Chiao Da Management Review
Vol. 34 No.1, 2014
pp.57 -78

實體團隊與虛擬團隊的團隊動力歷程

Group Dynamics in Collocated and Virtual Teams

周惠文 Huey-Wen Chou
中央大學 資管系
Department of Information Management, National Central University
林裕勛[1] Yu-Hsun Lin
明志科技大學 經營管理系
Department of Business and Management, Ming Chi University of Technology
許榮隆 Jung-Lung Hsu
開南大學 資管系
Department of Information Management, KaiNan University
郭蕙瑜 Hui-Yu Kuo
中央大學 資管系
Department of Information Management, National Central University

摘要：本研究以問卷方式收集共104筆來自台灣不同產業的工作團隊資料，包含53筆虛擬與51筆實體二種類型的工作團隊，以檢驗信任對團隊類型-衝突關係的中介角色，並探討團隊成員間共享的團隊認同對團隊類型-信任關係的調節角色是否存在。研究發現，相較於實體工作團隊，虛擬工作團隊有較高的團隊衝突與較低的團隊信任和團隊認同。其次，本研究發現團隊信任能顯著中介團隊類型與團隊衝突的關係，亦即，虛擬工作團隊的低團隊信任程度會形成該團隊較高的團隊衝突，而團隊認同的調節效果在本研究中並未獲得支持。除此，團隊成立時間長短或團隊性質（暫時性團隊或永久性團隊）並未

[1] Corresponding author: Department of Business and Management, Ming Chi University of Technology, New Taipei County, Taiwan, E-mail: yhsunlin@gmail.com

造成團隊信任或團隊衝突的顯著差異；但團隊規模大小則與團隊信任或團隊衝突有顯著關聯，亦即當團隊人數增加時成員間的信任程度會下降，且團隊內衝突會升高。因此本研究建議，隨著組織中虛擬團隊運作模式的普及，虛擬團隊領導者應控制團隊人數規模，若團隊規模漸大時，管理者應建立頻繁且方便使用的溝通機制以增強團隊內的有效溝通，藉以建立團隊成員間的信任與團隊認同，以降低團隊衝突。

關鍵詞：虛擬團隊；實體團隊；團隊認同；衝突；信任

Abstract: This study analyzed the results of survey data from 104 teams, including 53 virtual teams and 51 collocated teams, across various industries in Taiwan. The aims of this study were to examine empirically the proposed model a) with trust as the mediator of the team type-conflict relation and b) with shared team identity as the moderator of the team type-trust relation. Our study found, first, that the virtual teams, compared with collocated teams, experienced less shared team identity and less trust in team members, and exhibited a higher level of conflict within the team. Second, this study confirmed that trust in team members is a significant mediator between team type and conflict. Third, the significant moderating role of shared team identity, however, was not found. Fourth, among three control variables, this study found that team size has a significant association with trust in team members and conflict within the team. This result indicates that, as the team size increases, trust in team members will weaken as well as that more team conflict will emerge. Managers of a virtual team should constrain the team size so that the negative effects of large group size can be controlled. If a large team size is inevitable, team leaders should implement managerial interventions. Among all, building convenient communication channels to enhance frequent and effective intra-group communication so as to facilitate the development of trust in team and shared team identity is a plausible option. The managerial implications and discussion of the research limitations of this study conclude the paper.

Keywords: Virtual team; Collocated team; Shared team identity; Conflict; Trust

1. Introduction

Nowadays, global competition and international alliances result in coordination across geographical boundaries within or between organizations. As a consequence, the use of virtual teams has become increasingly common in organizations. With the support of the enabling information and communication technologies (ICT), virtual teams are assumed to be able to conquer the challenges of this interconnected global economy (Mukherjee, Lahiri, Mukherjee, & Billing, 2012; Sarker, Ahuja, Sarker, & Kirkeby, 2011; Gressgard, 2011; Purvanova & Bono, 2009). Despite the apparent enthusiasm for using virtual teams as an organization's work unit, outcomes for virtual teams are not always fruitful, and challenges exist in the areas of leadership (Mukherjee *et al.*, 2012; Hambley, O'Neil, & Kline, 2007), communication (Mancini, 2010), conflict (Wakefield, Leidner, & Garrison, 2008), trust (Han & Harms, 2010), and shared team identity (Raghuram, 2011; Cooper & Thatcher, 2010). Curseu, Shalk, and Wessel (2008) also indicated that although virtual teams have some pragmatic advantages above collocated teams, managing virtual teams remains a challenge. Curseu *et al.* (2008) further pointed out that the development of trust, cohesion and a strong team identity is one of the most difficult challenges for managers of virtual teams.

The essence of the difference between collocated team and virtual team members is their pattern of member distribution. Geographical isolation is likely to hamper communication among virtual team members. This limitation for the virtual team is likely to be diminished through the aid of the information technologies. Kankanhalli, Tan, and Wei (2006/2007), however, postulated that, because the information technologies used by virtual teams exhibit a lack of synchronicity, the amount of informal or non-task communication cues can be diminished, which may hinder team members from correctly interpreting the messages received and result further in poor trust, less building of shared team identity, and an increase in conflict among team members. These results occur because conflict in virtual teams may be exacerbated by communication delays and lack of face to-face contact (Kankanhalli, Tan, & Wei, 2006/2007). We,

therefore, argue that team type (collocated team *vs*. virtual team) plays an important role in explaining the formation of trust and of conflict.

Previous studies confirm that conflict is not only prevalent, but also particularly difficult to isolate and manage in virtual teams (Cohen & Gibson, 2003; Hinds & Bailey, 2003; Mannix, Griffith & Neale, 2002) and that it will obstruct team performance (Hinds & Mortenson, 2005; Raghuram, 2011). In addition, Kirkman, Rosen, Gibson, Tesluk, and McPherson (2002) found that due to the lack of face-to-face contact, it could be more difficult to build trust among team members in virtual teams than in collocated teams. Their study confirmed that trust is vital to virtual team success and helps reduce team conflict. In a different approach, Han and Harms (2010) have documented that trust and team identification are likely to be related to team conflict. Specifically, their study found that trust mediates the team identification-conflict relationship. However, their study is based on survey data drawn from only two companies, and their research model does not explicitly answer the question of whether team shared identity and trust have different effects on conflict in collocated teams as compared to virtual teams. To fill the aforementioned gap, this study proposes a conceptual research framework to explore the relationships among team type, shared identity, and trust to help provide a clearer understanding of how these relationships affect conflict.

Shared team identity is a person's sense of belonging to a social category (Ashforth & Mael, 1989). Those who identify more with their workgroups tend to perceive a higher level of trust and confidence (Fiol & O'Connor, 2005). Hinds and Mortensen (2005) describe shared team identity as a function of team context, inputs, and processes. Shared team identity appears to be a plausible social/contextual factor to help enhance trust in virtual teams. Strong shared team identity in virtual teams would help promote a sense of togetherness despite a relative lack of physical contact. Members' perceptions of belonging would help them unite to work towards a shared common goal.

The perspective of intervening process theories provides a conceptual foundation with respect to the formation process of conflict. Qin, Smyrnios, and Deng (2012) apply the extended intervening process model (EIPM) to describe

how group process variables and contextual variables underlie the linkage between team type and team conflict. The study reported here adapts the EIPM perspective and proposes trust as the process variable acting as an intervening variable that mediates the antecedent-outcome relationship and shared identity as the contextual variable that moderates the aforementioned antecedent-outcome relationship. In other words, this study explores the mediating role of trust and the moderating role of shared team identity to examine whether the former serves as a process variable to intervene the team type-conflict relation and whether the latter can help raise the level of team trust from the less favourable level otherwise found in a virtual team.

2. Literature Review

2.1 Team Type and Trust in Team Members

The implementation of the virtual team as an organizational unit has increased substantially. In a virtual work setting, where employees are working in different locations, the opportunity for face-to-face contact is limited most of the time. Face-to-face encounters are considered critical for building trust in teams. Trust in members within virtual teams is intrinsically difficult to achieve since people are separated by time and physical space. Jarvenpaa and Leidner (1999) suggest that, although global virtual teams may experience a form of 'swift' trust, such trust appears to be extremely fragile and temporal. Thus, compared with virtual teams, collocated teams - where members can easily meet and synchronously communicate with each other - are more apt to establish trust in team members. Trust increases as members learn the shared beliefs and values of the group's collective identity. Therefore, this study proposes the first hypothesis as follows:

H1: Compared with collocated teams, virtual teams will establish less trust in team members.

2.2 Trust in Team Members and Team Conflict

Mancini (2010) developed a team performance model that includes

commitment, trust, conflict, and task process. Their study confirmed that trust would decrease team conflict level. Previous research indicated that when trust in team members is high, team members are sheltered from experiencing the worst of future interpersonal conflict. Based on the above literature, we propose that when team trust is high, team members may be more capable of exerting normative pressure on dissenting team members, thus reducing conflict occurring in the team. Thus, this study proposes Hypothesis 2 as follows:

H2: Trust in team members will have a negative relation to a team's conflict.

Conflict is critical to predict the outcomes of performance. Conflict within a team has been acknowledged to be detrimental to virtual team effectiveness (Han & Harns, 2010). Comparing the difference in conflict between virtual teams and collocated teams, Mannix, Griffith, and Neale (2002) indicated that conflict would be more extreme in virtual than in collocated teams. In addition, as intervening process theories suggested that intervening variables may provide a clearer interpretation of the antecedent-outcome relationship, we argued that other process variables may be intervening in the team type-conflict relationship. Trust in team members is one of the processes variables that can bridge the causal linkage between team type and conflict. When, compared to members of collocated team, members in virtual team experience lower trust, they are more prone to interpret others' ambiguous behaviour negatively, which may result in team conflict (Simons & Peterson, 2000). Based on the above discussion, this study proposes the third hypothesis as follows:

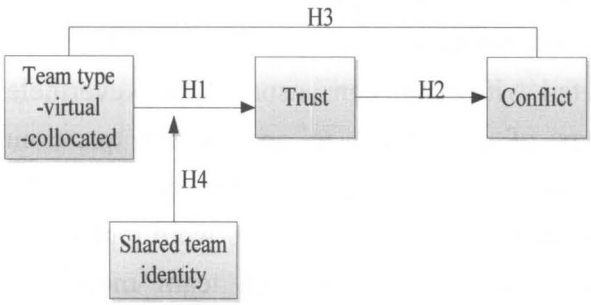
H3: Trust in team members will mediate the relationship between team type and team conflict.

2.3 Boundary Conditions of the Team Type and Trust

Hinds and Mortensen (2005) found that shared team identity can help establish a psychological link among distant team members to overcome physical and contextual distance. If no strong shared identity exists, team members are likely to criticize other team members' behaviors and assume a competitive, rather

than cooperative stance, when problems arise. Shared team identity can help distant team members to link across the physical and contextual distance and evaluate other team members' behaviors positively. Webster and Wong (2008) proposed that trust can result from shared membership in a category (such as an in-group). Fiol and O'Connor (2005) also suggested that having team members who identify more strongly with their group would lead to greater trust among members. Jehn, Northcraft and Neal (1999) indicated that a strong shared team identity among members is beneficial to reduce conflict, particularly interpersonal conflict. Like Hinds and Mortensen (2005), they found that, in the absence of a strong shared team identity, team members are likely to evaluate other team members' behaviors negatively and to assume a competitive rather than cooperative stance when problems or misunderstandings arise. The intra-group hostility can evolve into interpersonal conflict and weaken trust in team members. Furthermore, Hinds and Bailey (2003) proposed that shared team identity can moderate the relationship between team type (collocated vs. virtual) and conflict. Hinds and Mortensen (2005) further indicated a strong shared team identity across distributed sites can decrease mistrust. Their study not only confirmed the significant moderating role of shared team identity in the team type-conflict relationship, but also suggested its plausible moderating effects on the team type-trust relationship. Following their suggestion, this study aims to examine the moderating effects of shared team identity on the team type-trust relationship by using a larger sample size. Our fourth hypothesis is as follows:

Figure 1
Research Model



H4: Shared team identity will moderate the team type-trust relationship.

Figure 1 illustrates our proposed model on the relationships between team type and conflict, the mediating role of trust in team members, and the moderating role of shared identity in between.

3. Methods

3.1 Data Collection

Virtual teams and collocated teams were chosen as the study target. Data were collected by stratified random sampling from organizations across three major industry types in Taiwan, including manufacturing (25%), banking (10%), and services (65%). A total of 142 teams - 36, 14, 92 teams from manufacturing, banking and service industries respectively - were initially contacted and checked with respect to the availability of virtual/collocated teams in their company. Of these, 110 - 22, 10, 80 teams from manufacturing, banking and service industries respectively - teams agreed to participate, which makes the response rate 77%. Then we called and explained our research objectives to the key volunteers in each company that agreed to participate. The key volunteer in his/her company found one team and randomly selected two team members in that team to fill out the questionnaire.

Of the 110 teams in the study, 56 were virtual teams, and the remaining 54 were collocated teams. These teams consisted of IS (information systems) integration teams (53), quality improvement teams (6), R&D teams (7), business management teams (3), customer service teams (4), production teams (10), sales teams (23) and others (9). All respondents were team members; none of them were team leaders or acting in a managerial role.

Kumar, Stern, and Anderson (1993) found that data from single informants were highly correlated with team consensual data. Nevertheless, we randomly picked two members of each team to answer the questionnaire because of concerns that there might be some doubts if we asked only one member to answer the questionnaire. To ensure that the responses were representative of that team, we use r_{wg} to determine whether the two team members' responses were

correlated. Among these questionnaire responses, six teams' r_{wg}'s were below 0.7, and these teams were removed from later analysis. The responses of the two members of each team were then averaged for the team-level analyses. The range of these averages for the remaining teams is between 0.74 and 0.81. Our final sample included 53 virtual teams (members situated at two or more locations) and 51 collocated teams (members all situated at one location). Of the 104 teams, 23 teams were temporarily grouped and 81 teams were permanently grouped. The teams ranged in size from 3 to 21 members. The duration for a team ranged from 2 to 78 months, with an average of 30.75 months.

3.2 Measurements

The original research instrument is in English, so the instrument was translated from English to Chinese using forward-translation method to ensure that the Chinese version instrument corresponds to the semantic of the original English version instrument. Then two researchers worked together to revise the initial Chinese version instrument. Finally, a panel meeting was held by four independent researchers to refine the translation. A pre-test was administered to thirty participants from the target population, and the instrument was revised accordingly.

The team was used as the unit of analysis; therefore, the scales were measured at the team level. The questionnaire was designed to collect the following information on a team basis: (1) background information on the team including team size, team duration, whether the team is organized on a temporary or permanent basis, and team type; and (2) perceived trust, conflict, and shared team identity among team members.

Team type. This variable has two categories: collocated and virtual. A virtual team is a team in which members were scattered across at least two locations, whereas a collocated team is a team in which team members are based at the same location, building, or campus. This is a dummy variable with virtual team and collocated team coded as 1 and 0 respectively.

Shared team identity. Shared team identity is a psychological state - a dynamic

attribute of a team. This study adapted a subset from measurements used by Tyler (1999) to assess shared team identity. Thirteen items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is: 'My team members are proud to think of themselves as members of the team.'

Trust. A total of 11 items were adapted from several studies (Dirks & Ferrin, 2002; Kanawattanachai & Yoo, 2002; Aubert & Kelsey, 2003) to measure trust in team members. Respondents rated each item as to the extent of trust in team members perceived by individuals within their team. Statements were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A sample item is: 'If I share my problem with team members, I know they would respond constructively and caringly.'

Conflict. Eight items adapted from Jehn's study (1995) were included to measure task (four items) and interpersonal (four items) conflict. Respondents rated each item as to the extent each type of conflict was perceived within their team. Statements were rated on a five-point Likert scale ranging from 1 (not at all) to 5 (very much). A sample item concerning interpersonal conflict is: 'How much friction is there within the team?'

4. Results and Discussion

Prior to hypothesis testing, we justified the measurement model according to the reliability and validity of the scales. Confirmatory factor analysis (CFA) by the LISREL 8.52 program was employed to assess reliability, convergent and discriminant validities of the scales. In CFA, the initial model consisted of 32 reflective items and five hypothesized factors. Each item was modelled as a reflective indicator of its hypothesized latent construct. Table 1 showed the parameter derived from CFA. The composite reliability (CR) coefficient was the indicator for measuring the internal consistency of the scale items for a given variable. We found the values of CR coefficient for trust, shared identity, and conflict were 0.973, 0.989, and 0.983 respectively, which were greater than the threshold for the test of reliability coefficient, 0.8, recommended by Nunnally

(1978). Thus, the reliability of the measurement model reached an acceptable level.

Table 1

Means, Standard Deviations, and Inter-Correlations Among Variables

Variable	1.	2.	3.	4.	5.
1. Team size					
2. Team duration	0.144				
3. Trust	-.143	0.202*	**0.786**		
4. Team identity	-.041	0.065	0.104	**0.881**	
5. Conflict	0.216*	-0.096	-0.578**	-0.642**	**0.884**
Mean (*S.D.*)	8.58(5.46)	30.75(20.11)	3.90(0.55)	3.90(6.57)	2.35(0.56)
Min (Max)	3(21)	2(78)	2.15(5)	1.92(4.75)	1.31(4.44)
α			0.856	0.779	0.878
CR			0.973	0.989	0.983

Note: The **bold** values on the diagonal are the average variance extracted (AVE). The values on the off-diagonal are the correlations among constructs. $^{*}p < 0.05$; $^{**}p < 0.01$ (two-tailed test).

Following the recommendation by Fornell and Larcker (1981), we use the following three criteria to evaluate the convergent validity of the measurement scales. First, all indicator factor loading (λ) should be significant and exceed the relevant threshold, 0.7. Second, the CR coefficient of the scale items for a given variable should be greater than 0.8. Third, average variance extracted (AVE) should be greater than the threshold, 0.5. While all item loadings (λ) were significant ($p < 0.001$), the CFA results suggested two item loadings were less than 0.7 on their hypothesized factor. We re-specified the model by eliminating those two items, which then resulted in 30 measurement items and five factors. As depicted in Table 1, the AVE values of constructs in the range of 0.786 to 0.884 were greater than the threshold value of 0.7 and the CR coefficients of constructs were all well above the threshold, 0.8. Taking the three conditions as a whole, the measurement scales have high convergent validity. Fornell and Larcker (1981) suggested a procedure to assess discriminant validity: the AVE for each construct should be larger than the squared correlation between the construct and any other

construct. As shown in Table 1, all the values of AVE listed in the diagonal were greater than any squared correlation between constructs. The results suggested that our measurement model demonstrated sufficient discriminant validity.

This study used self-report data to test the hypotheses, which can result in the common method bias. A post-hoc remedy, Harman's one-factor test, suggested by Podsakoff, MacKenzie, Lee, and Podsakoff (2003), was employed to check whether the common method bias exists. All variables in the proposed research framework in Figure 1 were entered into an exploratory factor analysis. The result of an un-rotated principal components factor analysis revealed that totaling four factors with eigenvalues greater than 1 accounted for 79.46% of the total variance. The largest factor accounted for 41.48% of the total variance and was not greater than 50%, which is the minimum threshold value requirement for common method effect assessment; nevertheless, the value attributable to the largest factor was slightly greater than half of the variance (39.73%) attributable to the four factors with eigenvalues greater than 1. Therefore, the data may have some common variance problems but it is probably not sufficiently large enough to invalidate the research conclusion (Doty & Click, 1998).

Table 1 shows descriptive statistics and inter-correlations among studied variables. The correlations among studied variables indicate that, as team size grows, team conflict correspondingly increases ($r = 0.216$, $p < 0.05$). In addition, the longer the team duration, the more trust in team members will be established ($r = 0.202$, $p < 0.05$). Conversely, the more conflict perceived in the team, the less trust as well as the less shared team identity was perceived in the team ($r = -0.578$ and -0.642 respectively, both p's < 0.01). It is worth noting that trust and team identity are only marginally correlated ($r = 0.104$). Table 2 shows the t-test statistics results on control variables and on trust, team identity and conflict. It demonstrates that, as expected, the virtual teams reported a higher level of perceived conflict and lower levels of trust and shared team identity than the collocated teams. Compared to collocated teams, virtual teams have slightly larger team size and shorter team duration.

Table 2

Team Type Differences for Selected Variables

	Team Type		
Variables	**Virtual(n=53) means(s.d)**	**Collocated(n=51) means(s.d)**	***t*-value**
Team size	9.05(5.51)	8.09(5.42)	0.92
Team duration	28.89(20.59)	32.83(21.07)	-0.24
Trust	3.31(5.02)	4.18(0.42)	-6.31^{***}
Shared team identity	3.38(0.50)	3.63(0.41)	-2.61^{**}
Conflict	2.58(0.56)	2.07(0.43)	5.25^{***}

Note: $^{**}p < 0.01$, $^{***}p < 0.001$ (two-tailed test). Team type: collocated team: 0; virtual team: 1.

We included control variables as part of the regression tests to examine the impacts of team background on conflict. Three control variables include (1) team size; (2) a temporary vs. a permanent team; and (3) team duration. Table 3 demonstrates that, among these three control variables, only team size has a significant association with trust in team (-0.149 in Model 2) and conflict within the team (ranging from 0.162 in Model 6 to 0.237 in Model 5). This result indicates that as the team size increases, trust in team members will weaken as well as that more team conflict will emerge. In order words, managers have to be very careful about controlling the team size in order to obtain the maximal benefits of a team effort without an offsetting cost of reduced trust and intense conflict. In addition, if large team size is inevitable, more effective and frequent communication mechanisms should be designed to help reduce the negative impacts of team size on trust.

To test Hypothesis 1, we regressed trust on team type. The results in Table 3 (Model 2) show that team type (collocated vs. virtual) has a significant negative relation to trust among team members (β coefficient of -0.535, $p < 0.001$). The results indicated that virtual teams established less trust in team members than collocated teams. This result, thus, supports Hypothesis 1. Team size also had a negative relation to trust (β coefficient of -0.149, $p < 0.05$), which indicates the larger the team's size the less trust there is in team members. This result supports the conclusion that larger team size hinders team members from building trust in

team members. In addition, comparing Model 2 to Model 1, we found a significant R^2 change (0.299) due to team type. This evidence suggests that the fundamental differences between virtual team and collocated team would hinder team trust.

We regressed conflict on trust in team members to test Hypothesis 2. The results in Table 3 (Model 4) show that trust in team members has a significant negative relation to conflict (β coefficient of -0.541, $p < 0.001$). This result means that the higher the trust in team members the less conflict the team experienced. Hypothesis 2 is, thus, supported. Model 4 also confirmed the significant association of team size with conflict (β coefficient of 0.176, $p < 0.05$), which indicates the more members on a team the more conflict the team perceived. This finding confirms that as the team size increases the more easily team conflict will grow. This is true for both collocated and virtual teams, as the correlation coefficients are 0.225 and 0.177 respectively.

The mediating effects of trust in team members in the team type-conflict relationship were tested following Baron and Kenny's procedures (1986). First, we tested whether team type (collocated vs. virtual) is associated with conflict. This association was supported in Table 3 (Model 5) (β coefficient of 0.491, $p < 0.001$). Second, we tested whether team type has a relation to trust. This was supported in Table 3 (Model 2) (β coefficient of -0.535, $p < 0.001$). Third, we tested whether trust has a relation to conflict. This was supported in Table 3 (Model 4) (β coefficient of -0.541, $p < 0.001$). Last, with team type controlled, we tested whether trust has a relation to conflict. As shown in Table 3 (Model 6), the β coefficient for trust among team members was -0.410 ($p < 0.001$), indicating a significant negative association of trust in team members with conflict. Comparing Model 6 with Model 5 in Table 3, the magnitude of the association of team type with conflict decreased from 0.491 to 0.272, indicating that when trust is entered into the regression model, the association strength of team type with conflict dramatically decreased. This finding confirms a significant partial mediating effect of trust on the team type-conflict relationship, which means team type significantly relates to team conflict, and this relation mostly happens via the effect of trust among team members. In other words, the higher conflict level

found in virtual teams was partially mediated by its smaller team trust, whereas the lower conflict level found in their counterparts (i.e., collocated teams) was due to the team's higher degree of trust. The result, thus, supports Hypothesis 3.

Comparing the R^2 change in Model 2 to that in Model 5, this study found that team type has a stronger relation to trust than to conflict (0.299 *vs*. 0.155). That is, the direct impact of a virtual type of team is stronger on team trust than on conflict. Models 4 & 5 show the relative importance of the predictors of team conflict. Using Model 3 as a baseline, the R^2 change of team type in Model 5 is 0.155, which is slightly larger than half the size of trust (0.295) in Model 4. This evidence demonstrates that, as compared to team type, the level of trust is a better predictor with respect to conflict. This evidence is confirmed in Model 6, which shows the results of regressing conflict on team type and trust, where the coefficients were 0.272 and -0.410 for team type and trust respectively indicating trust is a relatively better predictor.

Hypothesis 4 proposed that shared team identity would moderate the team type-trust relationship. That is, the negative impacts of virtual team on team trust can be reduced if a strong shared team identity is provided. The moderating effect of shared team identity is examined following Cohen, Cohen, West, & Aiken, (2003). As shown in Table 4 (Model 2 and Model 3), team type has a direct effect on trust. An insignificant moderating effect of shared team identity on the team type-trust relationship was found and therefore Hypothesis 4 is not supported. One possible reason for the insignificant moderating effect of shared team identity on the team type-trust relation is that shared team identity is directly related to team trust. Model 2 of Table 4 confirmed that shared team identity has a direct and significant relation to team trust (0.54, $p < 0.001$), which is consistent with Webster and Wong's (2008) and Fiol and O'Connor's (2005) findings. The R^2 change in Model 3 of Table 4 indicated that the contribution of the moderating effects is quite trivial (0.101) and the corresponding R^2 change is 0.01. Based on the aforementioned findings, our study thus suggested that team leaders should create and maintain team members' level of trust in one another and sense of shared identity so as to reduce conflict within the team. Since members' shared team identity would positively relate to their attitude towards the team and team

morale, organizations should provide incentives and training programs to help employees to cultivate teamwork attitude and spirit as well as to acquire teamwork skills.

Table 3
Summary of Regression Analysis

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent Variable	Trust	Trust	Conflict	Conflict	Conflict	Conflict
Control Variables						
Team size	-0.141	-0.149*	0.220*	0.176*	0.237**	0.162**
Temporary vs.	-0.135	-0.048	-0.070	0.119	0.139	0.030
Team duration	0.035	0.128	-0.061	-0.099	-0.151	-0.047
Independent Variable						
Team type		-0.535***			0.491***	0.272**
Trust				-0.541***		-0.410***
R^2	0.047	0.555	0.278	0.609	0.526	0.589
Adj. R^2	0.012	0.280	0.157	0.339	0.248	0.321
F	1.343	11.211***	3.184*	12.967***	9.670***	10.435***
R^2	-	0.299***	-	0.295***	0.155***	0.246***

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$. Temporary: 0; permanent: 1. Team type: collocated team: 0; virtual team: 1.

Table 4
Summary of Moderating Effect Tests

	Model 1	Model 2	Model 3
Dependent Variable		Trust	
Control Variable			
Team size	-0.140	-0.115	-0.080
Temp vs. permanent team	0.152	-0.037	-0.035
Team duration	0.058	0.117	0.112
Independent Variables			
Team type		-0.38***	-0.31***
Shared identity		0.54***	0.51***
Team type ×Shared identity			0.101
R^2	0.053	0.53	0.54
Adj. R^2	0.026	0.53	0.52
F	1.977	49.08*	34.11*
ΔR^2	0.053	0.583***	0.01

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$. Team type: collocated team: 0; virtual team: 1.

5. Conclusion

Research on virtual teams is burgeoning, yet our understanding of the dynamics in virtual teams remains limited, and it is not yet clear how virtual team dynamics compare to those of collocated teams. Nor have we understood much about what other factors may be at work, in addition to those under examination in this research. Our study found that virtual teams experienced higher conflict than did their collocated counterparts. We also found that virtual teams experienced lower levels of trust and of shared team identity than collocated teams. This finding was in accordance with the literature, such as Hinds and Mortenson (2005) and Han and Harms (2010). However, why these factors differ across the two team types is worth further investigation.

In addition, this study found that lack of adequate trust is the most influential factor contributing to team conflict. We also found that trust in team members played a mediating role, which can partially and significantly mitigate the negative effect of virtual teams on team conflict. Therefore, managers of virtual team should intervene to help foster a strong trust climate within a team, so as to reduce possible negative effects of the team type, i.e., of being a virtual rather than a collocated team.

A conjecture at the outset of our study was that the negative impacts of a virtual team on trust should be reduced by a strong shared team identity among team members, but this argumentation did not receive empirical support. Although the insignificant moderating effect of shared team identity was found, our data supported a direct relation of it to team trust. This study concluded that creating and maintaining team trust and team identity can help reducing team conflict. Curseu *et al.* (2008) found that the quality of the interpersonal communication among team members is one of the most important sources of trust. They indicated that frequent and high quality communication among team members would facilitate the development of strong intragroup ties and shared team identity. In line with Curseu *et al.*'s (2008) finding, this study suggested that team leaders work on using appropriate communication tools to help team trust emerge especially in the first stage of team formation. In addition, organizations

should provide necessary training to help employees acquire the teamwork skills and attitude to work as one.

5.1 Research Limitations and Implications

There are, of course, limitations to our study. First, this study treated different team types as a dichotomous variable - virtual vs. collocated team. The dichotomy of team type could oversimplify this factor because, in the real situation, virtual teams have different levels such as semi-virtual or hybrid teams (Webster and Wong 2008). Future research to address this limitation involves collecting data to classify further the different levels of virtual teams. Second, this study did not include the industry type as a control variable, which limits the extent to which one can generalize the study's findings. Third, this study only focused on how team type is associated with selected team dynamic variables, including conflict, shared team identity, and trust in team members. There remain many other team dynamics variables, such as social capital, shared context, leadership, and the quality and quantity of communications that could bond team members together, or obstruct them, in achieving shared team goals. Further research may explore the roles of these factors in team dynamics. Finally, the data were cross-sectional and both the measurement of predictor and criterion were provided by the same respondent. Although the test result on common method bias was satisfactory, future researchers should employ multiple sources to collect data as well as to examine similar constructs with longitudinal data in a larger sample.

Despite the aforementioned limitations, this study contributes to the literature in the following areas. First, this study extended Han and Harms' (2010) study and found that trust in team members is a significant mediating factor between team type and conflict. Specifically, compared to their counterparts (i.e., collocated teams) the higher conflict found in virtual teams was partially medicated by its smaller team trust. This result explains the critical role trust plays in virtual teams. Second, among three control variables, this study found that only team size has a significant association with trust in team members and conflict within the team. This finding indicates that managers who want to engender trust

among team members should control the team size so that the maximal benefits of having a team can be obtained. If a large team size is inevitable, then effective managerial interventions such as frequent, mutual, and effective communication mechanisms, as well as multiple and convenient communication channels should be established. In addition, structural feedback may be needed from time to time to monitor the progress and to ensure that the team process is transparent and on the right track. Besides, individual member's role should be clearly defined and evaluated to avoid potential free rider effects which could result from a large size team.

References

Ashforth, B. E. and Mael, F. (1989), "Social Identity and the Organization," *Academy of Management Review*, 14(1), 20-39.

Aubert, B. A. and Kelsey, B. L. (2003), "Further Understanding of Trust and Performance in Virtual Teams," *Small Group Research*, 34(5), 575-618.

Baron, R. M. and Kenny, D. A. (1986), "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology*, 51(5), 1173-1182.

Cohen, S. G. and Gibson, C. B. 2003. "In the Beginning: Introduction and Framework," in C. B. Gibson and S. G. Cohen (Eds.), *Virtual Teams that Work: Creating Conditions for Virtual Team Effectiveness*, (1-13), San Francisco: Jossey-Bass.

Cohen, J., Cohen, P., West, S. G. and Aiken, L. S. (2003), *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. 3rd ed., New York, NY: Routledge Academic.

Cooper, D. and Thatcher, M. B. S. (2010), "Identification in Organizations: The Role of Self-Concept Orientations and Identification Motives," *Academy of Management Review*, 35(4), 516-538.

Curseu, P. L., Schalk, R. and Wessel, I. (2008), "How do Virtual Teams Process Information? A Literature Review and Implications for Management," *Journal of Managerial Psychology*, 23(6), 628-652.

Dirks, K. T. and Ferrin, D. L. (2002), "Trust in leadership: Meta-Analytic Findings and Implications for Research and Practice," *Journal of Applied Psychology*, 87(4), 611-628.

Doty, D. H. and Click, W. H. (1998), "Common Methods Bias: Does Common Methods Variance Really Bias Results?" *Organizational Research Methods*, 1(4), 374-406.

Fiol, M. C. and O'Connor, E. J. (2005), "Identification in Face-to-Face, Hybrid, and Pure Virtual Teams: Untangling the Contradictions," *Organization Science*, 16(1), 19-32.

Fornell, C. and Larcker, D. F. (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, 18, 39-50.

Gressgard, J. L. (2011), "Virtual Team Collaboration and Innovation in Organizations," *Team Performance Management*, 17(1/2), 102-119.

Hambley, L. A., O'Neil, R. A. and Kline, T. J. B. (2007), "Virtual Team Leadership: The Effects of Leadership Style and Communication Medium on Team Interaction Styles and Outcomes," *Organizational Behavior and Human Decision Processes*, 103(1), 1-20.

Han, G. H. and Harms, P. D. (2010), "Team Identification, Trust and Conflict: A Mediation Model," *International Journal of Conflict Management*, 21(1), 20-43.

Hinds, P. J. and Mortensen, M. (2005), "Understanding Conflict in Distributed Teams: The Moderating Effects of Shared Identity, Shared Context, and Spontaneous Communication," *Organization Science*, 16(3), 290-307.

Hinds, P. J. and Bailey, D. E. (2003), "Out of Sight, Out of Synch: Understanding Conflict in Distributed Teams," *Organization Science*, 14(6), 615-632.

Jarvenpaa, S. L. and Leidner, D. E. (1999), "Communication and Trust in Global Virtual Teams," *Organization Science*, 10(6), 791-815.

Jehn, K. A., Northcraft, G. B. and Neale, M. A. (1999), "Why Differences Make a Difference: A Field Study of Diversity, Conflict, and Performance in Workgroups," *Administrative Science Quarterly*, 44(4), 741-763.

Jehn, K. A. (1995), "A Multimethod Examination of the Benefits and Detriments of Intra-Group Conflict," *Administrative Science Quarterly*, 40(2), 256-282.

Kanawattanachai, P. and Yoo, Y. (2002), "Dynamic Nature of Trust in Virtual Teams," *Journal of Strategic Information Systems*, 11(3-4), 187-213.

Kankanhalli, A., Tan, B. C. Y. and Wei, K. K. (2006/2007), "Conflict and Performance in Global Virtual Teams," *Journal of Management Information Systems*, 23(3), 237-274.

Kirkman, B. L., Rosen, B., Gibson, C. B., Tesluk, P. E. and McPherson, S. O. (2002), "Five Challenges to Virtual Team Success: Lessons from Sabre, Inc.," *Academy of Management Executive,* 16(3), 67-72.

Kumar, N., Stern, L. W. and Anderson, J. C. (1993), "Conducting Interorganizational Research Using Key Informants," *Academy of Management Journal*, 36(6), 1633-1651.

Mancini, J. M. (2010), "Building Organizational Trust in Virtual Teams," *Journal of Behavioral Studies in Business*, 2, 1-5.

Mannix, E. A., Griffith T. L. and Neale, M. A. (2002), "The Phenomenology of Conflict in Virtual Work Teams," in P. J. Hinds and S. Kiesler (Eds.), *Distributed Work*, (213-234), Boston, MA: MIT Press.

Mukherjee, D., Lahiri, S., Mukherjee, D., and Billing, T. K. (2012), "Leading Virtual Teams: How do Social, Cognitive, and Behavioral Capabilities Matter?" *Management Decision*, 50(2), 273-290.

Nunnally, J. C. (1978), *Psychometric Theory*, New York, NY: McGraw-Hill.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y. and Podsakoff, N. P. (2003),

"Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," *Journal of Applied Psychology*, 88(5), 879-903.

Purvanova, K. R. and Bono, E. J. (2009), "Transformational Leadership in Context: Face-to-Face and Virtual Teams," *The Leadership Quarterly*, 20(3), 343-57.

Qin, J., Smyrnios, K. X. and Deng, L. (2012), "An Extended Intervening Process Model Diversity, Group Processes, and Performance," *Human Resource Development Review*, 11(3), 269-298.

Raghuram, S. (2011), "Organizational Identification among Young Software Professionals in India," *International Journal of Human Resource Management*, 22(18), 3913-3928.

Sarker, S., Ahuja, M., Sarker, S. and Kirkeby, S. (2011), "Revisiting the Role of Trust and Communication in Globally-Distributed Teams: A Social Network Analysis Perspective," *Journal of Management Information Systems*, 28(1), 273-309.

Tony L. Simons, S. S. and Randall, S. P. (2000), "Task Conflict and Relationship Conflict in Top Management Teams: The Pivotal Role of Intragroup Trust," *Journal of Applied Psychology*, 85(1), 102-111.

Tyler, T. R. (1999), "Why People Cooperate with Organizations: An Identity Based Perspective," *Research in Organizational Behavior*, 21, 201-246.

Wakefield, R. L., Leidner, D. E. and Garrison, G. (2008), "A Model of Conflict, Leadership and Performance in Virtual Teams," *Information Systems Research*, 19(4), 434-455.

Webster, J. and Wong, W. K. P. (2008), "Comparing Traditional and Virtual Group Forms: Identity, Communication and Trust in Naturally Occurring Project Teams," *The International Journal of Human Resource Management*, 19(1), 41-62.