Received 14 September 2015
Revised 4 May 2016
Accepted 12 May 2016

The mediating role of sense of virtual community

Hsin Hsin Chang
Department of Business Administration, National Cheng Kung University, Tainan, Taiwan
Pei-Hsuan Hsieh
Institute of Information Management, National Cheng Kung University, Tainan, Taiwan, and
Chen Su Fu
Department of Business Administration, National Cheng Kung University, Tainan, Taiwan

Abstract

Purpose – The purpose of this paper is to provide a comprehensive model to illustrate the mediating role of sense of virtual community (SOVC) in virtual communities of practices (VCoPs). The interrelations between social capital and collective action in terms of knowledge contribution in the VCoP context are also examined.

Design/methodology/approach – A total of 253 members from the Zclub and Jorsindo, responded to the survey. PLS-SEM path modeling was used to analyze survey data.

Findings – Members' structural capital and cognitive capital both positively and significantly influence members' SOVC, and, in turn, their SOVC influences relational capital.

Research limitations/implications – The study linked two theories, namely, social capital and theory of collective action, to discuss knowledge contribution in VCoPs. Social capital and SOVC have significant and positive effects on knowledge contribution in VCoPs.

Practical implications – Knowledge contributions in VCoPs are created through interactions among members, as well as the facilitation resulting from shared visions. Administrators can promote the formation of social-interaction ties in VCoPs to reinforce the formation of social capital and a SOVC.

Social implications – Administrators of knowledge-oriented groups must strive to sustain proper levels of SOVC among members to ensure their continued participation in VCoPs.

Originality/value – The main objectives of this study were to examine the effects of social capital (structural, cognitive, and relational capitals) on the quality and quantity of knowledge contribution. SOVC was proposed as a mediator in the relationship between structural and/or cognitive capital toward relational capital.

Keywords Sense of virtual community, Social capital, Collective action, Knowledge contribution
Paper type Research paper

1. Introduction

Issues related to virtual communities have attracted scholars' attention for many years, with knowledge contribution in virtual communities of practices (VCoPs) recently becoming one of the most popular topics in this field. The expansion of internet communication technologies has not only led to the proliferation of virtual communities (Shen *et al.*, 2010; Wasko *et al.*, 2009), but also facilitated knowledge exchanges in completely novel ways (Chiu *et al.*, 2006).

To better understand these interacting phenomenon, numerous studies have examined knowledge contribution in VCoPs from various perspectives (Bond and Lockee, 2014; Wasko *et al.*, 2009; Wasko and Faraj, 2005; Shen *et al.*, 2010). Wasko and Faraj (2005) employed the theory of collective action, social capital, and individual motivations;

Online Information Review
Vol. 40 No. 7, 2016
pp. 882-899

1468-4527
DOI 10.1108/OIR-09-2015-0304

and through this approach, provided explanations for knowledge sharing in electronic networks of practice. Their seminal work became a model thereafter. Building on this, Wiertz and Ruyter (2007) blended social capital with collective action to explain knowledge contributions in virtual communities. They viewed social capital as invisible and immediately accessible resources embedded in the relationships among participants, and defined collective action as individuals willingly working together to create and maintain public goods without expectation of rewards. Further, Lu *et al.* (2013) reported that social capital can, in principle, be generated virtually through media-based communities and social interactions. Moreover, such social interactions are bounded by common ties and belongings, as well as shared social interests and identity (Abfalter *et al.*, 2012; Guo and Cheng, 2016). In the literature, social identity is identified as an important element in virtual communities, particularly with regard to describing how an individual's self-concept is derived from their perceived membership of a social group (Tonteri *et al.*, 2011). In the VCoP context, social identity can be viewed as a sense of virtual community (SOVC), which can further facilitate feelings of belonging, identity, and attachment to the associated virtual community (VC) (Abfalter *et al.*, 2012; Guo and Cheng, 2016).

Although previous studies have argued for the importance of SOVC in the VCoP context, (e.g. Abfalter *et al.*, 2012; Tonteri *et al.*, 2011; Blanchard, 2008), none have attempted to create an elaborate structure to discuss the role that SOVC plays in social capital theory. Moreover, Wasko *et al.* (2009) claimed that having social capital does not guarantee the long-lasting participation of members; rather, it only explains how individuals' access and exchange the resources embedded within the relationships in the VCoPs. However, a lack of studies attempting to visualize the connections between social capital and collective action exists (Ahn and Ostrom, 2008). Accordingly, this study aimed to provide a comprehensive model to illustrate the mediating role of SOVC in VCoPs. The interrelations between social capital and collective action in terms of knowledge contribution in the VCoP context are also examined.

2. Theoretical background and conceptual framework

2.1 Theoretical background

2.1.1 Social capital theory. The concept of social capital has been applied in various research areas; yet, it remains challenging to define succinctly (Okoliand Oh, 2007; Wang and Chiang, 2009). Tsai and Ghoshal (1998) and Chow and Chan (2008) suggested that social capital included various different aspects, such as social ties and trusting relationships, that can facilitate the actions of individuals. Chang and Chuang (2011) and Okoli and Oh (2007) characterized social capital as a resource embedded in a social structure that is mobilized in purposive action. Referring to Nahapiet and Ghoshal (1998), this study defined social capital as the invisible resources embedded in social relations within groups that are accessible to an individual or social unit through a network of relationships. According to Nahapiet and Ghoshal (1998), social capital can be viewed from three dimensions, namely, structural capital, relational capital and cognitive capital, all three of which have been examined in numerous studies (e.g. Shin, 2010; Wasko and Faraj, 2005).

Structural capital represents the presence or absence of social-interaction ties between actors (Chiu *et al.*, 2006), and is established when connections arise between individuals (Wang and Chiang, 2009). These connections are commonly referred to as ties, and can ease as well as aggravate interpersonal interactions (Inkpen and Tsang, 2005). Adding to this, Wasko and Faraj (2005) stated that collectives characterized by

higher levels of structural capital are more likely to be maintained. Moreover, Tsai and Ghoshal (1998) showed that structural capital has a significant and positive association with relational capital.

Relational capital refers to the assets created and leveraged through ongoing relationships that influence the behavior of social actors (Yang and Farn, 2009). More specifically, it is established via the history of interactions among members, which leads to collective action and pro-social behavior (Robert *et al.*, 2008). Accordingly, commitment and trust are considered to be key components of relational capital (Inkpen and Tsang, 2005; Wasko and Faraj, 2005); and due to these components, relational capital is believed to be critical to the development of lasting social capital in VCoPs.

Cognitive capital represents resources that can improve understanding, facilitate open discussion, and encourage frequent communication among individuals within a network (Nahapiet and Ghoshal, 1998). Therefore, cognitive capital may promote not only better interactions, but also friendship and intimacy among members (Gima and Murray, 2007). Moreover, it has been suggested that cognitive capital may serve as the catalyst for better relationships among individuals.

2.1.2 Theory of collective action. The theory of collective action focuses on how to avoid problems that can arise the existence of conflicting incentives and suggests that individuals engage in such action due to social capital (Coleman, 1990). One problem that can arise in virtual communities is the existence of conflicting incentives, which can persuade or even force individuals not to engage in collective action. Ahn and Ostrom (2008) identified knowledge contribution as a behavior that departs from purely selfish motivations in the context of VCoPs. They indicated that when personal interests surpass the common interest, individuals will be willing to face the risk of supporting free-riders and losing the advantage of possessing otherwise exclusive knowledge.

According to Tsai and Bagozzi (2014), knowledge creation and sharing are of great importance to knowledge-orientated virtual communities, because one of the reasons that members participate in such communities is to seek knowledge and resolve problems. Newly generated knowledge will often attract new members, who represent new resources for the purpose of knowledge production. However, for successful growth, expansion and maintenance, the benefits of VCoPs must be clearly communicated to potential participants (Kang *et al.*, 2007; Gafni *et al.*, 2014). Further, ensuring active knowledge sharing remains challenging as members in most volunteer networks have different levels of willingness to participate (Gafni *et al.*, 2014; Shin, 2010). Consequently, it is not realistic to expect that every member will share knowledge. The free-rider phenomenon, which is to describe some members care only about self-benefits to access useful information in a community without contributing their own knowledge may also occur in VCoPs. Therefore, both knowledge seeking and contribution behaviors are highly related to the motives of VC participants, as well as their sense of community (SOC) (Gafni *et al.*, 2014; Shen *et al.*, 2010; Shin, 2010).

2.1.3 VCoP. A VC is a social network formed from the relationships of individuals who interact with others through specific social media to pursue goals and reciprocal benefits, as well as obtain social support (Chang and Chuang, 2011; Shin, 2010). In contrast, a community of practice is a group of individuals that work together in the physical world in order to achieve specific goals through producing, sharing, and leveraging knowledge (Chow and Chan, 2008). The primary difference between conventional communities of practice and VCoPs is that the latter are usually more loose-knit, as members are geographically distributed and share practice-related

knowledge mostly through computer-based technologies (Chow and Chan, 2008). Thus, this study viewed a VC as a social network that creates a space or forms a club online for people who are interested in a specific field to exchange information and experiences, as well as seek solutions for related problems. VCoPs can be viewed as "computer-mediated social spaces where individuals working on similar problems self-organize to help each other and share knowledge, advice, and perspectives about their occupational practice or common interests" (Wasko *et al.*, 2009, p. 254).

2.1.4 SOVC. McMillan and Chavis (1986, p. 9) defined SOC as "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together". Blanchard (2008) and Abfalter *et al.* (2012) extended the SOC concept to the virtual context. Based on the original concept of SOC, the SOVC is composed of three dimensions: membership, influence, and immersion (Koh and Kim, 2003), all of which can reflect the affective, cognitive, and behavioral aspects of VC members. Therefore, when members have a greater SOVC, they will be more committed to the aims of a VCoP (Tonteri *et al.*, 2011; Bond and Lockee, 2014). Accordingly, this study defined SOVC as an individual's feelings of membership, influence, and immersion in a VC. Membership refers to the experience of feelings of belonging to a VC; influence refers to the influence that an individual feels they have on other members in a VC; and immersion reflects the feeling of a state of flow when using a VC (Koh and Kim, 2003).

In the literature, it has been demonstrated that SOVC provides reasons for individuals to share knowledge in VCoPs, but does not encourage continued participation. Nevertheless, people who participate in a VCoP may have a desire to develop a SOC with others who share similar concerns (Pearson *et al.*, 2008). With higher levels of SOVC, members usually feel a greater sense of belongingness and emotional support, and tend to be more enthusiastic with regard to contributing knowledge to the collective (Bond and Lockee, 2014; Gafni *et al.*, 2014; Guo and Cheng, 2016). Therefore, we infer that individuals who experience a higher SOVC are more willing to spend time and effort participating in virtual communities.

2.2 Conceptual framework

In the context of VCoPs, this study followed Pearson *et al.* (2008) and Tsai and Ghoshal (1998) by adopting the structural and cognitive dimensions as antecedents of the relational dimension. Since SOVC has been identified as playing an important role in facilitating relationships among VC members, it is taken in this study as the mediating variable in the relationship between the structural/cognitive and relational dimensions. It is expected that structural and cognitive dimensions will facilitate the member relationship dimension via SOVC, and, in turn, enhance the contribution of knowledge in such communities. Figure 1 illustrates the conceptual framework of this study.

3. Hypotheses development

3.1 Linkage of structural capital and cognitive capital

Structural capital is an impersonal configuration of links between people or units (Nahapiet and Ghoshal, 1998), and can also be described as the connections created when members of a network interact with each other (Wang and Chiang, 2009). One facet of the constructs of structural capital is a social-interaction tie between members (Chiu *et al.*, 2006). Such ties allow individuals to exchange knowledge and find solutions by which to solve problems in VCoPs (Wasko *et al.*, 2009). Moreover, social-interaction

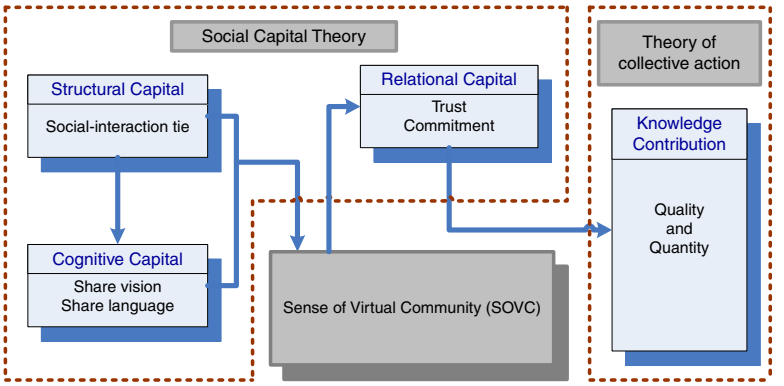

Figure 1.
Conceptual framework

ties are an essential aspect of social capital since they represent opportunities for social capital transactions (Adler and Kwon, 2002; Chiu *et al.*, 2006; Lu *et al.*, 2013). With the popularity of the internet, interactions between people are often no longer face-to-face, but rather occur via virtual connections in order to share common interests. The information exchanged through social-interaction ties can be knowledge related to the topics of the VCoPs, which in turn facilitates members' continued interest in the VCoPs.

Cognitive capital is the public good aspect of social capital (Coleman, 1990). Chiu *et al.* (2006) argued that cognitive capital as a resource provides shared understanding; further, the shared visions and shared language elements construct cognitive capital in VCoPs. Moreover, they believed that cognitive capital may help members enhance the effectiveness of knowledge exchange.

Shared vision is the major element that groups people both in real life and online (Chow and Chan, 2008). Shared vision is usually referred to as shared values, goals, and understandings that bind network members together to cooperatively achieve beneficial networks. Based on Tsai and Ghoshal (1998), this study defined shared vision as "a bonding mechanism which embodies collective goals and aspirations, and facilitates the integration of resources among different members in VCoPs".

Shared language arises from interactions between members. In virtual communities, member interactions mostly rely upon computer-mediated text messages, which may hinder effective interaction since individuals' expressive abilities are limited (Wasko and Faraj, 2005). As such, the key function of shared language is to transfer specific meanings within VCoPs. According to Chiu *et al.* (2006), shared language provides an avenue through which participants can understand each other and build common language in their domains. Based on Nahapiet and Ghoshal (1998), this study defined shared language as "the acronyms, subtleties, and underlying assumptions that are involved in daily interactions among members". In this manner, shared language not only helps with regard to evaluating the possible benefits of exchange, but also enhances the ability of members in VCoPs to access information.

Shared vision is the guidelines by which members reach collective goals, reduce misunderstandings, and facilitate cooperation (Tsai and Ghoshal, 1998). To achieve this element, members share experiences and interactions over time to develop common vision and purpose, which is expressed in unique language and ideas (Pearson *et al.*, 2008). qOnce members have had extensive interactions with each other, they will have a better understanding of the specific language and goals associated with their interactions.

This indicates that individuals will perceive themselves as part of a collective and thus behave in ways that achieve goals (Shin, 2010). Moreover, as members interact more and develop stronger ties, shared language develops, resulting in more efficient communication (Nahapiet and Ghoshal, 1998). At this point, individuals may feel that communicating with others becomes easier and more effective. Thus, we conclude that shared vision and shared language is distributed to members in online communities through social-interaction ties among members. Therefore, the following hypotheses are proposed:

H1a. Social-interaction ties are positively related to shared vision in VCoPs.

H1b. Social-interaction ties are positively related to shared language in VCoPs.

3.2 Linkage of structural capital and SOVC

SOVC may serve as an important motivation for individuals to continuously participate in VCoPs (Koh and Kim, 2003). Moreover, individuals forming and maintaining relationships with others exist not only in reality, but also in the virtual context. The connections between members allow them to learn about the environment and to gradually feel that they are part of the community. The SOVC is believed to stem from interactions among members as a result of the creation of their own identities and of learning the identity of other members (Tsai and Bagozzi, 2014). As a SOVC is developed through active participation, individuals will perceive fitness within the group after spending time and exerting effort. This supports the study argument that the more relationships within a VCoP one possesses, the more time one contributes to the VCoP; also, the higher the communication frequency with other members, the more one will establish SOVC in a VCoP. This leads to the following hypothesis:

H2. Social-interaction ties are positively related to a SOVC in VCoPs.

3.3 Linkage of cognitive capital and SOVC

Cognitive capital is a resource that promotes shared interpretations within a collective (Wasko and Faraj, 2005). Higher cognitive capital provides members with a common perspective that enables them to develop similar perceptions and interpretations of events (Guo and Cheng, 2016; Yang and Farn, 2009); in turn, these members are more likely to feel that they are part of a group. Inkpen and Tsang (2005) argued that shared vision not only influences knowledge transfer but also provides a decisive bonding mechanism. Shared vision brings "solidarity" to a group, which itself facilitates individuals to act toward collective goals and to consider their personal needs as secondary to those goals (Adler and Kwon, 2002; Shin, 2010). When members are involved in a VCoP in which everyone has common goals, they may feel group membership and perceive a SOVC.

Shared language allows members to understand and learn from each other in VCoPs. Tsai and Ghoshal (1998) and Chiu *et al.* (2006) suggested that shared language not only promotes communication efficiency, but also facilitates members' common understanding about the collective goals and guidelines by which to behave. Hence, a SOVC will be facilitated when members understand each other better. In this regard, shared language may also be a key that drives individuals to maintain participation in VCoPs.

Pearson *et al.* (2008) suggested that a shared purpose (shared vision and language) among the members of VCoPs not only creates collective understanding, but is also

necessary for maintaining members SOVC to collaborate and achieve long-term goals for the collective. In line with this notion, Wang and Chiang (2009) stated that cognitive capital (shared vision and language) enables members to integrate resources and to promote shared communication, which has significant effects on actor cohesion and community fostering. Based on the discussion above, we proposed the following hypotheses:

H3a. Shared vision is positively related to a SOVC in VCoPs.

H3b. Shared language is positively related to a SOVC in VCoPs.

3.4 Linkage of SOVC and relational capital

Relational capital has been identified as an important facilitator of individual action in a collective (Wasko and Faraj, 2005), and describes the personal quality of interpersonal relationships and represents the motivational characteristics of interpersonal social exchange (Yang and Farn, 2009). Relational capital places an emphasis on establishing relationships between members and the VCoP. Tsai and Ghoshal (1998) proposed that relational capital is positively and significantly related to the exchange and combination of resources, and that it may be accumulated by those who have a SOVC in VCoPs (Guo and Cheng, 2016; Nahapiet and Ghoshal, 1998).

Several dimensions are included in relational capital, such as commitment, reciprocity, trust, norm, obligation, and identification (Chang and Chuang, 2011; Chiu *et al.*, 2006; Nahapiet and Ghoshal, 1998; Pearson *et al.*, 2008; Wasko and Faraj, 2005). This study adopted trust and commitment as the primary factors of relational capital in the VCoP context, but excluded identification, as it is included in the concept of SOVC. Members possessing higher levels of SOVC will eventually facilitate trust among members and enable them to feel commitment toward the collective (Capello and Faggian, 2005).

Trust: though trust is the key facet in the relational dimension of social capital, its definition is elusive because the term is used with different meanings (Inkpen and Tsang, 2005). The role of trust has been seen as central to the success of relationship building in all contexts of relational exchanges. Following the work of Chiu *et al.* (2006), this study defined trust as "an individual's expectation that members in a virtual community will follow a generally accepted set of values, norms, and principles".

Commitment: Wasko and Faraj (2005) and Wiertz and Ruyter (2007) indicated that commitment is the duty or obligation to a VC that leads to a perceived responsibility to help others. Membership is an important social relationship in virtual communities and represents individuals experience of belonging to a collective (Guo and Cheng, 2016). Strong social capital should reflect mutual commitment arising from obligations that service to foster relationships among members (Pearson *et al.*, 2008). Based on Wiertz and Ruyter's (2007) and Wasko and Faraj's (2005), this study defined commitment as "an obligation that arises from frequent interactions and can stimulate individuals to help others in the collective due to shared membership".

The relationship between SOVC and relational capital (trust and commitment) that the current study adopted contradicts that found in prior research, which has suggested that SOVC is facilitated by trust and commitment (Kim *et al.*, 2009). However, as relational capital is established via accumulated interactions among members (Robert *et al.*, 2008), we argue that in the VCoPs context, individuals initially establish SOVC, which is then followed by trust and commitment to the VC. Based on this line of thinking, the individuals need a certain degree of interaction to trust other

VC members and commit to the VCoP before a SOVC can be established. Thus, the following hypotheses are proposed:

H4a. A SOVC is positively related to trust in VCoPs.

H4b. A SOVC is positively related to commitment in VCoPs.

3.5 Linkage of relational capital and knowledge contribution

Research on knowledge contribution has commonly focused on two issues, namely, the quality and quantity of knowledge contribution. The quality of knowledge contribution has been defined as "knowledge contributed by members that is relevant to the topic, easy to understand, accurate, complete, reliable and timely" (Chiu *et al.*, 2006). By contrast, the quantity of knowledge contribution has been defined as "the amount of knowledge one contributes during a period of time, which implies the frequency of knowledge contribution and reveals whether one is active in virtual communities of practice" (Chiu *et al.*, 2006).

Kim *et al.* (2009) mentioned that VC members will stop sharing knowledge when they detect harmful actions in other members, such as misusing or taking advantage of the shared knowledge. This infers that trust is the expectation that others will behave in predictable ways that develop between members over time who mutually interact in VCoPs. The quantity and quality of knowledge contribution will be enhanced when trust exists among members, which leads to the following hypotheses:

H5. Trust is positively related to the (a) quality and (b) quantity of knowledge contribution in VCoPs.

There have also been different viewpoints on the relationship of commitment and knowledge contribution in VCoPs (e.g. Wiertz and Ruyter, 2007; Wasko and Faraj, 2005). Kang *et al.* (2007) stated that members with strong levels of commitment will be more concerned about the development of the community and will show socially desirable behavior within the community. Members having developed a strong affective bond toward a VCoP, are more likely to contribute to the community (Blanchard, 2008; Tsai and Bagozzi, 2014). This implies that when members perceive commitment to a VCoP, they feel obliged to a collective and contribute more frequently in terms of knowledge sharing, which leads to the following hypotheses:

H6. Commitment is positively related to (a) quality and (b) quantity of knowledge contribution in VCoPs.

Based on the previous discussion, Figure 2 illustrates the research framework of this study.

4. Methodology

The definitions and measurement scales of all variables were adapted from prior studies. All scales consisted of a seven-point Likert scale ranging from 1 "strongly disagree" to 7 "strongly disagree", except for the item regarding frequency of knowledge contribution. Apart from the measurement items, the questionnaire also included several demographic variables, such as gender, age, participation motivation, membership length, and time spent per day in the particular VC.

A web-based questionnaire was linked to a VCoP named Zclub (www.zclub.com.tw) for the purpose of conducting a pilot test. In total, 108 members responded to the pilot test, with 36 invalid responses. All scales and items were above the reliability threshold

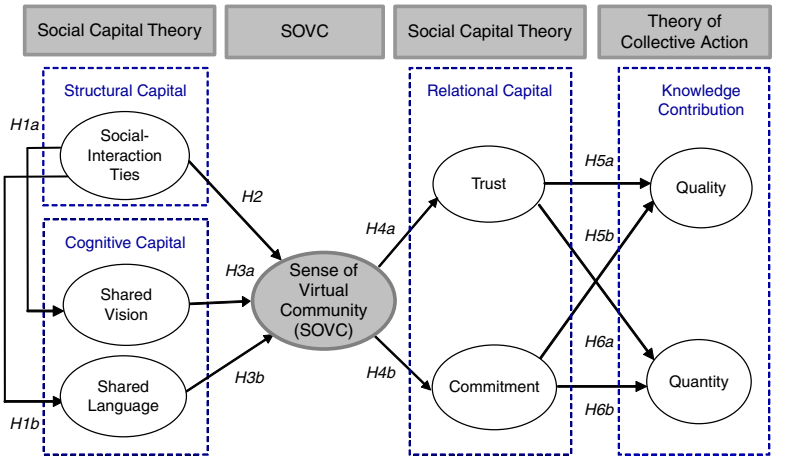

Figure 2.
Research framework

(Item-to-total of 0.5, and Cronbach's α of 0.7); therefore, all items were included in the item pool for the formal questionnaire. In addition, the study included four additional items to evaluate the content validity of each questionnaire and clarify whether the participants/members actually contributed motorcycle-related knowledge in the VCoPs or simply used the non-practice-related forums (e.g. transaction forums, talk forums, etc.). Accordingly, there were a total of thirty-nine items (including one reversed item) in the pool for the formal questionnaire.

5. Results of data analysis

Two VCoPs were chosen as platforms for conducting the formal test, Zclub and Jorsindo Motor Club (www.jorsindo.com). The same pilot test method was used to link the questionnaire to Zclub; however, to avoid violating the regulations and club policies of Jorsindo, the manager agreed to distribute a word file of the questionnaire to its members. In this manner, a total of 637 members, 115 from Zclub and 522 from Jorsindo, responded to the survey.

After eliminating incomplete questionnaires as well as those via the reversed item and the four additional items, 253 valid questionnaires remained. The demographic characteristics are exhibited in Table I.

5.1 Measurement assessment

SOVC, comprising the membership, influence and immersion dimensions, is treated as a formative construct in this study. SOVC was thus added to social capital theory to test its mediating effect; consequently, this study is more exploratory than confirmatory in nature. Partial least squares structural equation modeling (PLS-SEM) is more appropriate than covariance-based SEM (CB-SEM) when the research objective is theoretical development, and so the formative construct is included in the structural model (Hair *et al.*, 2014). Therefore, PLS-SEM path modeling was used in this study to assess the path modeling with latent variables by using SmartPLS 2.0, which was comprised of factor loadings as well as convergent and discriminant validity analyses. According to the criteria of convergent validity proposed by Fornell and Larcker (1981), the convergent validity of the scales used in this study is satisfactory. As shown in Table II, all indicator loadings are significant and exceed 0.7, all construct reliabilities are greater than 0.8, and

Descriptions	Freq.	%	Descriptions	Freq.	%
Gender			*Length of membership in XXX*		
Male	131	52	Less than 3 months	28	11
Female	122	48	3-6 months	28	11
			6-12 months	38	15
			1-2 years	75	30
			2-3 years	51	20
			More than 3 years	33	13
Age			*Time spend on XXX per day*		
19 and below	47	18	Less than 1/2 hr	8	3
20-24	164	65	1/2-1 hr	92	36
25-29	32	13	1-2 hrs	86	34
30-34	7	3	2-3 hrs	39	16
35 and above	3	1	3-4 hrs	7	3
			More than 4 hrs	21	8
Motivation of participation					
Fulfill one's self-interest	113	45			
Interact with others	14	6			
Developing friendship	14	5			
Exchange related experience	107	42			
Others	5	2			

Note: XXX represents either Jorsindo motor club or Zclub

Table I. Demographic characteristics

all average variance extracted (AVE) values by each construct exceed 0.5. As shown in Table III, all values of the AVE square root on the diagonal are greater than the correlations among constructs on the off-diagonal. It can thus be concluded that the scales used in this study have sufficient construct validity.

5.2 PLS path model

Figure 3 shows the path diagram of the bootstrap results, and suggests that social interaction ties are positively and significantly related to shared vision ($\beta = 0.138$, $p < 0.05$), shared language ($\beta = 0.103$, $p < 0.05$), and SOVC ($\beta = 0.461$, $p < 0.001$), and thus *H1a*, *H1b*, and *H2* are supported. Although shared vision was found to have a positive relationship with SOVC ($\beta = 0.319$, $p < 0.001$), shared language was insignificantly related. *H3a* is thus supported, but *H3b* is not. In the case of the relationships between SOVC and trust and/or commitment, both were positive and significantly related ($\beta = 0.431$, $p < 0.001$; $\beta = 0.551$, $p < 0.001$, respectively), and so *H4a* and *H4b* are supported. Furthermore, trust had a positive and significant relationship with both the quality ($\beta = 0.412$, $p < 0.001$) and quantity ($\beta = 0.184$, $p < 0.001$) of knowledge contribution, so both *H5a* and *H5b* are supported in this study. Commitment was also found to have positive and significant relationships with quality ($\beta = 0.364$, $p < 0.001$) and quantity of knowledge contribution ($\beta = 0.332$, $p < 0.001$), and thus *H6a* and *H6b* are supported. A summary of the hypothesis-testing results is presented in Table IV.

6. Discussion and Implications

Discussion and conclusion

The results showed that social capital can facilitate knowledge sharing of members who are characterized by different personal tendencies, such as altruism or egotism in VCoPs.

Constructs	Items	FL	CR	AVE	Cronbach's α
Social-interaction ties (SIT)			0.9354	0.7836	0.9073
	SIT1	0.8898			
	SIT2	0.8631			
	SIT3	0.8916			
	SIT4	0.8960			
Shared vision (SV)			0.9432	0.8471	0.9055
	SV1	0.9303			
	SV2	0.9312			
	SV3	0.8993			
Shared language (SL)			0.8647	0.6829	0.8168
	SL1	0.7289			
	SL2	0.9339			
	SL3	0.8032			
Sense of virtual community (SOVC)			0.9370	0.8128	0.9292
Membership (SVM)	SVM1	0.8833			
	SVM2	0.8761			
Influence (SVIn)	SVIn1	0.8329			
	SVIn2	0.8235			
Immersion (SVIm)	SVIm1	0.8189			
	SVIm2	0.8288			
Trust (TR)			0.9181	0.6918	0.8878
	TR1	0.7979			
	TR2	0.8537			
	TR3	0.8469			
	TR4	0.8490			
	TR5	0.8094			
Commitment (COM)			0.9167	0.7861	0.8620
	COM1	0.8370			
	COM2	0.9186			
	COM3	0.9021			
Quality of knowledge contribution (QLKC)			0.9292	0.8140	0.8849
	QLKC1	0.9056			
	QLKC2	0.9272			
	QLKC3	0.8729			
Quantity of knowledge contribution (QTKC)			0.9152	0.7295	0.8731
	QTKC1	0.8403			
	QTKC2	0.8745			
	QTKC3	0.8429			
	QTKC4	0.8583			

Table II.
Factor loading, composite reliability, AVE and Cronbach's α

Notes: $n = 253$. FL, factor loading; CR, composite reliability; AVE, average variance extracted

This study also provided preliminary support for the correlations of the social capital dimensions; more specifically, the structural and cognitive dimensions served as antecedents of the relational dimension (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998; Pearson *et al.*, 2008). Relational capital (trust and commitment) had a positive effect on both the quality and the quantity of knowledge contribution. Although members may contribute to a collective due to their interest in the topics being discussed, trust can help temper their fear of losing unique value when exchanging knowledge. When members trust each other, concerns of being replaced in the collective are alleviated. As committed members possess a sense of responsibility to help each other in VCoPs, if their topic knowledge is sufficient, they post and make comments to the collective more often (Shin, 2010).

Latent construct	SIT	SV	SL	SOVC	TR	COM	QLKC	QTKC
SIT	*0.885*							
SV	0.138	*0.920*						
SL	0.103	0.134	*0.826*					
SOVC	0.507	0.386	0.114	*0.902*				
TR	0.219	0.624	0.132	0.431	*0.832*			
COM	0.258	0.548	0.132	0.551	0.4	*0.887*		
QLKC	0.314	0.631	0.04	0.561	0.558	0.529	*0.902*	
QTKC	0.597	0.279	0.126	0.769	0.317	0.406	0.461	*0.854*

Notes: SIT, social-interaction ties; SV, shared vision; SL, shared language; SOVC, sense of virtual community; TR, trust; COM, commitment; QLKC, quality of knowledge contribution; QTKC, quantity of knowledge contribution. Diagonal elements (in italic) are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements

Table III.
Discriminant validity

The results also verify that a SOVC facilitates member identification, promotes feelings of belongingness and involvement in the collective, and reduces communication barriers, thereby helping form relationships between members. Establishing a member's SOVC can facilitate relationships by increasing trust and commitment between members in VCoPs. When people identify themselves as belonging to a group after having interacted with members for some time, they not only feel they have an obligation to contribute to the group, they also tend to build similar visions as those of established members (Abfalter *et al.*, 2012; Andrews, 2002; Guo and Cheng, 2016; Tonteri *et al.*, 2011). For those who first join VCoPs only for the purpose of accessing knowledge, a SOVC will serve as an element that positively influences their willingness to continue participation (Ostrom, 2000).

Undoubtedly, the most basic element to create social capital and a SOVC is the interactions among members. Social interaction ties allow members to exchange information and share emotions with others and also minimize the problem of free-riders. Prior studies have often investigated the free-rider problem with respect to knowledge contribution. Moreover, free-riders are considered to have a negative effect on knowledge contribution (Ostrom, 2000; Wasko *et al.*, 2009). Hence, stimulating interactions among members may increase opportunities for sharing practice-related knowledge and building cognitive capital, a SOVC, and relational capital.

Theoretical implications

This study began by pointing to a lack of research linking social capital and the theory of collective action in relation to knowledge contribution in VCoPs. In response to the comments of Ahn and Ostrom (2008), this study facilitated an understanding of the relationships between social capital and the theory of collective action. Moreover, a SOVC can be considered as a link between social capital and the theory of collective action in VCoPs. Both social capital and SOVC can be developed based on the mutual interactions among members. Furthermore, findings from this study also support the notion that relational capital (trust and commitment) stems from a feeling of belongingness (Capello and Faggian, 2005). We may conclude that those who perceived a SOVC will be more likely to share knowledge and sustain the community.

Maintaining member feelings of belongingness in VCoPs may be necessary to develop and hold better social capital within the collective and further smooth the collective action that occurs. In addition, the present study combined the concepts of

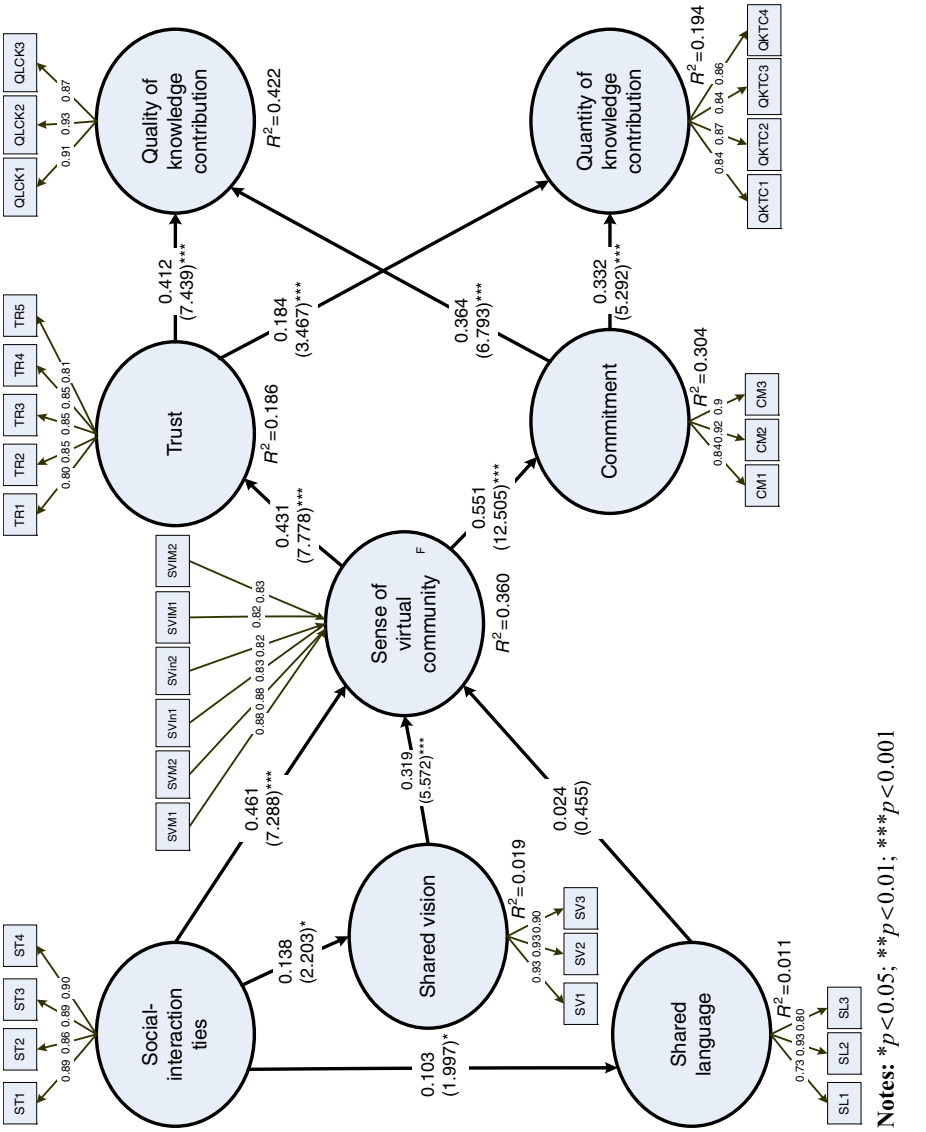

Figure 3.
Bootstrap results of PLS

Path		*t*-value	Path coefficient	Results
H1a	Social interaction ties → Shared vision	2.203	0.138*	Supported
H1b	Social interaction ties → Shared language	1.997	0.103*	Supported
H2	Social interaction ties → Sense of virtual community	7.288	0.461***	Supported
H3a	Shared vision → Sense of virtual community	5.572	0.319***	Supported
H3b	Shared language → Sense of virtual community	0.455	0.024	Not supported
H4a	Sense of virtual community → Trust	7.778	0.431***	Supported
H4b	Sense of virtual community → Commitment	12.505	0.551***	Supported
H5a	Trust → Quality of knowledge contribution	7.439	0.421***	Supported
H5b	Trust → Quantity of knowledge contribution	3.467	0.184***	Supported
H6a	Commitment → Quality of knowledge contribution	6.793	0.364***	Supported
H6b	Commitment → Quantity of knowledge contribution	5.292	0.332***	Supported

Notes: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table IV. Bootstrap results of the hypothesis testing

interrelationships of social capital dimensions, which was not considered in Wasko and Faraj (2005) and Chiu *et al.* (2006). The results were similar to those of Tsai and Ghoshal (1998), who discussed the correlations of these dimensions at firm levels. However, the present study took SOVC into consideration, the results of which showed structural capital to be both positively and significantly related to cognitive capital in VCoPs. It is noted that these findings differ from the work of Tsai and Ghoshal (1998), which might be due to cognitive capital playing a more important role in such conditions than in an intra-firm context.

Lastly, results regarding the relationship between relational capital (trust and commitment) and the quality and quantity of knowledge contribution were contrary to the suggestions of Wasko and Faraj (2005), who argued that relational capital might not exist in VCoPs due to a lack of shared history; be that as it may, our results provide support to the work of Wiertz and Ruyter (2007). Generally, posted contents in VCoPs can be stored and recorded; and so members can review past information and learn from it. Thus, shared history is accumulated. However, in VoVPs, individuals are exposed to a risky environment since they cannot predict others' behavior. Under such circumstances, the assessments an individual makes of the relationships with others can be even more important than in other contexts. Thus, relational capital can have a positive impact on knowledge contribution in VCoPs.

Practical implications

To tie members together for maintaining order within the community as well as social capital, setting rules in written words to clearly communicate a shared vision to members, especially in the case of new or potential members, is a common and effective method employed by most VCoPs. Administrators are suggested to further verify whether the rules are structurally aligned with the design features of their VCoP, so that shared vision can be confirmed to have been concretely implemented (Shin, 2010). For example, some newcomers focus mostly on knowledge seeking in VCoPs, and so the feature of automatically retrieving knowledge updates on certain topics from varied news feeds (e.g. RSS or e-mail alerts) should be available during their registration process. Customized or personalized account settings should also be available to enable quick viewing of the latest knowledge updates when logging into the community. Presenting numbers of active members and displaying who are currently online via their activity

status "ready to talk or chat" (e.g. Skype account status) could increase members' motivation to continue interactions as well as contribute their own knowledge.

In addition, administrators could gradually enlarge the infrastructure of their VCoPs by offering more knowledge-oriented interactive features and user-friendly social supports to reinforce members' feelings of belongingness at all times (Guo and Cheng, 2016). For example, administrators could develop a grading mechanism with facial expression features along with a dialogue box that automatically appears with member's account photos below every post, as in the Facebook "Like" and "comment" features. Members may easily be encouraged to evaluate a post by giving grades and/or leaving comments, which may indirectly contribute knowledge in VCoPs. Administrators could present the predicted ranking of a member's account reputation for continuously interacting with others when viewing a post and then receiving cumulative evaluation scores after a certain period of time. By doing so, members could have the motivation to be recognized as role models that often provide the latest knowledge content, respond to members' posted questions on certain topics, and post open-ended questions to initiate more discussion threads in VCoPs.

Lastly, although the present results showed that social capital and a SOVC have significant and positive effects on knowledge contribution in VCoPs, administrators should not treat them as perfect solutions. Moreover, caution should be exercised as both social capital and a SOVC may lead to intense group solidarity that implies a potential for creating exclusivity. Interpersonal networks can develop strong norms and identification over time and lead to limited openness to new information and diverse viewpoints (Nahapiet and Ghoshal, 1998). Accordingly, for knowledge-oriented groups such as VCoPs, administrators should strive to sustain proper levels of social capital and a SOVC among members while simultaneously maintaining a new-comer-friendly environment.

Limitations and implications for future research

Despite the implications above, we acknowledge that limitations of this study exist. First, the study only used two VCoPs for motorcycle-related topics as the platform. In addition, the study had difficulties and limits in regard to accessing the member database of the VCoPs. As such, future researchers could conduct more investigations into different types of VCoPs with data from the member database to verify and generalize the findings of this study. Second, although the present results supported that a SOVC is vital for the survival of VCoPs, we could not identify which stage of participation in the VCoPs is the key to the development of individual feelings of a SOVC, nor could we distinguish the extent of that feeling or the distinct influences on different feelings. Accordingly, future research could also examine the subtle differences among different individual personality traits as well as the differences in members exhibiting different characteristics in virtual communities. Examining the association between social capital and the theory of collective action in contexts apart from virtual communities (e.g. economics, politics, and social welfare issues) would also be worthwhile. Lastly, further research is suggested to explore the relationship among the three dimensions of social capital, as suggested by Tsai and Ghoshal (1998), in order to determine if the relationships are unidirectional or whether cyclic-relationships exist. Moreover, scholars have yet to reach an agreement on the composite facets of social capital. Ahn and Ostrom (2008) mentioned that since social capital is an evolving theory, future research could employ different variables and identify the appropriate factors related to social capital in different contexts.

References

Abfalter, D., Zaglia, M.E. and Mueller, J. (2012), "Sense of virtual community: a follow up on its measurement", *Computers in Human Behavior*, Vol. 28 No. 2, pp. 400-404.

Adler, S.P. and Kwon, S.W. (2002), "Social capital: prospects for new concept", *Academy of Management Review*, Vol. 27 No. 1, pp. 17-40.

Ahn, T.K. and Ostrom, E. (2008), "Social capital and collective action", in Castiglion, D., Van Deth, J.W. and Wolleb, G. (Eds), *The Handbook of Social Capital*, Oxford University Press, New York, NY, pp. 70-100.

Andrews, D. (2002), "Audience-specific online community design", *Communications of the ACM*, Vol. 45 No. 4, pp. 64-68.

Blanchard, A.L. (2008), "Testing a model of sense of virtual community", *Computers in Human Behavior*, Vol. 24 No. 5, pp. 2107-2123.

Bond, M.A. and Lockee, B.B. (2014), *Building Virtual Communities of Practice for Distance Educators*, Springer, New York, NY.

Capello, R. and Faggian, A. (2005), "Collective learning and relational capital in local innovation process", *Regional Studies*, Vol. 39 No. 1, pp. 75-87.

Chang, H.H. and Chuang, S.S. (2011), "Social capital and individual motivations on knowledge sharing: participant involvement as a moderator", *Information & Management*, Vol. 48 No. 1, pp. 9-18.

Chiu, C.M., Hsu, M.H. and Wang, E.T. (2006), "Understanding knowledge sharing in virtual communities: an integration of social capital and social cognitive theories", *Decision Support Systems*, Vol. 42 No. 3, pp. 1872-1888.

Chow, W.C. and Chan, L.S. (2008), "Social network, social trust and shared goals in organizational knowledge sharing", *Information & Management*, Vol. 45 No. 7, pp. 458-465.

Coleman, J.S. (1990), *Foundations of Social Theory*, Belknap Press, Cambridge, MA.

Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation modelswith unobservable and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.

Gafni, R., Geri, N. and Bengov, P. (2014), "Investigating the effect of tangible and virtual rewards on knowledge contribution in online communities", *Online Journal of Applied Knowledge Management*, Vol. 2 No. 1, pp. 1-11.

Gima, K.A. and Murray, J.Y. (2007), "Exploratory and exploitative learning in new product development: a social capital perspective on new technology", *Journal of International Marketing*, Vol. 15 No. 2, pp. 1-29.

Guo, T.C. and Cheng, Z.C. (2016), "Sense of belonging based on novel posting: individuals' processes of social and psychological integration into virtual groups", *Online Information Review*, Vol. 40 No. 2, pp. 204-217.

Hair, J.F., Sarstedt, M., Kuppelwieser, V. and Hopkins, L. (2014), "Partial least squares structural equation modeling (PLS-SEM): an emerging tool for business research", *European Business Review*, Vol. 26 No. 2, pp. 106-121.

Inkpen, A.C. and Tsang, E.W.K. (2005), "Social capital, networks, and knowledge transfer", *Academy of Management Review*, Vol. 30 No. 1, pp. 146-165.

Kang, I., Lee, K.C., Lee, S. and Choi, J. (2007), "Investigation of online community voluntary behavior using cognitive map", *Computers in Human Behavior*, Vol. 23 No. 1, pp. 111-126.

Kim, D., Ferrin, D. and Rao, H.R. (2009), "Trust and satisfaction, two stepping stones for successful e-Commerce relationships: a longitudinal exploration", *Information Systems Research*, Vol. 20 No. 2, pp. 237-257.

Koh, J. and Kim, Y. (2003), "Sense of virtual community: a conceptual framework and empirical validation", *International Journal of Electronic Commerce*, Vol. 8 No. 2, pp. 75-93.

Lu, J., Yang, J. and Yu, C.S. (2013), "Is social capital effective for online learning?", *Information & Management*, Vol. 50 No. 7, pp. 507-522.

McMillan, D.W. and Chavis, D.M. (1986), "Sense of community: a definition and theory", *Journal of Community Psychology*, Vol. 14 No. 1, pp. 6-23.

Nahapiet, J. and Ghoshal, S. (1998), "Social capital, intellectual capital, and the organizational advantage", *Academic Management Review*, Vol. 23 No. 2, pp. 242-226.

Okoli, C. and Oh, W. (2007), "Investigating recognition-based performance in an open content community: a social capital perspective", *Information & Management*, Vol. 44 No. 3, pp. 458-465.

Ostrom, E. (2000), "Collective action and evolution of social norms", *Journal of Economic Perspectives*, Vol. 14 No. 3, pp. 137-158.

Pearson, A.W., Carr, J.C. and Shaw, J.C. (2008), "Toward a theory of familiness: a social capital perspective", *Entrepreneurship Theory and Practice*, Vol. 32 No. 6, pp. 949-969.

Robert, L.P., Dennis, A.R. and Ahuja, M.K. (2008), "Social capital and knowledge integration in digital enabled teams", *Information System Research*, Vol. 19 No. 3, pp. 314-334.

Shen, K.N., Yu, A.Y. and Khalifa, M. (2010), "Knowledge contribution in virtual communities: accounting for multiple dimensions of social presence through social identity", *Behavior & Information Technology*, Vol. 29 No. 4, pp. 337-348.

Shin, D.H. (2010), "Analysis of online social networks: a cross-national study", *Online Information Review*, Vol. 34 No. 3, pp. 473-495.

Tonteri, L., Kosonen, M., Ellonen, H. and Tarkiainen, A. (2011), "Antecedents of an experienced sense of virtual community", *Computers in Human Behavior*, Vol. 27 No. 6, pp. 2215-2223.

Tsai, H.T. and Bagozzi, R.P. (2014), "Contribution behavior in virtual communities: cognitive, emotional, and social influences", *MIS Quarterly*, Vol. 38 No. 1, pp. 143-164.

Tsai, W. and Ghoshal, S. (1998), "Social capital and value creation: the role of intrafirm networks", *Academy of Management Review*, Vol. 41 No. 4, pp. 464-476.

Wang, J.C. and Chiang, M.J. (2009), "Social interaction and continuance intention in online auctions: a social capital perspective", *Decision Support Systems*, Vol. 47 No. 4, pp. 466-476.

Wasko, M.M. and Faraj, S. (2005), "Why should I share? Examining knowledge contribution in electronic networks of practice", *MIS Quarterly*, Vol. 29 No. 1, pp. 1-23.

Wasko, M.M., Teigland, R. and Faraj, S. (2009), "The provision of online public good: examining social structure in an electronic network of practice", *Decision Support Systems*, Vol. 47 No. 3, pp. 254-265.

Wiertz, C. and Ruyter, K.D. (2007), "Beyond the call of duty: why customers contribute to firm-hosted commercial online communities", *Organization Studies*, Vol. 8 No. 3, pp. 347-376.

Yang, S. and Farn, C. (2009), "Social capital, behavioral control, and tacit knowledge sharing – a multi-informant design", *International Journal of Information Management*, Vol. 29 No. 3, pp. 210-218.

About the authors

Hsin Hsin Chang is a Distinguished Professor of the Department of Business Administration at the National Cheng Kung University, Taiwan. She received a PhD from the School of Management, University of Bradford, England, UK. Her current research interests fit broadly into the areas of e-business, online consumer behavior and decision, m-commerce, human-computer interaction, collaborative and innovation, e-health care, and global logistics. She has published in several journals such as *Decision Support Systems*, *Information & Management*,

Information Systems Journal, *Information Systems Frontiers*, *International. Journal of Information Management*, *International. Journal of Computers-Human Studies*, *Computers in Human Behavior*, *Health Information Management Journal*, *Internet Research*, *IT&People*, *ID*, *IJCIM*, *JOBIM*, *JOEUC*, *OIR*, *TQM&BE*, *Supply Chain Management, Technovation*, etc. Hsin Hsin Chang is the corresponding author and can be contacted at: easyhhc@mail.ncku.edu.tw

Pei-Hsuan Hsieh is an Associate Professor of Institute of Information Management at the National Cheng Kung University, Taiwan. Her research interests are online services, web-based knowledge management, e-government and information ethics. She has published a numbers of journal articles, conference papers and book chapters in her fields. She is also the reviewer of several peer-reviewed and indexed academic journals.

Chen Su Fu is a Postdoctoral Fellow in the Department of Business Administration, National Cheng Kung University, Taiwan. Her current interests lie in the development and applications of new integrated (qualitative/qualitative) methodologies for understanding consumer behaviors. She has published several articles in *Industrial Marketing Management*, *Information Systems Frontiers*, *IT & People*, *Journal of Health Communication*, *Scandinavian Journal of Psychology*, etc.