



Perceived job effectiveness in cooperation: A survey of virtual teams within business organizations

Chieh-Peng Lin^{a,*}, Yi-Ju Wang^{b,c}, Yuan-Hui Tsai^c, Yu-Fang Hsu^d

^a Institute of Business & Management, National Chiao Tung University, Taiwan

^b Nankai University, China

^c Department of Finance, Chihlee Institute of Technology, Taiwan

^d National Yunlin University of Science and Technology, Taiwan

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ABSTRACT

This study establishes a model by drawing from key postulates and findings under cooperation to explain the formation of perceived job effectiveness in team collaboration. In the proposed model, perceived job effectiveness is influenced directly by knowledge sharing, cooperative attitude, and competitive conflict, while knowledge sharing is influenced by cooperative attitude and competitive conflict. Accordingly, perceived job effectiveness is influenced indirectly by shared value, perceived trust and perceived benefit via the mediation of cooperative attitude and competitive conflict. Empirical testing of this model, by investigating personnel in information technology (IT) organizations, confirms the applicability of cooperation in virtual teams. The test results indicate that all the model paths except one (linking shared vision and competitive conflict) are significant. Finally, managerial implications and limitations of the research are provided.

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1. Introduction

Organizational teams can be defined as a set of individuals who perceive themselves and whom outsiders perceive as constituting an identifiable social aggregate within the organization (Richter, Scully, & West, 2005). The interpersonal relationships within the teams can simultaneously be comprised of two elements including cooperation and competition. If both the elements are visible, then the relationship between the members is considered cooperation (Bengtsson & Kock, 2000). Many organizations use team arrangements to cope with their confrontations and also push team members to both compete and cooperate with each other, leading to a major challenge for organizations that seek to manage their team workflows and effectiveness (Tsai, 2002). Indeed, it is important that team members compete with each other to improve their drawbacks given their cooperation with one another for smoothing their teamwork process. Unfortunately, research on perceived job effectiveness containing both cooperation and competition is relatively scarce (Drach-Zahavy & Freund, 2007).

The basic philosophy underlying cooperative relationships in business organizations is that all business activities should aim for the establishment of a beneficial partnership relationship with one another in the organization, including the coworkers who may be considered as a kind of competitor (Zineldin, 2004). Since a cen-

tral goal in cooperation is to create added value, it is important for management to learn about cooperation so that they can propose appropriate strategies to improve their organizational performance. To sum up, the purpose of this study is to explore how both cooperation and competition function in team collaboration and to further scrutinize the critical advantages of cooperation in enhancing perceived job effectiveness.

This study differs from previous research in at least three important ways. First, a majority of previous research related to interactions within business organizations focuses on either competition or cooperation, which often resulted in a one-sided understanding of team members, their knowledge sharing and perceived job effectiveness (e.g., Passos & Caetano, 2005; Richter et al., 2005). This study suggests that the most advantageous relationship between team members is cooperation where the members cooperate and compete with one another, subsequently leading to substantial impacts to knowledge sharing and job effectiveness. In other words, this study attempts to consider both cooperation and competition as a whole so that a clear-cut contour about cooperation in influencing perceived job effectiveness can be presented for management.

Second, even though the issue of cooperation has been somewhat discussed in previous literature, most previous studies put emphasis on face-to-face team members rather than virtual team members. A rapid growing trend in the era of information technology (IT) is the increased prevalence of virtual teams in which members work collaboratively in geographically dispersed locations, given that advances in IT facilitate communication and the

* Corresponding author. Tel.: +886 2 23812386.

E-mail address: jacques@mail.nctu.edu.tw (C.-P. Lin).

sharing of information among virtual team members (Shachaf, 2008). However, few clear and consistent theoretical attempts to integrate the coopetition literature on virtual teams have emerged. For that reason, examining the applicability of coopetition among virtual team members is a necessary and important complement to previous studies given abundant research related to face-to-face team members. Particularly, while cooperation is good for virtual team members, questions arise as to whether internal competition restricts job effectiveness in virtual team collaboration or does precisely the opposite, given a cooperative attitude.

Third, while some prior empirical studies have examined coopetition from the perspective of firm-level (e.g., Tiessen & Linton, 2000), this study may be one of the pioneering studies to use primary survey data collected from virtual team members at an individual-level to test the causes and outcomes of coopetition. Research supports and extends the notion that coopetition is not only important among intra-organizational partners, but also among inter-organizational parties and interaction for a firm's long-term viability (Luo, Slotegraaf, & Pan, 2006).

The rest of this study proceeds as follows. The next section examines relevant theories (e.g., coopetition) and postulates hypotheses for empirical testing. The third section presents our research methods, such as subjects, sampling, and construct operationalization. The fourth section describes our data analytic techniques and observed results. The final section presents a discussion of our findings, including the limitations and implications for research and practice.

1.1. Development of theory and hypotheses

This study establishes a model by drawing from key postulates and findings in coopetition to explain the formation of perceived job effectiveness. In the proposed model, perceived job effectiveness is influenced directly by knowledge sharing, cooperative attitude, and competition, while knowledge sharing is influenced by cooperative attitude and competition. Perceived job effectiveness is also influenced indirectly by shared value, trust, and perceived benefit via the mediation of cooperative attitude and competitive conflict. Fig. 1 presents the model proposed by this study.

Note that the three critical antecedents in this study are not selected haphazardly, but are chosen due to their importance simultaneously confirmed across both categories of coopetition and virtual reality in recent years (please see Table 1). This proposed model is well grounded based on a core spirit of coopetition theory, suggesting that there is duality in every relationship – the simultaneous elements of cooperation and competition (Brandenburger & Nalebuff, 1996) – and the elements are in conflict with each other and must be separated in a proper way to make a coopetitive relationship possible (Bengtsson & Kock, 2000). Furthermore, the cooperation, its

Table 1

The recent literature support to the proposed antecedents across cooperation and virtual teams.

Research construct	Coopetition	Virtual teams
Shared vision	Kang, Yang, and Rowley (2006) Zineldin (2004)	Aimar and Stough (2007) Breu and Hemingway (2004) Hossain and Wigand (2004) Mohamed, Stankosky, and Murray (2004)
	Dionne, Yammarino, Atwater, and Spangler (2004) Rijamampianina and Gordon-Brown (2004)	
Perceived trust	Chin, Chan, and Lam (2008) Morris et al. (2007)	Curseu (2006) Henttonen and Blomqvist (2005). De Rosa, Hantula, Kock and D'Arcy (2004)
	Zineldin (2004)	Jarvenpaa, Shaw, and Staples (2004)
	Bunker, Alban, and Lewicki (2004)	
Perceived benefit	Morris et al. (2007)	Trimi and Galanxhi-Janaqi (2008)
	Ash (2007)	Malhotra, Majchrzak, and Rosen (2007)
	LeTourneau (2004b)	Rad and Levin (2006)
	Bengtsson et al. (2003)	Ward, Brown, and Massey (2005)

antecedents and outcome in this study are all discussed and analyzed at an individual level since this study attempts to explore the cooperation among team members rather than among firms.

Knowledge sharing is defined as individuals' sharing organizationally relevant experiences and information with one another in collaboration, increasing the resources of an organization (or a team) and reducing time wasted in trial-and-error (Lin, 2007a; Lin, 2007b). Coopetition entails sharing knowledge that may be a necessary source of competitive advantage in organizational teams and the effectiveness of their team members (Levy, Loebbecke, & Powell, 2003). Perceived job effectiveness in team collaboration represents individuals' perceived capacity of conducting collaborative tasks, whereas knowledge sharing is a positive force to enhance members' knowledge exchange and horizons that facilitate their conducting the tasks through effective brainpower and intellectual capital (Lin, 2008). As knowledge is a critical source of competitiveness, managing knowledge sharing among team members plays a prominent role in sustainable competitive advantage (Levy et al., 2003). For example, it was argued that an organization's knowledge must be shared and transferred across departments before knowledge can play a critical role as a strategic asset to increase organizational performance (Luo et al., 2006). For that reason, job effectiveness in team collaboration can be enhanced if its members share information, experiences, opinions, and insights with one another (Lin, 2008; Luo et al., 2006). Thus, the first hypothesis is proposed.

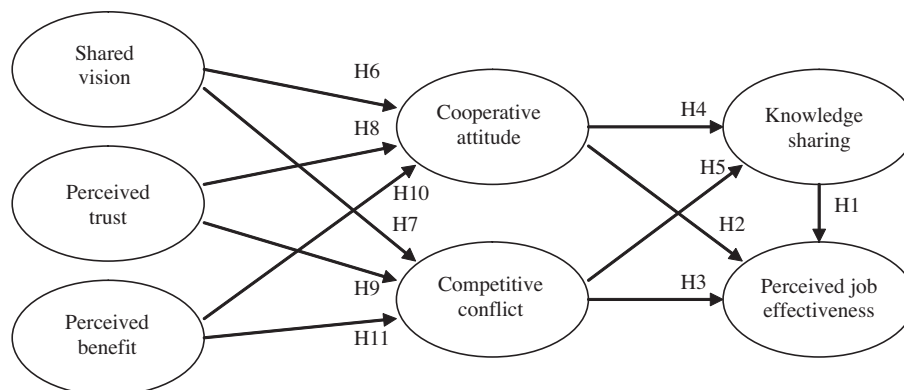


Fig. 1. Research framework.

H1: Knowledge sharing is positively related to perceived job effectiveness in team collaboration.

Coopetition involves the recognition that team members may benefit from working together (Levy et al., 2003). The first critical factor in the strategic process of coopetition is the cooperative attitude that enables employees to work closely within their team (Grant, 1991). Cooperative attitude represents individuals' like or dislike for the process of working or acting together with their colleagues. More specifically, cooperative attitude is a perspective toward a particular goal of common interest that involves interpersonal interaction (Pinto, Pinto, & Prescott, 1993) and therefore affects perceived job effectiveness in team collaboration through different ways such as integrative coordination, problem solving, and value creating (Green, 1989; Tiessen & Linton, 2000). Cooperative attitude entails inducements to the participating parties in their groups, because cooperation with others has a positive effect on coordination of product lines, technological diversity, and consequently effectiveness of particular business activities (Garcia & Velasco, 2002). Hence, the hypothesis is developed as follows.

H2: Cooperative attitude is positively related to perceived job effectiveness in team collaboration.

The second factor in the strategic process of coopetition is team competitive conflict (Tsai, 2002), because individual self-interest may not favor cooperation even if all members of a group would benefit in their cooperation with one another according to the prisoner's dilemma from game theory. Competitive conflict is defined as a perceived state of discord due to a rivalry between team members for benefits, resources or territory. Although traditional theories suggest that competitive conflict among team members is likely to undermine their job performance due to its catalysis to increased tension (e.g., Passos & Caetano, 2005; Richter et al., 2005), it is, however, not the case in that coopetition takes both cooperation and competition into account at the same time. Note that the major difference between the studies concentrating purely on competition and those concentrating on coopetition is that the former fail to obtain the simultaneous estimation in which cooperation is included. Given that cooperation and competition co-exist in business organizations, overlooking either one in the research of organizational behavior is inappropriate under a research framework development. That is probably also the reason why the empirical findings concerning the effects of organizational conflict on performance are highly inconsistent (Passos & Caetano, 2005).

Previous research regarding coopetition suggests that team members can benefit from both cooperation and competition simultaneously (Bengtsson & Kock, 2000). Intense competition between many parties is argued to be the most beneficial interaction (Bengtsson & Kock, 2000). Competitive conflict represents a behavior that team members seek their individuals' goal that consequently aggregate to the achievement of the team. Team members perceiving competition as important are likely to keep moving ahead with their individuals' efficiencies (e.g., Morris, Koçak, & Özer, 2007), which ultimately helps to boost their perceived job effectiveness in team collaboration. Thus, the hypothesis is developed as follows.

H3: Competitive conflict is positively related to perceived job effectiveness in team collaboration.

As coopetition is highly related to competitiveness through knowledge sharing, team members have to manage such sharing under both cooperation and competition (Levy et al., 2003). Knowledge sharing across team members can be both competitive and cooperative in nature (Luo et al., 2006). The competitive nature

often happens since knowledge can generate private gains for individuals to outperform their counterparts (Luo et al., 2006). At the same time, knowledge sharing among team members can be cooperative in nature since individuals must collaborate with one another in the knowledge sharing to obtain the common interests of the team members. Derived from the above nature, the influence of cooperative attitude and competitive conflict on knowledge sharing is discussed as follows.

Cooperative attitude involves the recognition that individual team members may benefit from working complementarily (Brandenburger & Nalebuff, 1996). Put differently, those members whose knowledge adds value to the work of their co-workers are likely to share knowledge (Levy et al., 2003), suggesting a positive relationship between cooperative attitude and knowledge sharing.

An individual with expectations whose exchanged knowledge may also be used by others for future competition against himself or herself (Levy et al., 2003) will discourage his or her intention to share knowledge with others. Indeed, it has been indicated as a paradox that the knowledge shared for cooperation may also be used for competition (Loebecke, Van Fenema, & Powell, 1999). While competitive conflict brings about certain pressure to stimulate individuals' growth and consequently facilitates teamwork effectively (as hypothesized in H3), this conflict also causes a strong suspicion of losing prime superiority or advantages if they share knowledge with others, thus decreasing their intention to share knowledge with others in general. Therefore, the hypotheses are derived as below.

H4: Cooperative attitude is positively related to knowledge sharing.

H5: Competitive conflict is negatively related to knowledge sharing.

Considering the heart of a teams' strategy (Orndorff, 2002), a shared vision herein represents the team's overarching objective or mission among individual team members (Croteau & Raymond, 2004), also suggesting that each member possesses something of value that the other member wants (Zineldin, 2004). Developing a shared vision strategically among individual members of the teams is critical in team collaboration (Ferioli & Migliarese, 1996), because a shared vision reflects an important agreement of beliefs and assumptions that consequently bring about internal stability to the cooperative attitude (Henderson & Sifonis, 1988), suggesting its positive influence on cooperative attitude.

A competitive conflict arises in the case when a shared vision, a common protocol of cooperation, is not erected in virtual organizations (Voss, 1996). More specifically, a shared vision is described as a photograph of the team's future among team members, setting the priorities for their team planning (Keen, 1991) and implying its critical determinant role in lessening malign competition. Based on the above rationale, two hypotheses are developed as below.

H6: Shared vision is positively related to cooperative attitude.

H7: Shared vision is negatively related to competitive conflict.

Trust can be defined as a relationship of reliance among members of a team or an organization. The importance of trust in successful interpersonal relationships has been discussed in previous research (Neves & Caetano, 2009; Sargeant & Lee, 2004). Individuals aim to practice cooperation with other team members when they perceive the members to be trustworthy. The cooperation that captures the level of coordinated actions between team members in their efforts to achieve mutual goals cannot be realized without trust among the members (Palmatier, Dant, Grewal, & Evans, 2006). Indeed, given that perceived trust can be defined as a mem-

ber's expectation that another member desires co-ordination, will fulfill obligations, and will pull weight in the relationship (Dwyer, Schurr, & Oh, 1987; Peters & Karren, 2009), team members who possess trust on their peers are perceived to be under obligation not to undermine their team collaboration (Morris et al., 2007), indicating the positive relationship between perceived trust and cooperative attitude.

Perceived trust is negatively related to various phenomena of competitive conflict such as distracted collaboration, distributive efforts, and value claiming (Tiessen & Linton, 2000). Trust is necessary for cooperation, because trust dominates team members about whether they should cooperate with or compete against other team members to survive the dramatic changes (LeTourneau, 2004a). Trust is considered a control mechanism that dissuades individuals from behaving opportunistically against their co-workers, lessening team competitive conflict (Coletti, Sedatole, & Towry, 2005). Team members with a high level of trust are unlikely to raise competitive conflicts that hurt their esprit de corps. Therefore, the hypotheses are stated as below.

- H8: Perceived trust is positively related to cooperative attitude.
H9: Perceived trust is negatively related to competitive conflict.

Perceived benefit is considered perceived positive things that individuals were not previously entitled to receive. Cooperative attitude and competitive conflict are affected by perceived benefit (e.g., interests, incentives, or beneficial resources), which is analogous to the mutual benefit in some previous literature given that they both represent the benefit for every individual member of a team rather than for any particular person. Perceived benefit is positively associated with both cooperative attitude involving compatible interests (e.g., Bengtsson, Hinttu, & Kock, 2003) and competitive conflict involving conflicting interests (e.g., Richter et al., 2005). First, team members perceiving attractive benefit are likely driven to work collaboratively with their co-workers in order to pool their team resources and capabilities for obtaining such benefit (Hakansson & Ford, 2002), leading to a positive cooperative attitude.

Second, to a certain extent, individuals are likely to pursue their own interests at the expense of the overall team goal (Tjosvold, 1991). Previous research argues that an important reason for cooperation comes from altering the flow and allocating resources (Dowling & Roering, 1996; Wilkinson & Young, 2002). Thus, the more benefit that is perceived by team members for their obtaining conflicting interests, the more are they likely to, for example, compete over scarce resources, implying more competitive conflict inside their team. For example, it has been clearly described how manufacturing staff's preference for long, economic runs conflicts with sales staff's preference for quick delivery to consumers (Richter et al., 2005). Thus, the next two hypotheses are derived as follows.

- H10: Perceived benefit is positively related to cooperative attitude.
H11: Perceived benefit is positively related to competitive conflict.

2. Method

2.1. Subjects and procedures

The research hypotheses described above were empirically tested using a survey of professionals of virtual teams from forty IT firms in Taiwan. Professionals from IT firms were recruited for this study, because this population represents one of the largest user groups of online technologies and virtual teams in particular. Initially, 120 IT firms were drawn using a random sampling from the Taiwan business directory. After making phone calls for the

approval of the firms' authorities, 40 out of 120 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 40 firms, their virtual teams count heavily on e-mail, chat tools, online conference, instant messaging or other online systems to accomplish their teamwork. The members of virtual teams were recruited by this study, because such teams, in which online members collaborate with one another, have become a very popular mode of teamwork in today's modern societies. Of the 1000 questionnaires distributed to the subjects, 312 usable questionnaires were collected for a response rate of 31.2%. Table 2 presents the characteristics of the sample.

2.2. Measures

The constructs in this study are measured using 5-point Likert scales drawn and modified from existing literature. Four steps are employed in choosing measurement items. First, the items from the existing literature are translated into Chinese from English. Second, the items in Chinese were then substantially modified by a focus group of five people familiar with organizational behavior, including three graduate students and two professors. Third, following the questionnaire design, we next conducted two pilot tests (prior to the actual survey) to assess the quality of our measures and improve item readability and clarity further if needed. Finally, tips of back-translation suggested by Reynolds, Diamantopoulos,

Table 2
Sample characteristics.

Characteristic	N = 312
Gender	
Male	142 (45.51%)
Female	170 (54.49%)
Age	
18–19 years old	5 (2.00%)
20–29 years old	115 (36.86%)
30–39 years old	77 (24.68%)
40–49 years old	75 (24.04%)
50 or above	40 (12.42%)
Education	
High school or under	107 (34.29%)
University	175 (56.09%)
Graduate school	30 (9.62%)
Position level	
Management level	106 (33.97%)
Non-management level	206 (66.03%)
Department	
Research & development	29 (9.29%)
Human resource/training	38 (12.18%)
Finance/accounting	21 (6.73%)
Production	58 (18.59%)
Sales/service	121 (38.78%)
Others	45 (14.43%)
Tenure	
1 year or less	43 (13.78%)
1–5 years	95 (30.45%)
6–10 years	66 (21.15%)
11–15 years	35 (11.22%)
16–20 years	26 (8.33%)
21–25 years	26 (8.33%)
26 years or more	21 (6.74%)
Internet application on job	
Less than 1 year	35 (11.22%)
1 year more and less than 2 years	29 (9.30%)
2 years more and less than 3 years	36 (11.54%)
3 years or more	212 (67.94%)

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.

Perceived job effectiveness based on individuals' evaluation is measured with four items modified from Edmondson (1999) originally measuring team performance. Knowledge sharing is measured with three items directly drawn from Lin (2007a), Lin (2007b). Cooperative attitude with three items and competitive conflict with another three items are modified from Tjosvold, Hui, and Yu (2003). Shared vision with four items is modified from Croteau and Raymond (2004). Perceived trust with four items is modified from Yilmaz and Hunt (2001). Finally, perceived benefits with four items are drawn and modified from Gold, Malhotra, and Segars (2001) to measure the potential perceived benefits from the perspective of virtual team collaboration. All the scale items are summarized in the Appendix.

2.3. Data analysis

The survey data were analyzed (with the CALIS procedural of SAS software) using a two-step structural equation modeling (SEM) approach proposed by Anderson & Gerbing (1988). The first step performs confirmatory factor analysis (CFA) on all data collected to assess scale reliability and validity. The second step examines path effects and significances in the hypothesized structural model for purposes of hypotheses testing. Test results from each stage of analysis are presented next.

2.4. Measurement model testing

CFA analysis was performed on all items corresponding to the seven constructs measured in Likert-type scales. The goodness-of-fit of the CFA model was assessed using a variety of fit metrics, as shown in Table 3. The normalized chi-square (chi-square/degrees of freedom) of the CFA model was smaller than the recommended value of 2.0. Although the adjusted goodness of fit index (AGFI) was slightly lower than the recommended value of 0.9, the root mean square residual (RMR) was smaller than 0.05, the root mean square error of approximation (RMSEA) was smaller than 0.08, and the comparative fit index (CFI), the non-normed fit index (NNFI), the goodness of fit index (GFI), and the normed fit index (NFI) all exceeded 0.90. These figures suggest that the hypothesized CFA model in this study fits well within the empirical data.

Convergent validity was assessed using three criteria recommended by Fornell and Larcker (1981). First, as evident from the *t*-statistics listed in Table 3, all factor loadings were statistically significant at *p* < 0.001, which is the first requirement to assure convergent validity of construct (Anderson & Gerbing, 1988). Second, the average variance extracted (AVE) for all constructs exceeded or equaled 0.50, indicating that the overall hypothesized items capture sufficient variance in the underlying construct than that attributable to measurement error (Fornell & Larcker, 1981). Third, the reliabilities for each construct exceeded 0.70 (see Table 3), satisfying the general requirement of reliability for research instruments. At any rate, the empirical data collected by this study met all three criteria required to assure convergent validity.

Discriminate validity was assessed by chi-square difference tests between an unconstrained model, where all constructs in our CFA model were allowed to co-vary freely with constrained models and where covariance between each pair of constructs is fixed at one. The advantage of this technique is its simultaneous pair-wise comparisons for the constructs based on the Bonferroni

Table 3
Standardized loadings and reliabilities.

Construct	Indicators	Standardized loading	AVE	Cronbach's α
Perceived job effectiveness (F1)	JE1	0.72 (<i>t</i> = 13.14)	0.50	0.75
	JE2	0.76 (<i>t</i> = 14.15)		
	JE3	0.64 (<i>t</i> = 11.33)		
Knowledge sharing (F2)	KS1	0.65 (<i>t</i> = 12.10)	0.65	0.83
	KS2	0.90 (<i>t</i> = 18.83)		
	KS3	0.84 (<i>t</i> = 17.05)		
Cooperative attitude (F3)	CA1	0.76 (<i>t</i> = 15.17)	0.65	0.84
	CA2	0.80 (<i>t</i> = 16.17)		
	CA4	0.85 (<i>t</i> = 17.61)		
Competitive conflict (F4)	CC1	0.83 (<i>t</i> = 17.54)	0.79	0.92
	CC2	0.96 (<i>t</i> = 22.09)		
	CC3	0.88 (<i>t</i> = 19.40)		
Shared vision (F5)	SV1	0.82 (<i>t</i> = 16.95)	0.66	0.88
	SV2	0.86 (<i>t</i> = 18.49)		
	SV3	0.86 (<i>t</i> = 18.35)		
	SV4	0.71 (<i>t</i> = 14.00)		
Perceived trust (F6)	PT1	0.83 (<i>t</i> = 17.08)	0.63	0.87
	PT2	0.80 (<i>t</i> = 16.20)		
	PT3	0.81 (<i>t</i> = 16.73)		
	PT4	0.73 (<i>t</i> = 14.26)		
Perceived benefits (F7)	PB1	0.75 (<i>t</i> = 15.11)	0.67	0.89
	PB2	0.83 (<i>t</i> = 17.50)		
	PB3	0.86 (<i>t</i> = 18.44)		
	PB4	0.84 (<i>t</i> = 17.76)		

Goodness-of-fit indices (*N* = 312): $\chi^2_{231} = 423.01$ (*p*-value < 0.001); $\chi^2/d.f. = 1.83$; NNFI = 0.95; NFI = 0.91; CFI = 0.96; GFI = 0.90; AGFI = 0.87; RMR = 0.02; RMSEA = 0.05.

Note: an item of perceived job effectiveness is removed from this model due to its poor loading.

Table 4
Chi-square difference tests for examining discriminate validity.

Construct pair	$\chi^2_{231} = 423.01$ (unconstrained model)	
	χ^2_{232} (constrained model)	χ^2 difference
(F1, F2)	568.40***	145.39
(F1, F3)	540.93***	117.92
(F1, F4)	632.00***	208.99
(F1, F5)	555.02***	132.01
(F1, F6)	551.33***	128.32
(F1, F7)	534.99***	111.98
(F2, F3)	680.93***	257.92
(F2, F4)	1116.40***	693.39
(F2, F5)	767.23***	344.22
(F2, F6)	719.72***	296.71
(F2, F7)	727.61***	304.60
(F3, F4)	805.65***	382.64
(F3, F5)	579.73***	156.72
(F3, F6)	552.80***	129.79
(F3, F7)	643.71***	220.70
(F4, F5)	1127.61***	704.60
(F4, F6)	1120.14***	697.13
(F4, F7)	1120.05***	697.04
(F5, F6)	717.82***	294.81
(F5, F7)	942.06***	519.05
(F6, F7)	882.77***	459.76

Legends: F1 = perceived job effectiveness; F2 = knowledge sharing; F3 = cooperative attitude; F4 = competitive conflict; F5 = shared vision; F6 = perceived trust; F7 = perceived benefits.

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

method. Controlling for the experiment-wise error rate by setting the overall significance level to 0.01, the Bonferroni method indicated that the critical value of the chi-square difference should be 12.21. Chi-square difference statistics for all pairs of constructs exceeded this critical value of 12.21 (see Table 4), thereby assuring discriminant validity for our data sample. Overall, the test results herein indicated that research instruments used for measuring the constructs of interest in this study are statistically adequate.

3. Results

3.1. Structural model testing

The second step transforms the CFA model to a structural model that reflects the hypothesized associations described in our research model for purposes of hypotheses testing. Table 5 presents the test results of this analysis.

Ten out of our 11 hypothesized associations were significant at the $p < 0.01$ significance levels, and this shows that there is only one hypothesis that is not supported by this study. More specifically, the relationship between knowledge sharing and perceived job effectiveness is significant with a standardized path coefficient of 0.23 (H1 is supported). While perceived job effectiveness is significantly influenced by cooperative attitude and competitive conflict, respectively with standardized path coefficients of 0.55 and 0.22 (H2 and H3 are supported), knowledge sharing is significantly influenced by cooperative attitude and competitive conflict with respective standardized path coefficients of 0.57 and -0.15 (H3 and H4 are supported). Shared vision has a significant effect on cooperative attitude with a standardized path coefficient of 0.30 (H6 is supported), but its effect on competitive conflict is insignificant (H7 is not supported). Perceived trust has significant effects on cooperative attitude and competitive conflict with respective standardized path coefficients of 0.43 and -0.23 (H8 and H9 are supported), whereas perceived benefit also has a significant effect on cooperative attitude and competitive conflict with respective standardized path coefficients of 0.33 and 0.29 (H10 and H11 are supported).

The unsupported H7 indicates that shared vision which helps team consensus does not impact competitive conflict, suggesting that management strategies for steering appropriate cooperation and competition should be considered as the situation demands in a team. Nevertheless, the unexpected results for the unsupported

hypothesis may warrant further study so that the insights behind the hypothesis can be interpreted accurately.

4. Discussion

Cooperation and competition have been addressed in traditional literature as a trade-off in creating progress in organizational performance. This assertion may be true for joint ventures in general, but the question posed in this study concerns whether cooperation and competition are really a trade-off to each other in team collaboration, which has been rarely empirically confirmed. It is actually seen that the knowledge in previous literature about the effects that competitive conflict can have is relatively limited and narrow (De Dreu & Beersma, 2005). This study advances organizational behavior research by including influential effects of both cooperation and competition in a model to examine their antecedents and outcomes. Even though previous research has suggested a potential relationship between cooperation and job effectiveness, few studies have empirically explored the reasons for the relationship (Luo et al., 2006). For this reason, many useful implications are thus generated for the reference of management, which are described in detail as follows.

Previous research has indicated mixed empirical results about competition (i.e., competitive conflict). For instance, whereas Hammond and Goldman (1961) concluded that competition may not motivate job effectiveness and can be detrimental to group processes (e.g., Deutsch, 1973; Johnson & Johnson, 1989; Johnson, Maruyama, Johnson, Nelson, & Skon, 1981), Stanne, Johnson, and Johnson (1999) stressed positive effects of competition on job effectiveness. Similar research with mixed results suggested that competition facilitates productivity (and motivation) but lowers quality (Julian & Perry, 1967; Yauch & Adkins, 2004). These mixed empirical results reveal that some key mediators associated with competitive conflict and job effectiveness (e.g., knowledge sharing) should be included so that our understanding about competitive conflict can be substantially improved.

The empirical results of this study present critical findings that may quell above contradictory arguments about the good or bad of competitive conflict. Although competition has a positive effect on job effectiveness due to the fact that competitive activities often yield shorter completion times (e.g., lead times, set-up times, and design cycles) and higher productivity (e.g., Yauch & Adkins, 2004), such an effect can become just reverse given knowledge sharing taken into account. As a result, competitive conflict has a positive effect on job effectiveness but a negative effect on job effectiveness via the mediation of knowledge sharing. This finding suggests that the effect of competitive conflict on job effectiveness may be biased if knowledge sharing is not simultaneously evaluated in the same model.

All the above findings together provide strong justification about why the effects of competition on job effectiveness in previous studies are positive sometimes and negative other times, depending on their various inclusions of research constructs. In fact, competitive conflict has an indirectly negative effect on job effectiveness particularly when knowledge sharing is a must in job contexts. If employees can independently achieve their job goals without knowledge sharing, then competitive conflict is good for them. On the other hands, if employees cannot complete their job without knowledge sharing among one another, then competitive conflict that discourages knowledge sharing could be very bad eventually for their job effectiveness.

The findings of this study indicate the positive relationship between knowledge sharing and perceived job effectiveness in team collaboration, further complementing some previous studies that focus on intra-organizational or cross-functional collaboration (e.g., Luo et al., 2006). The test results of this study present that knowledge sharing plays a major mediating role to the extent to

Table 5
Path coefficients and t value.

Hypothesis	Standardized coefficient	t Value
H ₁ : Knowledge sharing → perceived job effectiveness	0.23**	2.99
H ₂ : Cooperative attitude → perceived job effectiveness	0.55**	6.44
H ₃ : Competitive conflict → perceived job effectiveness	0.22**	3.74
H ₄ : Cooperative attitude → knowledge sharing	0.57**	7.08
H ₅ : Competitive conflict → knowledge sharing	-0.15 **	-2.67
H ₆ : Shared vision → cooperative attitude	0.30**	4.88
H ₇ : Shared vision → competitive conflict	-0.08	-0.92
H ₈ : Perceived trust → cooperative attitude	0.43**	6.60
H ₉ : Perceived trust → competitive conflict	-0.23 **	-2.61
H ₁₀ : Perceived benefit → cooperative attitude	0.33**	6.35
H ₁₁ : Perceived benefit → competitive conflict	0.29**	3.99

** $p < 0.001$.

which cooperation among team members affects perceived job effectiveness. Therefore, the value of a simultaneous cooperative attitude and competitive conflict within social interaction among team members lies in how they affect the knowledge sharing of the team, which in turn influences their perceived job effectiveness. Particularly, given competitive conflict has a negative effect on knowledge sharing (but a positive effect on job effectiveness), management should learn that interpersonal conflict and sharing can, and often do, co-exist and that the balance of the two leads to enhanced job effectiveness. The findings of this study strongly suggest that competitive conflict can have pros and cons for organizations, striking management to plan out balanced measures to maintain certain competitive conflict under the rules of the organization. It would be very much mistaken for management to think that any competition should be eliminated due to its potentially negative effect on knowledge sharing.

While a cooperative attitude has a positive effect on both knowledge sharing and perceived job effectiveness, the competitive conflict reveals a negative influence on knowledge sharing, but a positive influence on perceived job effectiveness. These phenomena suggest that competitive conflict should be monitored and management should balance it so as to boost cooperation given a feasible competitive conflict. The perspective of balance is quite different from traditional literature that only focuses on cooperation without recognizing the existence of competitive conflict or that even suggests the complete elimination of competitive conflict (e.g., Tjosvold, Poon, & Yu, 2005). In fact, the teams that lack competitive conflict in the long run are unlikely to be motivated to make progress, consequently leading to a disaster in perceived job effectiveness. Of course, it does not mean that management should just release their control of a serious competitive conflict that is beyond their control. After all, the water that floats the boat can also sink the boat. Training for conflict management should be provided to team members so that competitive conflict can be well used to ultimately activate perceived job effectiveness. Management must also keep in mind that low knowledge sharing in cooperation may result from the risk of the unending competitive game that eventually hurts team morale.

Shared vision having a significant effect only on cooperative attitude rather than on competitive conflict suggests that its unique role is far different from perceived trust and perceived benefit – that is, this factor can be applied safely for boosting team cooperative culture without unpredictable complication in impacting competitive conflict. Therefore, it is best used to strengthen team members' attitude toward cooperation when management feels the current status of competitive conflict in the team is fragile and should not be further impacted.

Perceived trust having significant effects positively on cooperative attitude and negatively on competitive conflict suggests a key role in cooperation. Management attempting to boost cooperation in their teams within a short period should arrange a get-together or workshop so that team trust can be built efficiently given that virtual teams are sometimes temporary ones and have no sufficient time for members to foster trust with each other.

The positive influence of perceived benefit on both cooperative attitude and competitive conflict suggests that management should provide incentives as important benefits to team members with great caution, because the incentives perceived as important benefits by team members will not only cultivate their cooperative attitude, but also speed up their competitive conflict. This phenomena suggest that incentives are best provided when the level of competitive conflict is under control by management so that the incentives can be used for good purpose in cultivating the right attitudes for team cooperation.

Cooperation is of value to organizational teams, which should embrace and make good use of the proposed antecedents in this

study to manage cooperation. As good communication and interaction add to the depth and richness of mutual understanding between the members of virtual teams, management should keep upgrading IT facilities and tools that help communication and interaction so that shared vision, perceived trust, and perceived benefit can be enhanced to the anticipated extent. Management should keep in mind that there is no “one size fits all” solution for enhanced perceived job effectiveness, by purely, for example, encouraging cooperative attitude and discarding competitive conflict. Management must understand that perceived job effectiveness formation under cooperation is a complex process owing to both the underlying nature of cooperation and competition and the various ways the three antecedents can influence cooperative attitude and competitive conflict.

4.1. Limitations

This study contains three limitations related to the measurements and interpretations of the results. The first limitation is the possibility of common method bias, given that most predictors in the research model were measured perceptually at a single point in time. To test for this bias, this study conducted the single factor test of Harmon (Podsakoff & Organ, 1986). In this test, if substantial common method variance is present in the data sample, then either a single factor will emerge from the factor analysis or a general factor will account for the majority of the covariance in the independent and dependent variables. Exploratory factor analysis of measurement items for the seven constructs in the survey reveals the seven factors explaining 17.89%, 17.57%, 15.93%, 14.34%, 12.59%, 11.10%, and 10.57% of the total variance. These figures suggest that the variances are distributed well among multiple factors, suggesting that potential common method bias is unlikely to be a threat herein for subsequent analysis.

The second limitation of this study is its generalizability, due to the highly delimited nature of the subject sample. The inferences drawn from such a sample may not be fully generalizable to employees from other industries (e.g., retailing) or countries. Indeed, given that employees in high-tech industries have their unique way of working and collaborating with others (e.g., Lin, 2010), virtual work groups in other professional contexts (e.g., doctors, lawyers or bankers) may show a different working phenomenon or collaboration styles. Besides, given that the ways of team collaboration may vary widely among cultures, the results of this study may not apply to organizational members in a culture that is substantially different from Taiwan. Cultural psychologists suggest that national cultural differences can influence evaluations and decision-making of organizational team members.

While the second limitation is related to the cross-sectional design employed without longitudinal tests, the third limitation is that this study did not address other variables, such as workplace cultures, working hours, team sizes, etc. Future studies should attempt to improve these shortcomings by including more variables for further empirical tests and also by observing research subjects over time so that the genuine relationships between perceived job effectiveness in team collaboration and its determinants can be transparently revealed from a longitudinal perspective.

Appendix A. Measurement items

Perceived job effectiveness

TE1. Those who accept the service of our online team often appreciate our service.

TE2. The work quality of our online team is improving over time.

TE3. Those who interact with our online team often like how it functions.

TE4. Our online team seems to be “slipping” a lot in its level of performance and accomplishment. (Reverse coded)

Knowledge sharing

KS1. I share my expertise at the request of our online team members.

KS 2. I share my job experience with our online team members.

KS 3. I share my ideas about jobs with our online team members.

Cooperative attitude

CA1. Our team members encourage a “we are in it together” attitude.

CA2. Our team members do their best to work collaboratively.

CA3. Our team members combine the best of positions to obtain the goal of our collaboration.

Competitive conflict

CC1. Team members want others to make concessions but do not want to make concessions themselves.

CC2. Team members treat conflict as a win-lose contest.

CC3. Team members state their position strongly to dominate our teamwork.

Shared vision

SV1. The mission of our online team is clear for every member.

SV2. The objectives of our online team are coherent for every member.

SV3. The strategy of our online team is explicit for every member.

SV4. There is a strong feeling that a common commitment exists in our online team.

Perceived trust

PT1. I consider our online team members as people who can be trusted.

PT2. I consider our online team members as people who can be counted onto do what is right.

PT3. I consider our online team members as people who can be counted onto get the job done right.

PT4. I consider our online team members as people who are always faithful.

Perceived benefits

PB1. The online collaboration of our team reduces redundancy of work content for every member.

PB2. The online collaboration of our team coordinates the efforts of every member.

PB3. The online collaboration of our team facilitates the innovation of new ideas of every member.

PB4. The online collaboration of our team streamlines the internal processes for every member.

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