	**27 (47%)**
Knowledge quality/usefulness	**31 (53%)**	**Peer/other members influence**	**29 (50%)**	**Resource availability**	**15 (26%)**
Knowledge growth	**30 (52%)**	Knowledge-sharing norms	7 (12%)	Knowledge evaluation	8 (14%)
Compatibility	**27 (47%)**	Collective norms	5 (9%)	Search tool efficiency	8 (14%)
Trust	**15 (26%)**			Quick knowledge response	7 (13%)
Task needs/for work-related use	**12 (21%)**			Trust	6 (10%)
Moderator influence	8 (14%)				
Knowledge variety	7 (12%)				

Notes: Only beliefs with frequency >5 are shown; the bold numbers are percentage >20.

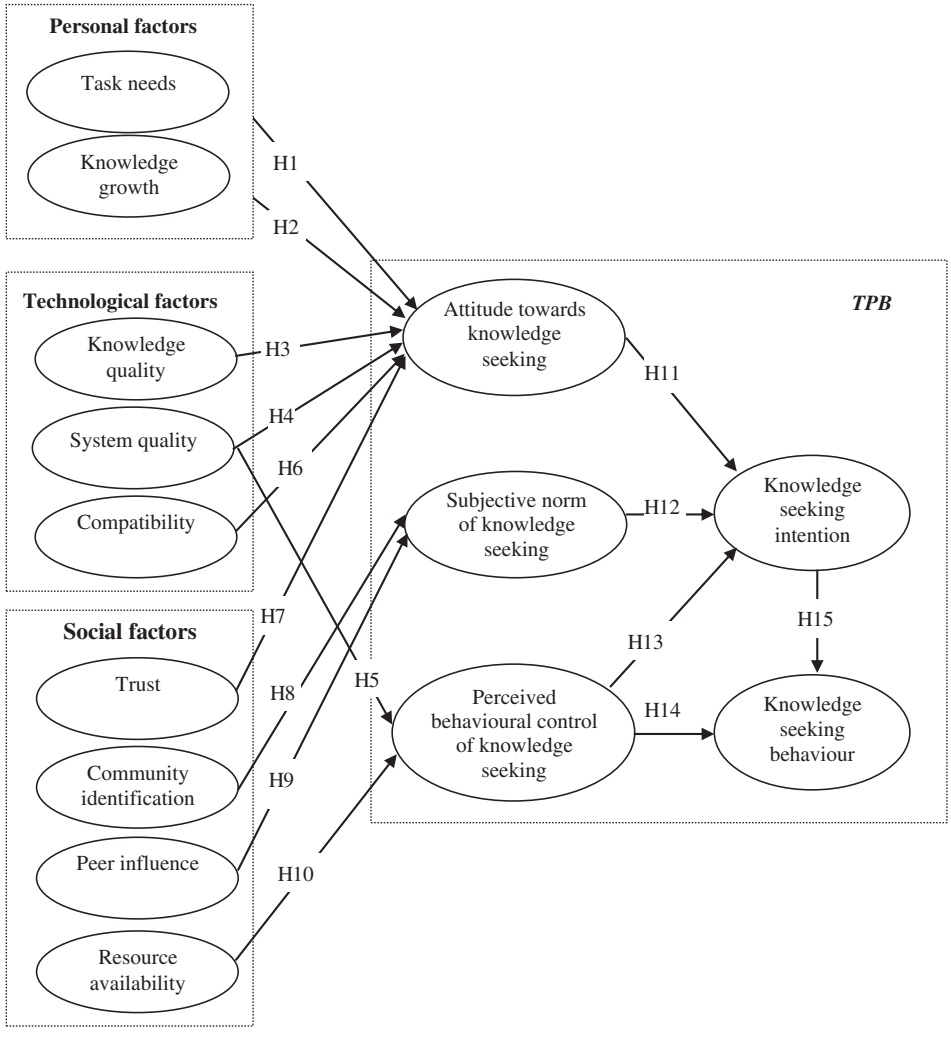

Figure 1. The proposed research model.

et al. 2006) and improve their individual capabilities (Chen and Hung 2010) when they obtain knowledge from KMSs. Such people are intrinsically motivated by the perception of knowledge growth (Wasko and Faraj 2000, Kankanhalli *et al.* 2011). By using a PVC to search for knowledge, users may perceive knowledge growth, which results in positive

attitudes about knowledge seeking. This idea gives rise to the following hypothesis:

H2: Knowledge growth positively affects a member's attitude towards knowledge seeking in PVCs.

3.3. Technological factors

3.3.1. Knowledge quality

Knowledge quality represents the members' perception of the quality of knowledge that a community produces (DeLone and McLean 1992). Knowledge appears to be the main commodity that influences member satisfaction with virtual communities (Lin 2008). An effective KMS must provide useful, accurate and updated knowledge (Gray 2001). Knowledge quality can reflect the output quality that users can obtain from a virtual community (Bock *et al.* 2008). The quality of knowledge content is a major incentive that encourages members to visit virtual communities. If community members can satisfy their need for information, they will not look elsewhere (Chang *et al.* 1999). When users seek knowledge via a PVC and perceive a high-knowledge quality, they develop positive attitudes towards knowledge seeking; thus, the hypothesis:

H3: Knowledge quality positively affects a member's attitude towards knowledge seeking in PVCs.

3.3.2. System quality

System quality is defined as a member's perception of the performance of a virtual community (DeLone and McLean 1992). This variable is essential for understanding why virtual communities succeed (Lin 2008). Previous research has extensively emphasised that excellent KMS quality significantly affects user satisfaction (Kulkarni *et al.* 2006, Halawi *et al.* 2008). Satisfaction with system quality positively affects attitudes towards knowledge seeking. This leads to the following hypothesis:

H4: System quality positively affects a member's attitude towards knowledge seeking in PVCs.

System quality similarly reflects the perceived ease of use or perceived system searchability (Bock *et al.* 2008). High searchability enhances the user performance in accessing knowledge from a KMS, thereby reducing search time (Bock *et al.* 2008). Thus, it increases the PVC members' perceived control over their capability to successfully obtain knowledge, which forms the fifth hypothesis:

H5: System quality positively affects a member's PBC of knowledge seeking in PVCs.

3.3.3. Compatibility

Compatibility is defined as the degree to which an innovation is perceived as consistent with the existing values, needs and past experiences of users (Moore and Benbasat 1991, Rogers 1995). In this study, perceived compatibility refers to a member's view of whether the values, needs and experiences of the PVC are similar to his/her value system. Perceived incompatibility may entail a lengthy learning process and cause dissatisfaction with a system (Kuo and Lee 2011). When a user sees the knowledge-seeking method via PVCs as consistent with his/her past experiences, he/she displays more positive attitudes towards knowledge seeking; therefore:

H6: Compatibility positively affects a member's attitude towards knowledge seeking in PVCs.

3.4. Social factors

3.4.1. Trust

Trust represents the degree to which a member believes that other members have good intentions and want to do good to the member out of altruistic motives (Mishra 1996, He *et al.* 2009). Trust is the building block of relationships, uniting community members (Preece 2004) and promoting effective knowledge exchange (Adler 2001, Lin 2008). Previous studies have shown that trust can create favourable perceptions about the outcomes of other people's actions, thereby creating positive attitudes (Pavlou and Fygenson 2006). In this study, we define trust as pertaining to a virtual community member's belief that other members will provide well-intentioned help, such as a positive contribution to knowledge. A community member who believes that other members want to share their knowledge is likely to have positive attitudes towards knowledge seeking. On this basis, we formulated the hypothesis:

H7: Trust positively affects a member's attitude towards knowledge seeking in PVCs.

3.4.2. Community identification

Identification has been defined as 'an emotional tie with another person' (Freud 1992) even when individuals are dispersed (Wiesenfeld *et al.* 1999). It also pertains to group identity, in-group identity and intra-group identity (Henry *et al.* 1999). When people strongly identify themselves with a group, 'they will be more willing to act cooperatively in that group – investing their time and energy in working to see the group succeed' (Tyler and Blader 2003, p. 356). Nahapiet and Ghoshal (1998) argue that identification influences the motivation for knowledge exchange. Positive identification also increases loyalty and facilitates cooperation with other members (Kimmerle *et al.* 2008). A member who strongly identifies himself/herself with a community is likely to subjectively consider other community members' opinions and to seek knowledge via PVCs. We thus expect the following:

H8: Community identification positively affects a member's SN of knowledge seeking in PVCs.

3.4.3. *Peer influence*

Peer influence represents the degree to which a member perceives that a peer/colleague will expect him/her to seek knowledge in a PVC (Taylor and Todd 1995). Since ancient times, people's actions have been affected by peers/colleagues. The vast reach of the Internet and rapid information transfer make this phenomenon even more apparent. For example, the book sales of Amazon.com are heavily influenced by customer reviews (Griskevicius *et al.* 2008). Previous studies have indicated that peer influence positively affects a user's SN (Taylor and Todd 1995, Hung *et al.* 2003, Teo *et al.* 2003); thus:

H9: Peer influence positively affects a member's SN of knowledge seeking in PVCs.

3.4.4. *Resource availability*

Resource availability refers to the extent to which a member evaluates the resource factors required in knowledge seeking, such as time and opportunities (Taylor and Todd 1995). When less time is available, people's behavioural intention to use a system decreases (Taylor and Todd 1995). Studies show that resource-facilitating conditions affect the use of KMSs for knowledge seeking (Bock *et al.* 2006). As resources increase, user perception that knowledge seeking is under control increases (Taylor and Todd 1995). We thus formulate the hypothesis:

H10: Resource availability positively affects a member's PBC of knowledge seeking in PVCs.

3.5. *TPB constructs*

Attitudes towards knowledge seeking pertain to a member's favourable or unfavourable feelings towards performing KSB (Ajzen 1991). The SN of knowledge seeking relates to a member's perception of the desire of key referents for the individual to perform or not perform KSB (Ajzen 1991). The PBC of knowledge seeking is defined as a member's perception of the ease or difficulty of carrying out a behaviour (Ajzen 1991). According to TPB, intention is determined by attitude, SN and PBC. The theory also suggests that behavioural intention is the best predictor of behaviour, and that PBC directly affects behaviour. As a direct reflection of TPB, the following hypotheses are proposed:

H11: Attitudes towards knowledge seeking positively affect a member's knowledge-seeking intention (KSI).
H12: The SN of knowledge seeking positively affects a member's KSI.
H13: The PBC of knowledge seeking positively affects a member's KSI.
H14: The PBC of knowledge seeking positively affects a member's KSB.
H15: The KSI positively affects a member's KSB.

4. Research methodology

4.1. *Data collection*

We tested the hypotheses using a web-based survey of three PVCs. In Taiwan, two of the largest programming PVCs are JavaWorld and BlueShop, and one of the multimedia design PVCs is Flash forum. All three are platforms for knowledge sharing, knowledge seeking, technical discussion, employment search and file uploading. To minimise the possibility of common method variance, we collected data in two stages (Podsakoff *et al.* 2003). The first survey included questions that measured attitudinal, normative and control beliefs, as well as attitudes, SN, PBC and behavioural intention. After a month, a link to the follow-up survey was sent to users who had completed the first survey. The follow-up survey was designed to collect data on actual KSB; the respondents were asked to indicate the time (hours) spent on knowledge seeking in a PVC each week. After another week, a reminder was sent to those who had not completed the follow-up questionnaire. The temporal design is consistent with the knowledge management (KM) literature (He and Wei 2009). Out of 1504 visitors who browsed the survey, 103 JavaWorld, 72 BlueShop and 148 Flash forum users returned complete responses. The 21.5% response rate is comparable to that reported in online community surveys

Table 4. Demographic information ($N = 323$).

Demographic variable	Count (%)	Demographic variable	Count (%)
Age		Gender	
20 years or below	62 (19.2%)	Male	212 (65.6%)
21–30 years	118 (36.5%)	Female	111 (34.4%)
31–40 years	84 (26.0%)		
41–50 years	40 (12.4%)	Member history	
51 years or above	19 (5.9%)	Under 3 months	17 (5.3%)
		3 months–6 months	45 (13.9%)
Education		6 months–1 year	42 (13.0%)
Under senior high school	1 (0.3%)	1 year–2 years	70 (21.7%)
Senior high school	33 (10.2%)	Over 2 years	149 (46.1%)
University or college	212 (65.6%)		
Graduate degree or above	77 (23.8%)		

performed in other studies in Taiwan (e.g. Chen and Hung 2010). Of the members who completed the entire questionnaire, 25 were rewarded. The sample consisted of 212 males (65.6%) and 111 females (34.4%). Participants with more than two years' experience with PVC membership accounted for 46.1% of the sample, indicating that most of them were familiar with a specific PVC (Table 4).

4.2. Measurement

All the constructs in the model were assessed using multiple items and were based on well-established scales from previous KM and information system (IS) literature. We made some minor modifications to fit our context. A pre-test and a pilot test were performed to validate the instrument. We pre-tested the questionnaire by having it checked by five IS experts, who were asked to evaluate the consistency of the English–Chinese translation, as well as the length, format and understandability of the instrument. The pilot test was conducted with 35 community members of JavaWorld.

Appendix 1 shows the 14 constructs in the research model. All the items were measured with a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), except for the data on KSB (time spent in knowledge seeking in the PVC each week).

5. Results

To test the research hypotheses, we performed structural equation modelling using AMOS 18. First, the measurement model was estimated to ensure that the constructs possessed sufficient reliability and validity. Second, the structural model was assessed by examining the overall model fit, as well as by estimating the standardised path coefficients and R^2 values.

5.1. Analysis of the measurement model

The measurement model was examined in terms of content validity, convergent validity and discriminant validity. *Content validity* was established from the extant literature, and a pilot test was performed to improve the validity of the measures. Confirmatory factor analysis (CFA) was conducted to determine convergent and discriminant validity. The AMOS programme with maximum-likelihood estimation was used to perform the CFA. The results of Mardia's test confirm that the data deviate from multivariate normality.[1] *Convergent validity* is demonstrated when indicator factor loadings (λ) are significant and exceed the acceptable value of 0.5 on their corresponding constructs, as recommended by Hair *et al.* (2006), and when the average variances extracted (AVEs) for constructs are larger than 0.5, exceeding the threshold value suggested by Fornell and Larcker (1981). All the λ values in the CFA model exceed 0.5 on their corresponding constructs and the loadings within constructs are higher than those across constructs (Appendix 2). While cross-loadings for some constructs are relatively high, the differences between loadings on principal factors and on other constructs are higher than the threshold value of 0.1 suggested by Gefen and Straub (2005).[2] The AVEs of all the constructs exceed the threshold value of 0.5, confirming convergent validity. *Discriminant validity* is demonstrated when the square root of AVE is greater than inter-construct correlations, as suggested by Fornell and Larcker (1981). Table 5 shows that the square root of the AVE values is greater than inter-correlations, indicating acceptable discriminant validity. Multicollinearity was also evaluated because of the relatively high correlations among some variables (e.g. a correlation of 0.685 between compatibility and ATT). The resultant variance inflation factors of all the constructs are between 1.021 and 1.936, which are considered acceptable.

Table 5. Discriminant validity.

Variables	CR[a]	CA[b]	1[c]	2	3	4	5	6	7	8	9	10	11	12	13
1. TASK	0.921	0.916	**0.89**												
2. GROW	0.956	0.956	−0.04	**0.92**											
3. KQ	0.914	0.908	−0.01	0.33	**0.88**										
4. SQ	0.843	0.850	−0.06	0.60	0.44	**0.72**									
5. COMP	0.951	0.950	−0.09	0.53	0.47	0.58	**0.93**								
6. TR	0.927	0.925	0.05	0.42	0.36	0.41	0.44	**0.90**							
7. IDEN	0.880	0.882	0.05	0.30	0.30	0.34	0.38	0.41	**0.75**						
8. PI	0.951	0.949	0.05	0.13	0.07	0.15	0.11	−0.02	−0.01	**0.95**					
9. RA	0.875	0.866	−0.36	0.63	0.33	0.56	0.50	0.32	0.42	0.20	**0.84**				
10. ATT	0.926	0.922	0.09	0.57	0.54	0.64	0.69	0.49	0.38	0.16	0.57	**0.90**			
11. SN	0.962	0.962	−0.07	0.39	0.24	0.43	0.38	0.25	0.38	0.06	0.44	0.40	**0.96**		
12. PBC	0.946	0.945	0.21	0.35	0.19	0.36	0.31	0.26	0.23	0.02	0.34	0.31	0.28	**0.92**	
13. KSI	0.958	0.956	−0.10	0.64	0.41	0.60	0.62	0.53	0.50	0.06	0.63	0.62	0.48	0.37	**0.94**

Note: See Appendix 1 for abbreviations used in Table 5.
[a]CR, composite reliability.
[b]CA, Cronbach's alpha.
[c]The bold numbers in the diagonal row are square roots of the AVEs. Off-diagonal elements are the correlations among constructs.

Table 6. Goodness of fit of the structural model.

Fit indicators	Results	Recommended value	Suggested by authors
χ^2/df	1.830	<3	Hair *et al.* (2006)
GFI	0.842	>0.8	Browne and Cudeck (1993)
AGFI	0.804	>0.8	Browne and Cudeck (1993)
RMSEA	0.051	<0.08	Browne and Cudeck (1993)
NFI	0.901	>0.9	Hair *et al.* (2006)
CFI	0.952	>0.9	Hair *et al.* (2006)

Finally, construct reliability was assessed in terms of composite reliability and Cronbach's alpha. Table 5 shows that all the composite reliabilities exceed the minimum reliability criterion of 0.7 recommended by Fornell and Larcker (1981). All Cronbach's alpha values also exceed 0.70, which is in the commonly acceptable range (Nunnally 1978).

5.2. *Analysis of the structural model*

The structural model was used to investigate model-fit indices, as well as the strength and direction of the relationship between constructs. As shown in Table 6, the model-fit statistics confirm that the research model exhibits good fit with the data (χ^2/df = 1.830, GFI = 0.842, AGFI = 0.804, RMSEA = 0.051, NFI = 0.901 and CFI = 0.952).

The data support the proposed model and 11 of the 15 hypotheses. Figure 2 illustrates the path coefficients and their significance in the structural model. Inconsistent with H1, task needs do not significantly influence user attitudes towards knowledge seeking ($\beta = -.007$, $p = .797$). Supporting H2, knowledge growth has a significant positive influence on user attitudes towards knowledge seeking ($\beta = .118$, $p = .006$). Confirming H3, knowledge quality has a significant positive influence on user attitudes towards knowledge seeking ($\beta = .092$, $p = .009$). Supporting H4 and H5, system quality has a significant positive influence on user attitudes towards knowledge seeking ($\beta = .411$, $p = .000$) and PBC of knowledge seeking ($\beta = .268$, $p = .002$). Supporting H6, compatibility has a significant positive influence on user attitudes towards knowledge seeking ($\beta = .242$, $p = .000$). Supporting H7, trust has a significant positive influence on user attitudes towards knowledge seeking ($\beta = .147$, $p = .000$). Supporting H8, community identification has a significant positive influence on the SN of knowledge seeking ($\beta = .465$, $p = .000$). Inconsistent with H9, peer influence does not significantly influence the SN of knowledge seeking ($\beta = .059$, $p = .259$).

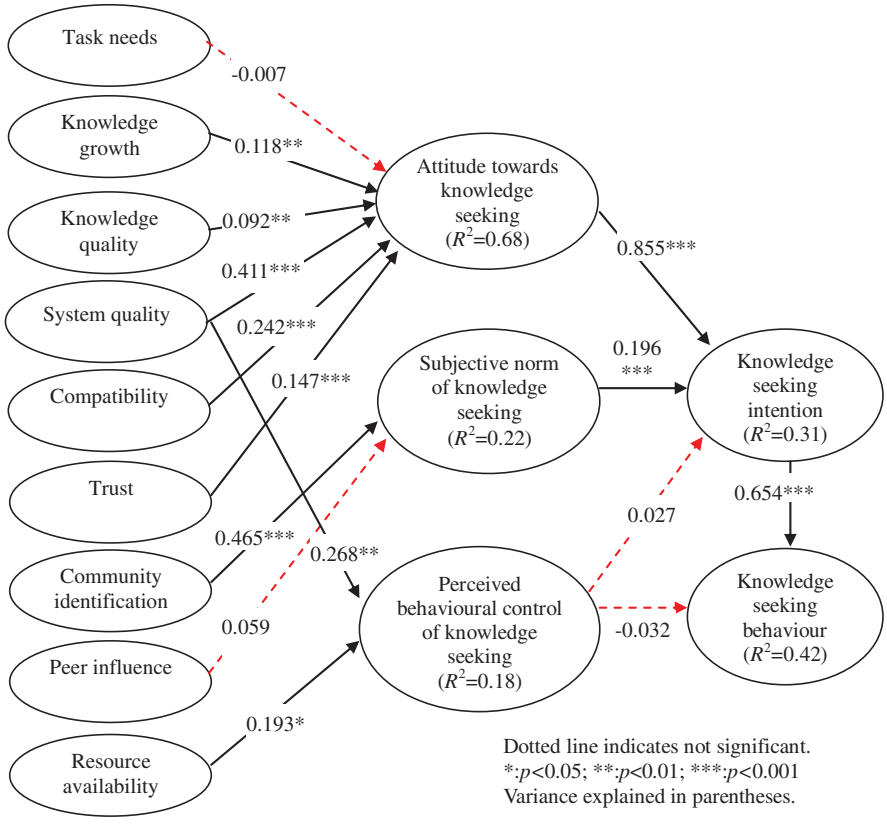

Figure 2. Result of the research model.

Supporting H10, resource availability has a significant positive influence on the PBC of knowledge seeking ($\beta = .193$, $p = .018$). Supporting H11, attitude has a significant positive influence on KSI ($\beta = .855$, $p = .000$). Supporting H12, SN has a significant positive influence on KSI ($\beta = .196$, $p = .000$). Inconsistent with H13 and H14, PBC does not significantly affect KSI ($\beta = .027$, $p = .478$) or behaviour ($\beta = -.032$, $p = .654$). Supporting H15, KSI has a significant positive influence on KSB ($\beta = .654$, $p = .000$).

6. Discussion

6.1. *Attitudinal beliefs*

The results show that attitudes towards knowledge seeking are significantly affected by, in order of importance, system quality, compatibility, trust, knowledge growth and knowledge quality. Contrary to expectations, however, task needs are an inconsequential factor in forming a positive attitude towards knowledge seeking in PVCs. This result indicates that task needs may be of minor concern in stimulating members' KSB in PVC settings. A plausible explanation for this low correlation is the membership duration and activity history. Of the respondents, 46% had been members for more than two years and 71% had experience with sharing knowledge. These respondents are both receivers and providers of knowledge. For long-term members, the influence of task needs on attitudes towards knowledge seeking may diminish.

Knowledge growth has a positive significant effect on members' attitudes towards knowledge seeking. The findings show that members who want to improve individual capability and absorb specialised knowledge have positive attitudes towards knowledge seeking. Gray and Meister (2004) find that job characteristics (intellectual demands) and individual traits (learning orientation) affect knowledge-sourcing behaviour in corporate environments. Previous work (Bock *et al.* 2006) indicates seekers' knowledge growth to be a significant determinant of KSB. However, He and Wei (2009) report that KMS is typically used to improve work efficiency and effectiveness rather than to acquire new knowledge. The current results suggest that community members use PVCs for knowledge growth rather than for task needs.

The current findings confirm the critical roles of system quality, compatibility and knowledge quality in creating positive attitudes towards knowledge seeking. Technological factors affect a member's attitude and eventually determine his/her intentions and behaviour. In a study on eight public sector organisations that span six industries, Kankanhalli *et al.* (2005b) argue that high-quality knowledge (i.e. relevant, reliable and timely), as well as adequate indexing and retrieval technologies, is needed to promote knowledge seeking from KMSs. Our results not only verify those of previous studies, but also highlight the importance of technological factors in a knowledge-seeking setting.

6.2. *Normative beliefs*

The current findings reveal that community identification is important for SN of knowledge seeking in PVCs. Few studies have tested the role of community identification in knowledge-seeking environments. As indicated in the literature review, identification is defined as 'an emotional tie with another person' (Freud 1992) that influences SN of knowledge seeking, which in turn, promotes KSB. Nevertheless, the results suggest that peer influence is irrelevant to members' SN of knowledge seeking. As Griskevicius *et al.* (2008) note, when people have little or no experience, the resultant uncertainty causes them to be especially receptive to peer influence. Further research is needed to recognise the potentially contingent effect of usage experience.

6.3. *Control beliefs*

The results show that PBC of knowledge seeking is significantly affected by, in order of importance, system quality and resource availability. The current findings support those of previous research, indicating that online community members are more concerned with whether a community system can be easily and effectively used for knowledge seeking rather than whether the community system is conducive to social interaction (Phang *et al.* 2009). This finding suggests that system quality is an important issue in the knowledge-seeking process.

The significant result regarding resource availability confirms the conclusions of previous research that this factor (i.e. time and opportunity) can facilitate KMS usage for knowledge seeking (Bock *et al.* 2006), especially in encouraging people to seek explicit knowledge (Kankanhalli *et al.* 2005b). This study implies that resources are a facilitating condition that increases controllability over KSB.

6.4. *TPB constructs*

Attitude ($R^2 = .68$) and SN ($R^2 = .22$) are significant predictors of KSI ($R^2 = .31$). The KSI also influences KSB ($R^2 = .42$). Contrary to the commonly held notion, PBC ($R^2 = .18$) does not significantly affect individual KSI and behaviour. As stated earlier, PBC has been defined as the perceived ease or difficulty of performing a behaviour (Ajzen 1991). The analytical results are both surprising and interesting, because they imply that PBC is not as salient as voluntary participation in a community. Another plausible explanation is a user's familiarity with the PVC, given that familiarity increases confidence, and therefore decreases the relevance of self-efficacy in stimulating usage intention (Khalifa and Shen 2008).

7. Implications and limitations

7.1. Implications for theory

This study makes several important contributions to research. First, unlike most knowledge-seeking research that follows social cognitive theory or social capital theory, this work extends TPB to explain KSB and to derive a set of important external beliefs. The KM literature shows sufficient evidence of individual motivational and contextual factors, whereas the overwhelming evidence in this study suggests that technological factors are now important determinants of attitudes towards knowledge seeking in a PVC setting. Second, the existing literature on KSB has largely ignored identification issues. If identification exists, how is it related to SN? People tend to benefit from groups with which they identify; that is, they favour in-group over out-group members (Ma and Agarwal 2007). We find that community identification positively affects SN of knowledge seeking. Third, this study contributes to KM literature by revealing that PBC may be an unimportant concern in KSI and behaviour in a PVC setting. Finally, although some researchers have investigated the importance of influencing factors in KSB, few have examined these with TPB. We have identified attitudinal, normative and control beliefs, and have integrated them with TPB to measure how such determinants affect KSI and KSB through their influence on psychological constructs (i.e. attitude, SN and PBC). We expect that understanding how external factors function in psychological formation to considerably enhance awareness of knowledge-seeking issues.

7.2. Implications for practice

The implications for managerial practice are that PVC managers and system developers can take specific actions to improve knowledge seeking in PVCs. First, the major challenge is that 'using KMS for knowledge seeking is for their task need, to perform their job more efficiently and effectively' (He and Wei 2009). However, community members appear to attach greater importance to knowledge growth than to fulfilling task needs, especially in a PVC context. The PVC managers should pay more attention to a seeker's knowledge growth or long-term learning. Second, acknowledging the importance of technological factors in knowledge seeking is critical. System quality exhibits the greatest relative importance, followed by compatibility and knowledge quality. System developers must ensure that they enable sufficient system searchability and usability to encourage usage behaviours. A community system should reduce effort by providing the necessary support and resources for knowledge seeking (Venkatesh 2000). Third, the results indicate that social factors, such as trust, directly affect attitudes towards knowledge seeking, and that community identification directly affects SN of knowledge seeking. The PVC moderators should therefore formulate community policies and regulations that create favourable environments for knowledge exchange. Moderators may also help by accurately matching seekers' knowledge needs to corresponding experts or by posting knowledge that seekers require (Phang *et al.* 2009). Finally, PVC members voluntarily participate in a community, indicating that PVC managers should ensure a social climate that fosters community participation (Koh *et al.* 2007). The enthusiasm of PVC moderators is expected to help to encourage identification with virtual communities (Koh and Kim 2003).

7.3. Limitations

We note the inherent limitations of this study. First, the data were collected from three Taiwanese PVCs. Future research should replicate this study in different countries to generalise results. Second, the development of virtual communities creates a need to understand the relationship between virtual community characteristics (e.g. moderator enthusiasm, offline activities and enjoyability) and behaviours (Koh and Kim 2003). Researchers should investigate how virtual community characteristics affect KSB. Finally, community size is a factor in ongoing community survival and is positively related to the viewing and posting behaviours of community members (Koh *et al.* 2007). A comparison of community size would be an interesting extension of this study.

8. Conclusion

This study has extended TPB to elucidate KSB by PVC members. It draws upon IS and KM theories in proposing and empirically examining a comprehensive model that explains the KSB of PVC members. The findings are useful for organisations that expect to use PVCs as KM tools, and for PVC managers in terms of PVC design and allocating support resources to community members. The results of the study indicate that attitudinal beliefs, such as task needs, may be a non-critical factor in the formation of positive attitudes towards knowledge seeking. However, system quality, along with compatibility, trust, knowledge growth and knowledge quality, positively affects user attitudes towards knowledge seeking. Normative beliefs, such as community identification, substantially affect SN of knowledge seeking by users, but peer influence is an unrelated factor. Control beliefs, including system quality and resource availability, significantly determine PBC of knowledge seeking. KSI is based on the attitude towards knowledge seeking and the SN of knowledge seeking, whereas KSB is solely determined by KSI.

This study contributes to theory and practice in three ways. First, it extends TPB in identifying the most important determinants with the aid of an open-ended questionnaire (not arbitrarily chosen). Second, the derived hypotheses have been tested using a comprehensive model and longitudinal assessment. Third, this study enhances the

understanding of PVCs, which is one type of KMS that is geographically dispersed but enhances individual and organisational learning.

Notes

1. The results show that the Mardia coefficients are 399.850 < 1935 (43 × 45).
2. Only 4 out of the 516 cross-loading differences are between 0.1 and 0.2; all other cross-loading differences are higher than 0.2.

References

Adler, P.S., 2001. Market, hierarchy and trust: the knowledge economy and the future of capitalism. *Organization Science*, 12 (2), 215–235.

Adler, P.R. and Christopher, J.A., 1999. *Internet community primer overview and business opportunities*. New York: Harper Collins.

Ajzen, I., 1991. The theory of planned behaviour. *Organizational Behavior and Human Decision Processes*, 50 (2), 179–211.

Alavi, M. and Leidner, D.E., 1999. Knowledge management systems: issues, challenges, benefits. *Communications of the Association for Information Systems*, 1 (7), 2–41.

Armstrong, A. and Hagel, J.I., 1996. The real value of on-line communities. *Harvard Business Review*, 74 (3), 134–140.

Bhattacherjee, A., 2000. Acceptance of e-commerce services: the case of electronic brokerages. *IEEE Transactions of Systems, Man, and Cybernetics*, 30 (4), 411–420.

Bock, G.W., Kankanhalli, A., and Sharma, S., 2006. Are norms enough? The role of collaborative norms in promoting organizational knowledge seeking. *European Journal of Information Systems*, 15 (4), 357–367.

Bock, G.W., Sabherwal, R., and Qian, Z., 2008. The effect of social context on the success of knowledge repository systems. *IEEE Transactions on Engineering Management*, 55 (4), 536–551.

Browne, M.W. and Cudeck, R., 1993. *Alternative ways of assessing model fit*. *In*: K. Bollen and J.S. Long, eds. *Testing structural equation models*. Newbury Park, CA: Sage, 136–162.

Chang, A.M., Kannan, P.K., and Whinston, A.B., 1999. Electronic communities as intermediaries: the issues and economics. *In*: *Proceedings of the 32nd annual Hawaii international conference on system sciences*. (HICSS-32), 5–8 January, Maui, Hawaii.

Chen, C.J. and 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.

Chiu, C.M., Hsu, M.H., and Wang, E.T.G., 2006. Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories. *Decision Support Systems*, 42 (3), 1872–1888.

DeLone, W.H. and McLean, E.R., 1992. Information system success: the quest for the dependent variable. *Information Systems Research*, 3 (1), 60–95.

Fornell, C. and Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18 (1), 39–50.

Freud, S., 1992. *Group psychology and the analysis of ego*. New York: Norton.

Gefen, D. and Straub, D., 2005. A practical guide to factorial validity using PLS-graph: tutorial and annotated example. *Communications of the Association for Information Systems*, 16 (1), 91–109.

Gray, P.H., 2001. The impact of knowledge repositories on power and control in the workplace. *Information Technology and People*, 14 (4), 368–384.

Gray, P.H. and Durcikova, A., 2005. The role of knowledge repositories in technical support environments speed versus learning in user performance. *Journal of Management Information Systems*, 22 (3), 159–190.

Gray, P.H. and Meister, D.B., 2004. Knowledge sourcing effectiveness. *Management Science*, 50 (6), 821–834.

Griskevicius, V., Cialdini, R.B., and Goldstein, N.J., 2008. Applying (and resisting) peer influence. *MIT Sloan Management Review*, 49 (2), 84–88.

Hagel, J. and Armstrong, A.G., 1997. *Net gain: expanding markets through virtual communities*. Boston, MA: Harvard Business School Press.

Hair, J., *et al.*, 2006. *Multivariate data analysis*. 6th ed. Upper Saddle River, NJ: Pearson Education.

Halawi, L.A., Mccarthy, R.V., and Aronson, J.E., 2008. An empirical investigation of knowledge management systems success. *Journal of Computer Information Systems*, 48 (2), 121–135.

He, W. and Wei, K.K., 2009. What drives continued knowledge sharing? An investigation of knowledge-contribution and -seeking beliefs. *Decision Support Systems*, 46 (4), 826–838.

He, W., Fang, Y., and Wei, K.K., 2009. The role of trust in promoting organizational knowledge seeking using knowledge management systems: an empirical investigation. *Journal of the American Society for Information Science and Technology*, 60 (3), 526–537.

Henry, K.B., Arrow, H., and Carini, B., 1999. A tripartite model of group identification. *Small Group Research*, 30 (5), 558–581.

Hsu, M.H., *et al.*, 2007. Knowledge sharing behaviour in virtual communities: the relationship between trust, self-efficacy, and outcome expectations. *International Journal of Human-Computer Studies*, 65 (2), 153–169.

Hung, S.Y., Ku, C.Y., and Chang, C.M., 2003. Critical factors of WAP services adoption: an empirical study. *Electronic Commerce Research and Applications*, 2 (1), 42–60.

Kankanhalli, A., Tan, B.C.Y., and Wei, K.K., 2005a. Contributing knowledge to electronic knowledge repositories: an empirical investigation. *MIS Quarterly*, 29 (1), 113–143.

Kankanhalli, A., Tan, B.C.Y., and Wei, K.K., 2005b. Understanding seeking from electronic knowledge repositories: an empirical study. *Journal of the American Society for Information Sciece and Technology*, 56 (11), 1156–1166.

Kankanhalli, A., Lee, O.K.D., and Lim, K.H., 2011. Knowledge reuse through electronic repositories: a study in the context of customer service support. *Information & Management*, 48 (2–3), 106–113.

Khalifa, M. and Shen, K.N., 2008. Drivers for transactional B2C m-commerce adoption: extended theory of planned behaviour. *Journal of Computer Information Systems*, 48 (3), 111–117.

Kim, J., Song, J., and Jones, D.R., 2011. The cognitive selection framework for knowledge acquisition strategies in virtual communities. *International Journal of Information Management*, 31 (2), 111–120.

Kimmerle, J., Wodzicki, K., and Cress, U., 2008. The social psychology of knowledge management. *Team Performance Management*, 14 (7), 381–401.

Koh, J. and Kim, Y.G., 2003. Sense of virtual community: a conceptual framework and empirical validation. *International Journal of Electronic Commerce*, 8 (2), 75–93.

Koh, J., *et al.*, 2007. Encouraging participation in virtual communities. *Communications of the ACM*, 50 (2), 69–73.

Kulkarni, U.R., Ravindran, S., and Freeze, R., 2006. A knowledge management success model: theoretical development and empirical validation. *Journal of Management Information Systems*, 23 (3), 309–347.

Kuo, R.Z. and Lee, G.G., 2011. Knowledge management system adoption: exploring the effects of empowering leadership, task-technology fit and compatibility. *Behaviour & Information Technology*, 30 (1), 113–129.

Lewis, W., Agarwal, R., and Sambamurthy, V., 2003. Sources of influence on beliefs about information technology use: an empirical study of knowledge workers. *MIS Quarterly*, 27 (4), 657–678.

Lin, H.F., 2008. Determinants of successful virtual communities: contributions from system characteristics and social factors. *Information & Management*, 45 (8), 522–527.

Lin, T.C. and Huang, C.C., 2008. Understanding knowledge management system usage antecedents: an integration of social cognitive theory and task technology fit. *Information & Management*, 45 (6), 410–417.

Lin, M.J.J., Hung, S.W., and Chen, C.J., 2009. Fostering the determinants of knowledge sharing in professional virtual communities. *Computers in Human Behavior*, 25 (4), 929–939.

Ma, M. and Agarwal, R., 2007. Through a glass darkly: information technology design, identity verification, and knowledge contribution in online communities. *Information Systems Research*, 18 (1), 42–67.

Marett, K. and Joshi, K.D., 2009. The decision to share information and rumors: examining the role of motivation in an online discussion forum. *Communications of the Association for Information Systems*, 24 (1), 47–68.

Mishra, A.K., 1996. Organizational responses to crisis: the centrality of trust. *In:* R.M. Kramer and T.R. Tyler, eds. *Trust in organizations, frontiers of theory and research.* Thousand Oaks, CA: Sage, 261–287.

Moore, G.C. and Benbasat, I., 1991. Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, 2 (3), 192–222.

Nahapiet, J. and Ghoshal, S., 1998. Social capital, intellectual capital, and the organizational advantage. *The Academy of Management Review*, 23 (2), 242–266.

Nunnally, J.C., 1978. *Psychometric theory*. New York: McGraw Hill.

Park, J., *et al.*, 2010. An investigation of information sharing and seeking behaviours in virtual communities. *In*: *Proceedings of the 31st international conference on information systems* (ICIS-31), 12–15 December, Saint Louis, Missouri, USA.

Pavlou, P.A. and Fygenson, M., 2006. Understanding and predicting electronic commerce adoption: an extension of the theory of planned behaviour. *MIS Quarterly*, 30 (1), 115–143.

Phang, C.W., Kankanhalli, A., and Sabherwal, R., 2009. Usability and sociability in online communities: a comparative study of knowledge seeking and contribution. *Journal of the Association for Information Systems*, 10 (10), 721–747.

Podsakoff, P.M., *et al.*, 2003. Common method biases in behavioural research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88 (5), 879–903.

Preece, J., 2004. Etiquette, empathy and trust in communities of practice: stepping-stones to social capital. *Journal of Universal Computer Science*, 10 (3), 294–302.

Quigley, N.R., *et al.*, 2007. A multilevel investigation of the motivational mechanisms underlying knowledge sharing and performance. *Organization Science*, 18 (1), 71–88.

Rheingold, H., 1993. *The virtual community: homesteading on the electronic frontier*. London: MIT Press.

Rogers, E.M., 1995. *Diffusion of innovations*. 4th ed. New York: The Free Press.

Shih, H.P., 2004. Extended technology acceptance model of internet utilization behaviour. *Information & Management*, 41 (6), 719–729.

Taylor, S. and Todd, P.A., 1995. Understanding information technology usage: a test of competing models. *Information System Research*, 6 (2), 144–176.

Teo, H.H., Wei, K.K., and Benbasat, I., 2003. Predicting intention to adopt interorganisational linkages: an institutional perspective. *MIS Quarterly*, 27 (1), 19–49.

Tseng, F.C. and Kuo, F.Y., 2010. The way we share and learn: an exploratory study of the self-regulatory mechanisms in the professional online learning community. *Computers in Human Behavior*, 26 (5), 1043–1053.

Tyler, T.R. and Blader, S.L., 2003. The group engagement model: procedural justice, social identity, and cooperative behaviour. *Personality and Social Psychology Review*, 7 (4), 349–361.

Venkatesh, V., 2000. Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, 11 (4), 342–365.

Venkatesh, V., *et al.*, 2003. User acceptance of information technology: toward a unified view. *MIS Quarterly*, 27 (3), 425–478.

Wasko, M. and Faraj, S., 2000. "It is what one does": why people participate and help others in electronic communities of practice. *The Journal of Strategic Information Systems*, 9 (2–3), 155–173.

Wasko, M. and Faraj, S., 2005. Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly*, 29 (1), 34–56.

Watson, S. and Hewett, K., 2006. A multi-theoretical model of knowledge transfer in organizations: determinants of knowledge contribution and knowledge reuse. *Journal of Management Studies*, 43 (2), 141–173.

Wenger, E., 1998. *Communities of practice. Learning, meaning and identity*. New York: Cambridge University Press.

Wiesenfeld, B.M., Raghuram, S., and Garud, R., 1999. Communication patterns as determinants of organizational identification in a virtual organization. *Organization Science*, 10 (6), 777–790.

Xu, B., Jones, D.R., and Shao, B., 2009. Volunteers' involvement in online community based software development. *Information & Management*, 46 (3), 151–158.

Appendix 1. Constructs and items

Item	Question	Mean	SD
Task needs (Source: Xu *et al.* 2009)			
TASK1	I personally need to use the PVC for problem solving	4.28	1.47
TASK2	I intend to solve problems that are causing me trouble	4.25	1.54
TASK3	I intend to find knowledge I want or need for a task	4.04	1.65
Knowledge growth (Source: He and Wei 2009)			
GROW1	Seeking knowledge from the PVC promotes my knowledge growth and development	5.55	1.19
GROW2	Seeking knowledge from the PVC reinforces my competence	5.60	1.11
GROW3	Seeking knowledge from the PVC helps me strengthen my concepts in my field	5.74	1.09
GROW4	Seeking knowledge from the PVC sharpens my knowledge	5.69	1.17
Knowledge quality (Source: Bock *et al.* 2008)			
KQ1	The (knowledge) output of the PVC is accurate	4.40	1.28
KQ2	The (knowledge) output of the PVC is trustworthy	4.37	1.17
KQ3	The (knowledge) output of the PVC has a good reputation	4.60	1.27
System quality (Source: Kulkarni *et al.* 2006)			
SQ1	The PVC is available for me to locate knowledge	4.95	1.47
SQ2	The PVC allows search using multiple criteria	5.14	1.29
SQ3	The PVC is accessible from anywhere by anyone	5.18	1.39
SQ4	The PVC is easy to use or adequately documented	5.02	1.27
SQ5	The PVC allows me to add useful knowledge	5.27	1.28
Compatibility (Source: Taylor and Todd 1995)			
COMP1	Using the PVC will fit well with the way I seek knowledge	5.11	1.40
COMP2	Using the PVC will fit into my seek style	4.98	1.41
COMP3	The PVC will be compatible with the way I seek knowledge	4.96	1.39
Trust (Source: Kankanhalli *et al.* 2005a, He and Wei 2009)			
TR1	I feel that other PVC members are trustworthy	4.48	1.39
TR2	I believe that other PVC users' knowledge is reliable	4.34	1.33
TR3	I believe that people in the PVC share their best knowledge	4.48	1.31
Community identification (Source: Ma and Agarwal 2007)			
IDEN1	When someone criticises this PVC, it feels like a personal insult	3.93	1.24
IDEN2	This PVC's successes are my successes	4.32	1.44
IDEN3	When someone praises this PVC, it feels like a personal compliment	4.31	1.26
IDEN4	I'm very interested in what others think about this PVC	4.93	1.28
IDEN5	When I talk about this PVC, I usually say 'we' rather than 'they'	4.41	1.35
IDEN6	If other people criticised this PVC, I would feel bad	4.47	1.37
Peer influence (Source: Lewis *et al.* 2003)			
PI1	People think that using the PVC is valuable for knowledge seeking	4.70	1.69
PI2	My colleagues/friends' opinions regarding PVC usage for knowledge seeking are important to me	4.80	1.73
Resource availability (Source: Bhattacherjee 2000)			
RA1	Resources required to use the PVC for knowledge seeking were available to me	5.09	1.26
RA2	I had access to hardware, software and Internet needed to use the PVC for knowledge seeking	5.21	1.33
RA3	I was constrained by the lack of resources needed to use the PVC for knowledge seeking (***Reverse***)	5.17	1.32
Attitude towards knowledge seeking (Source: He and Wei 2009)			
ATT1	Using the PVC for knowledge seeking is a good idea	5.08	1.32
ATT2	Using the PVC for knowledge seeking is a foolish idea. (***Reverse***)	4.93	1.53
ATT3	I like the idea of using the PVC for knowledge seeking	5.11	1.35
ATT4	Using the PVC for knowledge seeking is a pleasant experience	5.04	1.33
Subjective norm of knowledge seeking (Source: Taylor and Todd 1995)			
SN1	People who influence my behaviour would expect that I should use the PVC for knowledge seeking	5.02	1.62
SN2	People who are important to me would expect that I should use the PVC for knowledge seeking	4.93	1.63
Perceived behavioural control of knowledge seeking (Source: Taylor and Todd 1995)			
PBC1	I would be able to seek knowledge well through the PVC	4.77	1.51
PBC2	Using the PVC for knowledge seeking is entirely within my control	4.50	1.49
PBC3	I have the resources, knowledge and ability to seek knowledge through the PVC	4.79	1.55
Knowledge seeking intention (Source: Venkatesh *et al.* 2003)			
KSI1	I intend to seek knowledge through the PVC	5.18	1.28
KSI2	I will try to seek knowledge through the PVC	5.10	1.31
KSI3	I plan to seek knowledge through the PVC	5.10	1.35
Knowledge seeking behaviour			
How many hours per week do you use the PVC for knowledge seeking?		4.73	1.82

Appendix 2. Matrix of loading and cross-loading

	PI	KSI	PBC	RA	SN	ATT	TR	COMP	SQ	KQ	IDEN	GROW	TASK
PI2	0.912	0.033	0.002	0.154	0.039	0.117	−0.012	0.079	0.135	0.041	−0.045	0.124	0.064
PI1	0.990	0.035	0.002	0.167	0.042	0.126	−0.013	0.086	0.146	0.044	−0.049	0.134	0.070
KSI3	0.034	0.962	0.364	0.657	0.481	0.612	0.510	0.610	0.664	0.383	0.464	0.653	−0.125
KSI2	0.035	0.973	0.369	0.665	0.487	0.619	0.516	0.618	0.672	0.388	0.469	0.661	−0.126
KSI1	0.031	0.881	0.334	0.601	0.440	0.560	0.467	0.559	0.608	0.351	0.425	0.598	−0.114
PBC3	0.002	0.357	0.942	0.355	0.274	0.310	0.263	0.307	0.384	0.194	0.203	0.348	0.017
PBC2	0.002	0.350	0.922	0.348	0.268	0.304	0.257	0.301	0.377	0.190	0.199	0.341	0.017
PBC1	0.001	0.343	0.906	0.342	0.264	0.298	0.253	0.295	0.37	0.187	0.196	0.335	0.017
RA3	0.118	0.478	0.264	0.700	0.321	0.420	0.263	0.392	0.457	0.259	0.279	0.487	−0.046
RA2	0.156	0.629	0.348	0.921	0.422	0.552	0.346	0.515	0.602	0.341	0.366	0.640	−0.061
RA1	0.148	0.598	0.331	0.876	0.401	0.525	0.329	0.490	0.572	0.324	0.348	0.608	−0.058
SN2	0.041	0.477	0.278	0.437	0.955	0.409	0.248	0.387	0.471	0.233	0.351	0.387	−0.052
SN1	0.042	0.485	0.283	0.444	0.971	0.416	0.252	0.394	0.478	0.237	0.357	0.394	−0.053
ATT4	0.120	0.595	0.308	0.560	0.400	0.935	0.500	0.672	0.694	0.523	0.352	0.562	0.016
ATT3	0.123	0.613	0.317	0.577	0.412	0.963	0.515	0.693	0.716	0.539	0.363	0.579	0.016
ATT1	0.101	0.500	0.259	0.471	0.337	0.787	0.420	0.565	0.584	0.440	0.296	0.473	0.013
TR3	−0.011	0.468	0.246	0.331	0.229	0.471	0.882	0.402	0.420	0.325	0.381	0.405	0.056
TR2	−0.011	0.455	0.239	0.322	0.223	0.459	0.858	0.391	0.408	0.316	0.371	0.394	0.054
TR1	−0.012	0.506	0.266	0.358	0.248	0.510	0.954	0.434	0.454	0.351	0.412	0.438	0.060
COMP3	0.079	0.577	0.296	0.508	0.369	0.653	0.414	0.909	0.604	0.441	0.330	0.511	−0.091
COMP2	0.082	0.599	0.308	0.528	0.383	0.679	0.430	0.945	0.628	0.458	0.342	0.531	−0.095
COMP1	0.081	0.596	0.306	0.525	0.381	0.675	0.427	0.939	0.624	0.456	0.341	0.528	−0.094
SQ5	0.111	0.520	0.308	0.492	0.371	0.559	0.358	0.501	0.753	0.392	0.273	0.529	−0.047
SQ4	0.105	0.489	0.289	0.463	0.349	0.526	0.337	0.471	0.709	0.369	0.257	0.497	−0.044
SQ2	0.115	0.535	0.317	0.507	0.382	0.576	0.369	0.516	0.776	0.404	0.281	0.544	−0.048
SQ3	0.099	0.464	0.275	0.439	0.332	0.500	0.320	0.447	0.673	0.350	0.244	0.472	−0.042
SQ1	0.101	0.471	0.279	0.446	0.336	0.507	0.325	0.454	0.683	0.356	0.247	0.479	−0.043
KQ3	0.037	0.336	0.174	0.312	0.206	0.472	0.311	0.410	0.440	0.844	0.233	0.293	−0.014
KQ2	0.043	0.382	0.197	0.354	0.234	0.536	0.352	0.465	0.499	0.957	0.264	0.333	−0.016
KQ1	0.038	0.337	0.174	0.313	0.206	0.473	0.312	0.411	0.441	0.846	0.233	0.294	−0.014
IDEN6	−0.032	0.311	0.139	0.256	0.237	0.243	0.278	0.234	0.233	0.178	0.645	0.197	0.040
IDEN5	−0.040	0.384	0.172	0.317	0.292	0.300	0.344	0.289	0.288	0.220	0.796	0.243	0.049
IDEN4	−0.031	0.304	0.136	0.251	0.232	0.238	0.273	0.229	0.229	0.174	0.631	0.193	0.039
IDEN3	−0.045	0.437	0.196	0.361	0.333	0.341	0.392	0.329	0.328	0.250	0.907	0.277	0.056
IDEN2	−0.040	0.387	0.174	0.320	0.295	0.302	0.347	0.291	0.291	0.222	0.803	0.245	0.050
IDEN1	−0.032	0.312	0.140	0.257	0.238	0.243	0.279	0.235	0.234	0.178	0.647	0.197	0.040
GROW4	0.120	0.599	0.326	0.613	0.358	0.530	0.405	0.496	0.619	0.306	0.269	0.882	−0.028
GROW3	0.130	0.651	0.355	0.666	0.389	0.577	0.441	0.539	0.673	0.333	0.293	0.959	−0.030
GROW2	0.125	0.628	0.342	0.643	0.375	0.556	0.425	0.520	0.649	0.321	0.282	0.925	−0.029
GROW1	0.123	0.617	0.336	0.631	0.368	0.546	0.417	0.511	0.638	0.316	0.277	0.909	−0.029
TASK2	0.065	−0.120	0.017	−0.061	−0.050	0.015	0.059	−0.093	−0.058	−0.015	0.058	−0.029	0.927
TASK3	0.056	−0.103	0.015	−0.052	−0.043	0.013	0.050	−0.080	−0.050	−0.013	0.049	−0.025	0.796
TASK1	0.067	−0.123	0.017	−0.062	−0.051	0.016	0.060	−0.095	−0.059	−0.016	0.059	−0.030	0.946

Note: Factor loadings are from CFA. ATT2 was dropped due to poor loadings in factor analysis. Discriminant and convergent validity are confirmed, since individual items load above 0.5 on their corresponding constructs and the loadings within constructs are higher than those across constructs.