



Modeling job effectiveness and its antecedents from a social capital perspective: A survey of virtual teams within business organizations

Chieh-Peng Lin

Institute of Business & Management, National Chiao Tung University, 4F, 118, Sec. 1, Jhongsiao W. Rd., Taipei 10044, Taiwan

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ABSTRACT

This study develops two alternative models concerning job effectiveness, knowledge sharing, and their antecedents related to individuals' perception about their job effectiveness in a team. Model 1 of this study intends to be as parsimonious as theoretically justifiable. It posits that three dimensions of social capital – structural, relational, and cognitive social capital – simultaneously influence knowledge sharing and job effectiveness indirectly through the mediation of team commitment, while job effectiveness is also influenced by knowledge sharing. Based on Model 1, Model 2 further adds that knowledge sharing is influenced directly by three dimensions of social capital. The two models are tested by collecting data from professionals of virtual teams in high-tech industries. The test results support seven out of nine hypotheses in Model 2. Finally, managerial implications of the empirical findings are also discussed.

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1. Introduction

Teams have become basic units in organizations globally, and their activities are ubiquitous within the organizations. Employees' jobs are increasingly being structured into organizational teams (Simons, Germans, & Ruijters, 2003) in which knowledge sharing has become critical to the teams' success, because knowledge is of paramount importance for them to enhance their competitive advantages. Organizational teams mainly bring numerous benefits for both management and employees, including a method of pooling ideas, facilitating communication, improving workflow, and so on. For the benefits, individuals' job effectiveness in an organizational team remains one of the most perennial and important issues for many practitioners and academics (Yang, Kang, & Mason, 2008).

Specialized knowledge embedded in personnel is organizations' most important asset, and more particularly many employees need to be included on a collaborative team to meet task requirements and increase their individuals' effectiveness in a team (Pardo, Creswell, Thompson, & Zhang, 2006). A distinctive capability of a team rests on its ability to collaboratively blend efforts of the members from its "competence portfolio" to perform collaboration better than that of its competitors (Nordhaug & Gronhaug, 1994). However, a critical barrier to performing collaboration well is that teamwork arrangements must overcome the pull of social capital. Individuals with abundant social capital are more likely to approach reliable co-workers than those without the capital. The former are more likely than the latter to seek help, knowledge, and obligations from others, reduce search costs to obtain expert

opinions (e.g., Boh, Ren, Kiesler, & Bussjaeger, 2007), and eventually increase their job effectiveness.

Despite the importance of individuals' job effectiveness in their organizational teams, much previous research studying job effectiveness emphasizes individuals' attitudes or psychological attachment towards their organization (e.g., organizational commitment, trust) as antecedents that do not involve frequent social contacts with their team co-workers. Thus, in response to such insufficient discussions about individuals' job effectiveness in a team, our central research objective is to establish a rigorous understanding as to the formation, mediators, and antecedents of individuals' job effectiveness based on social capital theory across organizational teams and to eventually help understand the formation of individuals' job effectiveness in a team. Social capital theory is applied herein, because the theory helps explain various social relationships that are critical for collaboration and interactions among organizational members, leading to its appropriateness for examining job effectiveness in teaming contexts. More specifically, the research question of interest to this study is: Through what mediating mechanism does social capital influence individuals' job effectiveness in teaming contexts?

This study differs from previous research in two important ways. First, this study is one of the first to examine the influence of social capital on job effectiveness in the virtual world context. The issues related to social capital and job effectiveness have been examined for face-to-face organizational teams in some previous research, but in contrast, it is still uncertain whether the findings of previous research in social capital can be applied in virtual teams. An improved understanding of the key determinants of job effectiveness across virtual teams in this study can help man-

E-mail address: jacques@mail.nctu.edu.tw

agement design strategies that are well suited to the needs of the target team members in order to improve their online social capital and manage team collaboration in an effective manner. Second, while some research suggests knowledge sharing that influences individuals' job effectiveness is indirectly affected by social factors through the mediation of team commitment, others indicate that knowledge sharing is affected by the factors both directly and indirectly via team commitment. This study obtains empirical results, pertaining to this dispute, by testing the possibility of both direct and indirect influences of the determinants on knowledge sharing from a social capital aspect.

The rest of this paper proceeds as follows. The next section formulates conceptual models of job effectiveness and describes the theoretical underpinnings of social capital theory. Section 3 presents our research methods, including our choice of empirical context, subject sample, and research instrumentation. Section 4 describes data analysis procedures and results. Section 5 outlines the limitations of our study, the implications of our findings for practice in human resources, and future research.

2. Research framework and hypotheses

This study develops two alternative models of individuals' job effectiveness from a social capital perspective. Model 1 proposed in this study intends to be as parsimonious as theoretically justifiable. It posits that three dimensions of online social capital – structural, relational, and cognitive social capital – simultaneously influence knowledge sharing and job effectiveness indirectly through the mediation of team commitment, while job effectiveness is also influenced directly by knowledge sharing. Whereas Model 1 is the parsimonious model, an alternative, Model 2, is proposed for comparison. Based on Model 1, Model 2 adds that knowledge sharing is influenced directly by three dimensions of online social capital simultaneously. Nevertheless, the rationale about Model 1 is first provided in the following.

2.1. Knowledge sharing and job effectiveness

Knowledge sharing represents individuals' willingness to assist as well as to absorb from others the development of new skills or competencies (Ho & Huang, 2009; Kuo & Young, 2008; Lin, 2007a; Raban & Rafaei, 2007). Individuals' knowledge sharing networks are widely considered to contribute substantially to organizational effectiveness (Hoegl, Parboteeah, & Munson, 2003; Komlodi, 2004). They are particularly important in online communities where people can share their knowledge with others easily and efficiently.

Knowledge sharing can make a significant contribution to the development of core competencies and skills and the establishment of a sharing environment where organizational members are encouraged to share and utilize their knowledge in problem-solving conditions (Beers, Boshuizen, Kirschner, & Gijsselaers, 2005), leading to increased job effectiveness (Macneil, 2001). While knowledge increases its added value when it is shared with and transferred to other organizational members (Yang, 2007), the incomplete transferring of knowledge incurs a so-called organizational knowledge depreciation that results in job ineffectiveness (Argote, 1999). Thus, the hypothesis derived is stated as below.

- H₁₁: Knowledge sharing is positively related to job effectiveness.

2.2. Team commitment and job effectiveness

The strength of an individual's involvement with particular teams is considered individuals' perceived team commitment

(Bishop, Scott, & Burroughs, 2000), which is also characterized by a positive response toward team co-workers (Lin, 2007a). In other words, team commitment herein is considered traditionally an individual affect and attachment towards his or her team. In this study, team commitment is short for individuals' perceived team commitment.

Team commitment has been reported as an important determinant in explaining job effectiveness in studies based on non-IT contexts (Bishop, Scott, & Burroughs, 2000). For example, team commitment is strongly linked to sales force contexts with numerous team support, including those directed to co-workers (MacKenzie, Podsakoff, & Ahearne, 1998), implying that team commitment is likely associated with job effectiveness that lies crucially upon team support.

Given that team members are attracted to or repelled by teams owing to the extent of their attachment with the team (Schneider, 1987), online individuals with strong team commitment are likely to commit extra efforts (Meyer & Allen, 1997) to their teamwork, leading to enhanced job effectiveness. To sum up, developing team commitment represents one of the key issues in relation to the management of knowledge workers (Storey & Quintas, 2001), because workers with strong team commitment are unlikely to evade essential obligations and dedication within the team (Hislop, 2003), resulting in increased job effectiveness. Thus, the hypothesis is stated as follows.

- H₁₂: Team commitment is positively related to job effectiveness.

2.3. Team commitment and knowledge sharing

Based on the organization theory, team commitment is considered an important factor in explaining knowledge sharing in quite a number of studies (Lin, 2007a, 2007b; Van den Hooff & Van Weenen, 2004). Positively related to individuals' willingness to commit extra effort to their tasks (Lin, 2007a), team commitment is thus expected to be related to the willingness to provide and receive knowledge in the execution of the tasks (Van den Hooff & Van Weenen, 2004).

Various studies have specifically examined the relationship between commitment and knowledge sharing (e.g., Lin, 2007b; Van den Hooff & Van Weenen, 2004). In fact, the nature and pattern of individuals' behavior on knowledge sharing are affected by the individuals' commitment to their immediate teams or organizations (O'Reilly & Chatman, 1986) – that is, strong team commitment engenders individuals' beliefs that the team has the right to the information and knowledge which the team has created or acquired (Jarvenpaa & Staples, 2001), leading to enhanced knowledge sharing. Thus, the hypothesis is stated as follows.

- H₁₃: Team commitment is positively related to knowledge sharing.

2.4. Social capital online

Social capital can be used for understanding job effectiveness across teams, because social capital complements the medium theory as it explains what situations are important for individuals to interact with other team members, voluntarily, to an extensive degree (e.g., Bessiere, Newhagen, Robinson, & Shneiderman, 2006; Lin, Wang, Tsai, & Hsu, 2010; Pfeil, Arjan, & Zaphiris, 2009; Radin, 2006). In this study, individuals' team commitment is hypothetically driven by social capital online, including three dimensions: (1) structural links or connections between online individuals, which are named structural social capital; (2) individuals' cognitive capability that helps understand the feelings of others who are

online, which is named cognitive social capital; (3) social relationships that reflect strong, positive characteristics and values among online individuals, which are named relational social capital. The hypotheses development is clarified in detail in the following.

2.5. Structural social capital and team commitment

Social capital theory suggests that structural social capital reflected by network ties and configuration is accumulated through the interpersonal interconnection that leads to a critical outcome of collective action. Structural social capital is thus positively related to team commitment, given that team commitment can be considered a typical example of the collective effect towards a team. This phenomenon is partially supported by previous research indicating that a business relationship to the social and structural bond that exists between partners is a key predictor of long-term commitment in cross-national business relationships (Williams, Han, & Qualls, 1998).

Individuals' team commitment is achieved when they consider the team an important part of their social networks and affections in life. Consequently, the more the structural network ties among individuals are established in depth, the stronger the team commitment is naturally formed among them, leading to the hypothesis below.

- H₁₄: Structural social capital is positively related to team commitment.

2.6. Cognitive social capital and team commitment

Individuals' cognitive social capital reflected by "shared codes and language" and "narratives" includes the online resources which make possible shared meanings, connotation, and organizational chronicles among the team members. Individuals experiencing high levels of shared codes, languages, and narratives are likely to engage in depth their involvement on a particular team, leading to strong team commitment. This phenomenon is partially supported by a field study of 136 technology companies in previous research, showing that commitment-based human resource practices are positively related to organizational cooperation, shared codes, and language (Collins & Smith, 2006).

Given that the elements of cognitive social capital (e.g., shared codes and narratives) jointly provide a frame of reference for interpreting and recognizing the social environment (Wasko & Faraj, 2005) in which individuals identify themselves with the team, cognitive capital represents an important determinant of team commitment. Thus, individuals' cognizance on shared codes, language, and narratives is likely to boost team commitment, leading to the following hypothesis.

- H₁₅: Cognitive social capital is positively related to team commitment.

2.7. Relational social capital and team commitment

Individuals' relational social capital in a team stems from the perceptions of their interaction qualities with co-workers in terms of trust, norms, obligations, and identification (Nahapiet & Ghoshal, 1998). As virtual teams face greater communication challenges than face-to-face teams, it is important to build relational social capital such as trust among team members (Shachaf, 2008), which strengthens team commitment in order to overcome unpredictable challenges. Given that team commitment is associated with an affective response caused by social interaction within virtual teams – referred to as relational social capital characterized by trust, norms, obligations, and mutual identification (Nahapiet &

Ghoshal, 1998) – team commitment is positively impacted by relational social capital (e.g., Arnold, Barling, & Kelloway, 2001).

Relational social capital exists when individuals perceive, for example, that their co-workers possess qualities of trustworthiness and believe that the co-workers would do for the same when they identify themselves with the team (Lin, 2007a), leading to subsequent team commitment. Since team commitment entails vulnerability, individuals will seek only partners who reveal great trustworthiness, norms, obligations, and identification in the process of teamwork (e.g., Achrol, 1991), indicating the positive relationship between team commitment and relational social capital. Such a relationship is done through the principle of generalized reciprocity, which holds that mistrust breeds mistrust and as such also serves to ultimately decrease team commitment (Morgan & Hunt, 1994). At any rate, the hypothesis can be derived as follows.

- H₁₆: Relational social capital is positively related to team commitment.

2.8. An alternative model

Containing the same hypotheses proposed in Model 1, Model 2 additionally supplements three model paths, linking from three respective dimensions of social capital to knowledge sharing. From a social capital perspective, access to information by knowledge sharing is an important asset that facilitates instrumental action and enhances job performance (Lau, Shaffer, & Au, 2007). Particularly, given the importance of knowledge sharing and exchanging in organizations, management attempting to successfully achieve the goal of such sharing and exchanging should take great efforts to build social networking in order to facilitate the goal (Luo, 2003).

Of direct relevance to these three model paths is the work of Chiu, Hsu, and Wang (2006), who examined how individuals' social capital significantly influences knowledge sharing in online communities. Thus, the positive relationship between social capital (i.e., relational, cognitive, and structural capital) and knowledge sharing likely holds in the example of virtual teams herein as well. However, there are three notable differences between the research model of this study and that of Chiu et al. (2006) in terms of the mediator, outcome, and sample subjects. First, their research ignores the potential mediator of team commitment that may potentially interact with social capital in influencing knowledge sharing. Thus, their findings excluding team commitment may not be straightforward and exhaustive for generating managerial implications since team commitment is the most powerful factor in explaining organizational behavior and effectiveness (Park, Henkin, & Egley, 2005). Second, whereas their research ends with knowledge sharing as an outcome, this study extends to derive job effectiveness via knowledge sharing. Finally, while they surveyed unidentified subjects from online communities containing perhaps many student samples, this study collects data from purely working professionals in business organizations to appropriately assure the applications of social capital in virtual teams. Collectively, based on the preceding discussion, the hypotheses for Model 2 are summarized as below.

- H₂₁: Team commitment is positively related to job effectiveness.
- H₂₂: Knowledge sharing is positively related to job effectiveness.
- H₂₃: Team commitment is positively related to knowledge sharing.
- H₂₄: Structural social capital is positively related to team commitment.
- H₂₅: Cognitive social capital is positively related to team commitment.

- H₂₆: Relational social capital is positively related to team commitment.
- H₂₇: Structural social capital is positively related to knowledge sharing.
- H₂₈: Cognitive social capital is positively related to knowledge sharing.
- H₂₉: Relational social capital is positively related to knowledge sharing.

3. Method

3.1. Subjects

The subjects surveyed in this study are made up of professionals on virtual teams within Taiwan's information technology (IT) industry, as Taiwan has experienced rapid progress in the expansion of its IT industry. The members of virtual teams were recruited for an individual-level analysis, because such teams, in which online members collaborate with one another, have become a very popular mode of teamwork in today's modern societies. Specifically, given that the virtual team members surveyed in this study work under the same national culture and labor laws (note that there is only one time zone in Taiwan), suggesting the factors related to cultures, time zones, labor systems are unlikely to be threats for our subsequent analysis. Using the professionals with working experience in their virtual teams, rather than those without experience, helps facilitate improved external validity of this study.

Since the virtual teaming was more important and necessary in large and high-tech firms than small or medium ones, this study initially chose 42 large IT firms in the northern part of Taiwan. After making contact with the firms in order to seek out approval from their authorities, 20 out of 42 firms were willing to help with the survey. Note that the sample companies we chose must meet the criteria of their applying virtual teams in their organizations. Thus, the IT companies chosen herein are appropriate representative samples. Confirmed by the 20 firms, their virtual teams count heavily on e-mail, chat tools, online conferences, instant messaging, or other online systems to accomplish their teamwork.

Of the 540 questionnaires distributed to the subjects, 417 usable questionnaires were collected for a response rate of 77.22%. The sample of this study includes 201 males (48.20%) and 216 females (51.80%). The sample included 379 employees with a bachelor degree or above (90.89%) and the other 38 employees (9.11%) with a high school degree or under. In terms of subjects' ages, 363 employees were between 20 and 40 years old (87.05%) and the other 54 employees (12.95%) were 40 years old or above. The sample revealed that 75 subjects were managers (17.99%) and 379 subjects (90.89%) have seniority more than a year. In terms of subjects' major working tasks, 67 employees were responsible for R&D tasks (16.07%), 41 employees were responsible for administrative tasks (9.84%), 117 employees were responsible for production tasks (28.06%), 123 employees were responsible for sales and customer service tasks (29.50%), and the other 69 employees (16.53%) were responsible for several above tasks at the same time.

3.2. Measures

The constructs utilized in this study are measured using five-point Likert scales drawn and modified from existing literature. The following steps adopted by previous research (e.g., Lin, 2007a; Lin et al., 2010) are employed to choose scale items herein.

First, the items from the previous studies were translated into Chinese. Second, the items in Chinese were then modified or further extended by a focus group of five people, including three graduate students and two professors familiar with the area of organizational behavior. Based on repeat participant feedback from

the members of the focus group, some items were re-worded to better fit the virtual team context and Chinese language, while a few items that were less relevant to the context were eliminated. Third, the scale items were examined via two pilot tests. In the first pilot test, we invited ten graduate students to help fill out the questionnaire and provide comments for improving the wording of the questionnaire. In the second pilot test with data collected from 57 respondents, we use exploratory factor analysis (EFA) with the principal components technique and varimax rotation to analyze the data. Six factors emerged from the analysis with eigenvalues greater than 1.0, corresponding to the six hypothesized factors of this study. The improper items were further reviewed and refined before the actual survey. Pilot test respondents were excluded in the subsequent survey. Finally, tips of back-translation suggested by Reynolds, Diamantopoulos, and Schlegelmilch (1993) were used in composing an English version questionnaire as well as a Chinese one. A high degree of correspondence between the two questionnaires assures this research that the translation process did not substantially introduce artificial translation biases in the Chinese version of our questionnaire. Collectively, the entire process of instrument refinement led to considerable improvement in content validity and scale reliability.

Individual scale items are listed in Appendix A. Note that relational social capital is respectively measured with four items representing the team's trust, norms, obligations, and identification, which were developed by the focus group mentioned previously based on the definitions of Nahapiet and Ghoshal (1998). Furthermore, the items for measuring structural and cognitive social capital are also developed by the focus group that initially modified the items from Chiu et al. (2006), Obst and White (2005) based on the definitions of Nahapiet and Ghoshal (1998).

4. Results

4.1. Measurement model testing

This study employs a two-step structural equation modeling (SEM) procedure proposed by Anderson and Gerbing (1988) for data analysis. The first step of the procedure examines scale validity from the measurement model using confirmatory factor analysis (CFA), while the second step focuses on hypotheses testing using the structural model.

The overall goodness-of-fit indices in CFA shown in Table 1 (χ^2/df is smaller than 2.0; RMR is smaller than 0.05; NNFI, NFI, CFI, GFI, and AGFI are all greater than 0.9; RMSEA is smaller than the recommended maximum of 0.08) indicate that most fits of the measurement model are satisfactory.

The reliabilities for all constructs in Table 1 exceed 0.7, satisfying the general requirement of reliability for research instruments. All factor loadings for indicators measuring the same construct are statistically significant (see Table 1), suggesting that all indicators effectively measure their corresponding construct and support convergent validity (Anderson & Gerbing, 1988). In addition, the average variance extracted (AVE) for each construct exceeds 0.50, revealing that the hypothesized items capture much more variance in the underlying construct than that attributable to measurement error. Overall, the above test results confirm that instruments used for measuring the constructs of interest in this study are statistically adequate.

This study applies the chi-square difference test for confirming discriminant validity. The critical advantage of the chi-square difference test is that it allows for simultaneous pairwise comparisons for the constructs based on the Bonferroni method. The critical value of the chi-square test is $\chi^2(1, 0.001/15) = 15.90$, given the Bonferroni method under the overall 0.001 levels. Since the

Table 1
Standardized loadings and reliabilities.

Construct	Indicators	Standardized loading	AVE	Cronbach's α
Job effectiveness	JE1	0.71 ($t = 15.75$)	0.58	0.87
	JE2	0.81 ($t = 19.11$)		
	JE3	0.78 ($t = 18.09$)		
	JE4	0.72 ($t = 15.97$)		
	JE5	0.77 ($t = 17.70$)		
Knowledge sharing	KS1	0.79 ($t = 18.17$)	0.65	0.85
	KS2	0.83 ($t = 19.45$)		
	KS3	0.79 ($t = 18.11$)		
Team commitment	TC1	0.63 ($t = 13.15$)	0.55	0.82
	TC2	0.73 ($t = 15.90$)		
	TC3	0.75 ($t = 16.57$)		
	TC4	0.85 ($t = 19.56$)		
Structural social capital	SSC1	0.81 ($t = 18.76$)	0.52	0.84
	SSC2	0.79 ($t = 18.29$)		
	SSC3	0.68 ($t = 14.84$)		
	SSC4	0.68 ($t = 14.71$)		
	SSC5	0.62 ($t = 13.27$)		
Cognitive social capital	CSC1	0.68 ($t = 14.97$)	0.56	0.86
	CSC2	0.64 ($t = 13.90$)		
	CSC3	0.84 ($t = 20.06$)		
	CSC4	0.77 ($t = 17.89$)		
	CSC5	0.80 ($t = 18.66$)		
Relational social capital	RSC1	0.77 ($t = 17.33$)	0.52	0.81
	RSC2	0.70 ($t = 15.26$)		
	RSC3	0.68 ($t = 14.46$)		
	RSC4	0.74 ($t = 16.20$)		

Goodness-of-fit indices ($N = 417$): $\chi^2_{284} = 476.16$ (p -value < 0.001); NNFI = 0.96; NFI = 0.91; CFI = 0.96; GFI = 0.92; AGFI = 0.90; RMR = 0.02; RMSEA = 0.04.

chi-square difference statistics for every two constructs all exceed 15.90 for the model (see Table 2), discriminant validity is obtained successfully.

4.2. Structural model testing

Following the first step of measurement model testing, the second step analyzing the structural models is performed herein.

Table 2
Chi-square difference tests for examining discriminant validity.

Construct pair	$\chi^2_{284} = 476.16$ (unconstrained model)	
	χ^2_{285} (constrained model)	χ^2 difference
(Job effectiveness, knowledge sharing)	874.93***	398.77
(Job effectiveness, team commitment)	993.62***	517.46
(Job effectiveness, structural social capital)	1024.70***	548.54
(Job effectiveness, cognitive social capital)	1078.20***	602.04
(Job effectiveness, relational social capital)	834.84***	358.68
(Knowledge sharing, team commitment)	883.04***	406.88
(Knowledge sharing, structural social capital)	798.22**	322.06
(Knowledge sharing, cognitive social capital)	829.87***	353.71
(Knowledge sharing, relational social capital)	774.44***	298.28
(Team commitment, structural social capital)	951.38***	475.22
(Team commitment, cognitive social capital)	978.31***	502.15
(Team commitment, relational social capital)	957.92***	481.76
(Structural social capital, cognitive social capital)	802.48***	326.32
(Structural social capital, relational social capital)	718.20***	242.04
(Cognitive social capital, relational social capital)	706.54***	230.38

*** Significant at the 0.001 overall significance level by using the Bonferroni method.

More specifically, the test results for Models 1 and 2 are presented in Figs. 1 and 2, respectively.

Based on test results in Figs. 1 and 2, five out of six model paths in Fig. 1 and seven out of nine model paths in Fig. 2 are significant (H_{11} , H_{12} , H_{13} , H_{14} , H_{15} , H_{21} , H_{22} , H_{23} , H_{24} , H_{25} , H_{27} , and H_{29} are supported). Particularly, the empirical tests reveal the same significance for the overlap of the model paths across Models 1 and 2 (H_{11} – H_{16} vs. H_{21} – H_{26}). This phenomenon reflects the importance of team commitment whose significance does not shift with or without the direct effects of social capital on knowledge sharing. The comparison also reveals that it may be inappropriate to omit the direct effects of social capital on knowledge sharing given the significance between structural social capital and knowledge sharing and between relational social capital and knowledge sharing.

Model 2 is collectively better than Model 1 for explaining the job effectiveness formation and generating appropriate managerial implications according to the criteria of partial mediating effects suggested by Baron and Kenny (1986). Indeed, we perform the additional post hoc SEM analyses, which indicates that the path between cognitive social capital and knowledge sharing becomes significant by our removing the model path between team commitment and knowledge sharing in Model 2. As suggested by Baron and Kenny (1986), the post hoc analyses show that cognitive social capital does have only an indirect effect rather than a direct effect on knowledge sharing, and thus team commitment is an inevitable mediator herein.

The failure of the unsupported hypotheses H_{26} and H_{28} in Model 2 is interesting and may arise, because different dimensions of social capital do not necessarily influence job effectiveness through exactly the same mediators (e.g., team commitment and knowledge sharing). In other words, while job effectiveness is influenced by cognitive social capital via two mediators (i.e., team commitment and knowledge sharing), relational social capital affects job effectiveness only through knowledge sharing rather than team commitment.

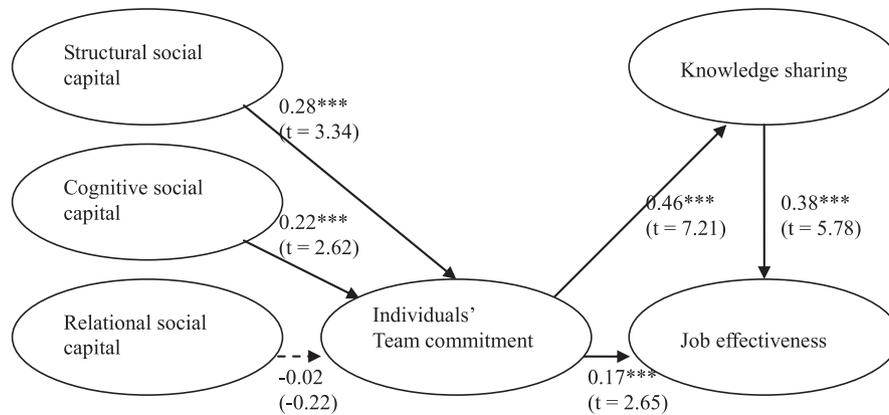


Fig. 1. Empirical results of Model 1.

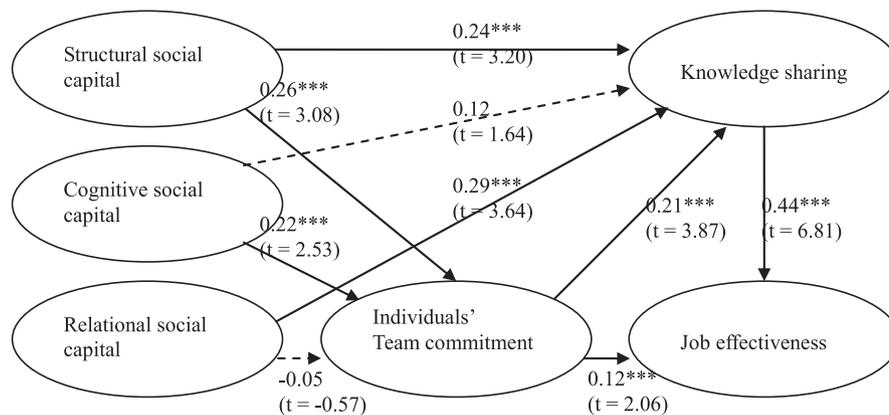


Fig. 2. Empirical results of Model 2.

5. Discussion and managerial implications

This study has assessed the formation of job effectiveness using team commitment and knowledge sharing as the mediators. Based on the test results in Model 2, job effectiveness is directly influenced by knowledge sharing and team commitment, suggesting that two parallel tracks of team commitment and knowledge sharing should be utilized for boosting job effectiveness. This inference is stronger than that of previous studies by only focusing on either commitment or knowledge sharing as a mediator (e.g., Child & Shumate, 2007; Drach-Zahavy & Freund, 2006). Note that the role distinction between team commitment and knowledge sharing is important and should receive more attention in theories about job effectiveness. For example, management may want to provide rewards to those who practice knowledge sharing with their co-workers by indicating the to-do list of knowledge sharing. On the other hand, however, the commitment mechanism could not be enforced purely by superficial or monetary rewards (e.g., Retallick & Sanchez, 1998). Nevertheless, strategies being made to affect either team commitment or knowledge sharing should be different.

Successful virtual teams rely heavily on their members sharing knowledge to each other, which synthesize the online members' competitive advantage and efforts in the teams (e.g., Lin, 2010). Since the online world has broken down all traditional and regional borders, benefits for knowledge sharing among online workers are greatly expanded (e.g., Gackebach, 1998; Lin, 2010). Previous study has indicated a greater importance for online workers than for traditional workers regarding the effectiveness of online health services in delivering a wide range of mutual-help facilities as well

as direct counseling (e.g., information sharing) (Mallen & Vogel, 2005). As a virtual team is formed to take on complicated and multifaceted endeavors, knowledge-intensive tasks in the team are more challenging to its members than ever before (Noe, Colquitt, Simmering, & Alvarez, 2003), suggesting the importance of the empirical findings herein.

More specifically, this study has theorized that greater online sharing by the virtual team members can be translated into better job effectiveness, as long as what is being shared is relevant (Hirschfeld, Jordan, Feild, Giles, & Armenakis, 2006). Virtual teams that successfully promote knowledge sharing and strengthen team commitment cannot only incorporate quality knowledge in team strategies but also strengthen their members' dedication, jointly increasing job effectiveness.

Knowledge sharing is impacted by team commitment, structural social capital, and relational social capital, whereas team commitment is influenced by structural social capital and cognitive social capital. It appears that structural social capital is more important to job effectiveness than the other two types of social capital given its significant effects on both team commitment and knowledge sharing. Hence, management should first design strategies that strengthen structural social bonds among team members so as to enhance job effectiveness efficiently in the long run. For example, face-to-face workshops, seminars, or meetings should be provided frequently so that structural social capital such as social interaction and cohesiveness can be reinforced among the team members, eventually lifting job effectiveness through both knowledge sharing and team commitment. The great importance of structural social capital in the test results of this study implies

that face-to-face meetings cannot be completely spared in a virtual team no matter how advanced the IT is that its members use. Tight structural social capital takes social relationships on a personal level in depth (e.g., Nahapiet & Ghoshal, 1998), whereas non-official activities such as team reunions or junkets should be provided periodically and team members should be encouraged to invite their family to participate in the activities, increasing personal familiarity among team members.

Regarding cognitive social capital, the finding of this study indicates that team commitment is a key bridge to convey the effects of cognitive social capital on knowledge sharing and job effectiveness. Thus, cognitive social capital fails to affect knowledge sharing or job effectiveness if team commitment malfunctions under some circumstances. Management should keep an eye on team commitment as a checkpoint so that cognitive social capital can have an outlet to help improve knowledge sharing and job effectiveness. In addition, management can issue online team publications such as e-newspaper containing perhaps texts, images, or video, and invite team members to share their life experiences through such media, strengthening their cognitive social capital.

The insignificant effect of relational social capital on team commitment suggests that knowledge sharing is the only channel for relational social capital to convey its indirect influence on job effectiveness. This is an important message, suggesting that management should help team members cultivate their interpersonal trust, norms, obligations, and identification so as to heighten their knowledge sharing. For example, codes, conducts, and descriptions about teamwork should be clearly made and announced for team members to follow, otherwise team members are likely to steer clear of their job duties and collaboration with their co-workers, hurting their knowledge sharing and job effectiveness.

In summary, the findings of this study lend support to the literature that attempts to explain how the lack of social capital in workplaces can create negative conditions for team commitment, knowledge sharing, and consequently job effectiveness. It is important to note that the relationships among the research constructs can be even more complicated with other additional perceptual determinants (e.g., social identity) as online tools become further advanced in the future by, for example, applying virtual reality to team meetings where team members can shake hands with tactile systems in a virtual world.

6. Limitations

This study suffers from some limitations relating to data collection and result interpretation. The first limitation is the possibility of a common method bias by using a single questionnaire to measure all constructs, which may inflate the strength of the relationships among these constructs. To examine such potential bias, this study has conducted the single factor test of Harmon (Podsakoff & Organ, 1986). In the single factor test, if substantial common method variance does exist in the sample data, then either a general factor will account for the majority of the covariance in the independent and dependent variables or a single factor will emerge from the factor analysis. Herein, exploratory factor analysis of measurement items for the seven constructs in the survey reveals the six factors explaining 19.97%, 19.01%, 17.74%, 15.79%, 14.69%, and 12.80% of the total variance. These figures indicate that the variances are distributed well among multiple factors, revealing that potential common method bias is unlikely to be a threat for subsequent analysis. The second limitation relates to the cross-sectional survey used in this study. The cross-sectional nature of it limits our ability to achieve causal inferences from the data. Longitudinal studies are needed in this area of research. The third limitation is that this study was conducted in a single

country setting – Taiwan. As a result, the generalizability of the findings might be limited due to the data collection of this study under a specific national and working culture. Additional research across different countries will be required in order to complement the findings of this study.

Future studies should attempt to improve the above shortcomings by conducting longitudinal data collection across different countries so that genuine relationships between job effectiveness and its antecedents may be further transparently revealed. It is important to note that this study focuses on the influence of social capital on knowledge sharing and job effectiveness based on inter-teams (e.g., Hoegl, Weinkauff, & Gemuenden, 2004) rather than intra-teams (e.g., Foo, Sin, & Yiong, 2006). Thus, future complementary research based on this study can be conducted by surveying members of intra-teams.

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Appendix A. Measurement items

A.1. Job effectiveness (modified from Gold, Malhotra, and Segars (2001))

- JE1. The online collaboration of our team reduces redundancy of work content.
- JE2. The online collaboration of our team improves team efficiency.
- JE3. The online collaboration of our team coordinates the efforts of everyone on the team.
- JE4. The online collaboration of our team facilitates innovative new ideas.
- JE5: The online collaboration of our team streamlines the internal processes.

A.2. Knowledge sharing (modified from Lin (2007a))

- KS1. I share my expertise at the request of our online team members.
- KS2. I share my job experience with our online team members.
- KS3. I share my ideas about jobs with our online team members.

A.3. Team commitment (modified from Wayne, Shore, and Liden (2001))

- TC1. I am willing to put in a great deal of effort beyond that normally expected in order to make the online collaboration with my co-workers successful.
- TC2. I really care about the online collaboration with my co-workers.
- TC3. I am proud to tell others that I am part of our team's online collaboration.
- TC4. I find that my values about online collaboration and those of my co-workers are very similar.

A.4. Structural social capital (modified from Chiu et al. (2006) and Obst and White (2005))

- SS1. I have close social relationships with some members of our online team.
- SS2. I spend a lot of time interacting with some members of our online team.
- SS3. I know some members of our online team on a personal level.

- SS4. I have frequent online contact with some members of our online team.
- SS5. I feel strong cohesiveness of our online team.

A.5. Cognitive social capital (modified from Chiu et al. (2006) and Obst and White (2005))

- CS1. In online communication, my colleagues and I both understand each other with jargon.
- CS2. In online communication, my colleagues and I easily obtain a consensus after team discussion.
- CS3. In online communication, my colleagues and I both share interesting narratives.
- CS4. In online communication, my colleagues and I both enjoy pleasant dialogue.
- CS5. In online communication, my colleagues and I both share life events.

A.6. Relational social capital (modified from Nahapiet and Ghoshal (1998))

- RS1. In online communication, my co-workers and I trust each other.
- RS2. In online communication, my co-workers and I have a common view regarding appropriate behavioral norms in our organization.
- RS3. In online communication, my co-workers and I both have obligations to support each other.
- RS4. In online communication, my co-workers and I both identify with each other.

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Appendix B. Correlation matrix from survey data

Name	JE1	JE2	JE3	JE4	JE5	KS1	KS2	KS3	TC1	TC2	TC3	TC4	SS1	SS2	SS3	SS4	SS5	CS1	CS2	CS3	CS4	CS5	RS1	RS2	RS3	RS4
Mean	3.56	3.66	3.68	3.59	3.67	3.88	3.97	3.84	3.59	3.57	3.48	3.49	3.95	3.87	3.79	3.71	3.48	3.86	3.82	3.92	3.98	3.74	3.76	3.70	3.86	3.74
STD	0.78	0.73	0.70	0.75	0.72	0.65	0.62	0.66	0.77	0.82	0.82	0.86	0.72	0.70	0.79	0.77	0.76	0.68	0.67	0.73	0.70	0.80	0.67	0.63	0.66	0.68
JE1	1.00	0.67	0.52	0.46	0.53	0.17	0.19	0.26	0.15	0.21	0.17	0.12	0.20	0.19	0.12	0.17	0.21	0.24	0.28	0.22	0.16	0.19	0.24	0.25	0.19	0.25
JE2	0.67	1.00	0.64	0.52	0.61	0.25	0.30	0.32	0.16	0.17	0.19	0.13	0.25	0.22	0.13	0.28	0.26	0.29	0.36	0.27	0.23	0.23	0.29	0.28	0.27	0.24
JE3	0.52	0.64	1.00	0.59	0.58	0.33	0.35	0.32	0.22	0.20	0.21	0.16	0.27	0.27	0.21	0.26	0.27	0.28	0.36	0.28	0.26	0.28	0.30	0.31	0.27	0.33
JE4	0.46	0.52	0.59	1.00	0.61	0.26	0.27	0.33	0.23	0.22	0.18	0.21	0.30	0.26	0.16	0.28	0.33	0.30	0.31	0.31	0.24	0.28	0.33	0.31	0.25	0.26
JE5	0.53	0.61	0.58	0.61	1.00	0.26	0.23	0.34	0.17	0.25	0.20	0.17	0.28	0.25	0.17	0.29	0.29	0.29	0.31	0.30	0.23	0.25	0.29	0.27	0.23	0.25
KS1	0.17	0.25	0.33	0.26	0.26	1.00	0.68	0.61	0.23	0.30	0.28	0.27	0.36	0.36	0.28	0.34	0.31	0.31	0.28	0.30	0.34	0.33	0.34	0.26	0.29	0.33
KS2	0.19	0.30	0.35	0.27	0.23	0.68	1.00	0.67	0.22	0.27	0.25	0.22	0.41	0.30	0.29	0.36	0.29	0.33	0.30	0.25	0.31	0.27	0.34	0.28	0.33	0.33
KS3	0.26	0.32	0.32	0.33	0.34	0.61	0.67	1.00	0.27	0.29	0.29	0.27	0.34	0.33	0.25	0.34	0.31	0.38	0.34	0.39	0.40	0.40	0.37	0.34	0.25	0.30
TC1	0.15	0.16	0.22	0.23	0.17	0.23	0.22	0.27	1.00	0.45	0.46	0.54	0.15	0.19	0.21	0.23	0.24	0.19	0.17	0.16	0.21	0.22	0.16	0.14	0.13	0.18
TC2	0.21	0.17	0.20	0.22	0.25	0.30	0.27	0.29	0.45	1.00	0.54	0.62	0.22	0.18	0.24	0.27	0.20	0.19	0.13	0.21	0.18	0.24	0.14	0.15	0.16	0.15
TC3	0.17	0.19	0.21	0.18	0.20	0.28	0.25	0.29	0.46	0.54	1.00	0.64	0.19	0.19	0.26	0.22	0.18	0.19	0.16	0.21	0.19	0.25	0.12	0.12	0.16	0.13
TC4	0.12	0.13	0.16	0.21	0.17	0.27	0.22	0.27	0.54	0.62	0.64	1.00	0.16	0.19	0.25	0.24	0.24	0.21	0.14	0.23	0.19	0.28	0.15	0.10	0.13	0.12
SS1	0.20	0.25	0.27	0.30	0.28	0.36	0.41	0.34	0.15	0.22	0.19	0.16	1.00	0.66	0.55	0.52	0.51	0.38	0.33	0.37	0.31	0.37	0.35	0.33	0.43	0.38
SS2	0.19	0.22	0.27	0.26	0.25	0.36	0.30	0.33	0.19	0.18	0.19	0.19	0.66	1.00	0.55	0.52	0.48	0.36	0.31	0.38	0.34	0.37	0.37	0.34	0.35	0.37
SS3	0.12	0.13	0.21	0.16	0.17	0.28	0.29	0.25	0.21	0.24	0.26	0.25	0.55	0.55	1.00	0.48	0.35	0.39	0.31	0.39	0.37	0.42	0.31	0.25	0.29	0.30
SS4	0.17	0.28	0.26	0.28	0.29	0.34	0.36	0.34	0.23	0.27	0.22	0.24	0.52	0.52	0.48	1.00	0.44	0.41	0.30	0.34	0.36	0.33	0.26	0.27	0.32	0.31
SS5	0.21	0.26	0.27	0.33	0.29	0.31	0.29	0.31	0.24	0.20	0.18	0.24	0.51	0.48	0.35	0.44	1.00	0.34	0.29	0.33	0.28	0.28	0.34	0.31	0.33	0.33
CS1	0.24	0.29	0.28	0.30	0.29	0.31	0.33	0.38	0.19	0.19	0.19	0.21	0.38	0.36	0.39	0.41	0.34	1.00	0.48	0.58	0.49	0.48	0.43	0.36	0.28	0.36
CS2	0.28	0.36	0.36	0.31	0.31	0.28	0.30	0.34	0.17	0.13	0.16	0.14	0.33	0.31	0.31	0.30	0.29	0.48	1.00	0.48	0.49	0.50	0.38	0.35	0.32	0.39
CS3	0.22	0.27	0.28	0.31	0.30	0.30	0.25	0.39	0.16	0.21	0.21	0.23	0.37	0.38	0.39	0.34	0.33	0.58	0.48	1.00	0.67	0.70	0.44	0.34	0.28	0.32
CS4	0.16	0.23	0.26	0.24	0.23	0.34	0.31	0.40	0.21	0.18	0.19	0.19	0.31	0.34	0.37	0.36	0.28	0.49	0.49	0.67	1.00	0.63	0.42	0.31	0.32	0.40
CS5	0.19	0.23	0.28	0.28	0.25	0.33	0.27	0.40	0.22	0.24	0.25	0.28	0.37	0.37	0.42	0.33	0.28	0.48	0.50	0.70	0.63	1.00	0.46	0.29	0.32	0.33
RS1	0.24	0.29	0.30	0.33	0.29	0.34	0.34	0.37	0.16	0.14	0.12	0.15	0.35	0.37	0.31	0.26	0.34	0.43	0.38	0.44	0.42	0.46	1.00	0.59	0.48	0.54
RS2	0.25	0.28	0.31	0.31	0.27	0.26	0.28	0.34	0.14	0.15	0.12	0.10	0.33	0.34	0.25	0.27	0.31	0.36	0.35	0.34	0.31	0.29	0.59	1.00	0.45	0.50
RS3	0.19	0.27	0.27	0.25	0.23	0.29	0.33	0.25	0.13	0.16	0.16	0.13	0.43	0.35	0.29	0.32	0.33	0.28	0.32	0.28	0.32	0.32	0.48	0.45	1.00	0.58
RS4	0.25	0.24	0.33	0.26	0.25	0.33	0.33	0.30	0.18	0.15	0.13	0.12	0.38	0.37	0.30	0.31	0.33	0.36	0.39	0.32	0.40	0.33	0.54	0.50	0.58	1.00

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