An Examination of the Relationship Among Structure, Trust, and Conflict Management Styles in Virtual Teams

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In today's competitive environment, successful organizations that are able to utilize advanced information technology to establish a dynamic form to adapt to the ever-changing landscape and customer requirements always gain a competitive advantage in global competition (Porter & Lilly, 1996). The virtual team has become one of the building blocks of a successful organization. In this article, a virtual team is defined as "a group of people with complementary competencies executing simultaneous, collaborative work processes through electronic media without regard to geographic location" (Chinowsky & Rojas, 2003, p. 98).

Virtual teams can offer a range of benefits to organizations, among them encouraging constructive dialogue and knowledge, nurturing a community of workers, triggering deeper processing of content through interaction, and offering flexible adaptation to complex tasks (Duarte & Snyder, 1999; Conrad & Donaldson, 2004; Palloff & Pratt, 2005; Lee, Bonk, Magjuka, Su, & Liu, 2006). However, a virtual team can also face challenges and issues that must be addressed for a successful team operation. From existing telework research, Workman, Kahnweiler, and Bommer (2001) summarize three attributes of virtual environments that are barriers to successful virtual collaboration: elevated ambiguity, increased isolation, and a less-structured environment. For example, in virtual environments lack of informal interactions, the constraints of dispersed asynchronous communication context, and limited capabilities of transmitting social

The emergence of new technologies has made it increasingly easy for distributed collaboration in both educational and noneducational settings. Although the effectiveness in traditional settings of the dynamics of small group work has been widely researched, there is limited research that offers evidence on how teams can work effectively in a virtual environment. The purpose of this study is to examine the relationship among team structure, trust, and conflict management style, in addition to their impact on teamwork effectiveness in a virtual environment. An experimental design was used to assess the effects of structure on team performance. Forty-four groups, divided into hierarchical and nonhierarchical groups, worked on an online simulation project in an online MBA course. The results suggest that team structure is strongly associated with team performance, whereas trust and a collaboration conflict management style contribute to teamwork satisfaction.

cues may render an environment that is low in social presence and interactivity. Such an environment can create difficulties for effective communication and collaboration (Montoya-Weiss, Massey, & Song, 2001). Thus it has been suggested that virtual teams may have to make extra efforts in communication and collaboration for a successful operation. Walther (1996) suggests that in some instances a level of interaction that surpasses face-to-face interaction could occur thanks to strong involvement, intense relationships, and reciprocation. Although the effectiveness of small group work in traditional settings has been widely researched, there is still limited research with evidence concerning how teams can work effectively in a virtual environment. In particular, there is a lack of research on linking the social, task, and technological dimensions to the entry, process, and outcome variables of the teamwork process (Carabajal, LaPointe, & Gunawardena, 2003) in a virtual environment. Existing theory about teamwork processes may not be transferable to a virtual setting because introduction of media technology may have changed or altered the dynamics of the group process. For example, conflict in a virtual team may persist longer without being noticed (Griffith, Mannix, & Neale, 2003), or trust development—which is generally regarded as a prerequisite for developing shared commitment—may be undermined from the lack of a personal human touch (Crossman & Lee-Kelley, 2004).

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The purpose of this study is to add to the existing knowledge about virtual teamwork by examining the roles of team structure, trust, and conflict variables in the effectiveness of virtual teamwork. This study intends to answer several research questions: (1) Would there be significant differences in team performance or satisfaction if virtual teams were structured differently? (2) Are there any significant relationships between trust and virtual team performance or satisfaction? (3) Are there any significant relationships between team conflict management styles and virtual team performance or satisfaction?

Literature Review

Team Structure

In this article, *team structure* refers to the division of a team's work environment into subtasks assigned to individual members or subteams. Such division can dictate the distribution of information and responsibilities of each team member. In teamwork, two types of structures were usually studied to understand their effects on team performance (Moon et al., 2004; Urban, Bowers, Monday, & Morgan, 1995). Hierarchical structure refers to those structures in which team members have specialized roles or hold information and capabilities that are unique to

each other. Such division of roles results in high interdependency among team participants. Nonhierarchical structure refers to those structures in which team members have nonspecialized roles and have fewer interdependencies in accomplishing a common team goal (Urban et al., 1995). In general, team structure defines the nature and patterns of relationships and the division of work among individuals in groups (Wong & Burton, 2000).

Studies that examine the relationship between team structure and team performance in organization settings revealed diversified results. Researchers, for instance, have proposed that a high degree of group division can reinforce individual accountability, and therefore it can prevent participants from slacking off or freeloading, which commonly impairs group performance in a virtual environment (Lin & Hui, 1999; Pugh et al., 1963; Lin, Yang, Arya, Huang, & Li, 2005). In a study that compared the problem-solving performance in two types of structure, the group with hierarchical structure indicated higher perceptions of intersubjectivity—that is, a "shared collective understanding"—and deep processing in group learning during the initial weeks of activity. Over time, however, these levels equalized across group structures (Rose, 2004). In another study, Joung and Keller (2004) evaluated two types of structure during online group debate. The results suggested that the group with hierarchical structure demonstrated greater use of critical thinking skills and revealed more critical and dynamic interaction patterns than the nonhierarchical group.

Nevertheless, some studies also suggested that nonhierarchical structure seemed to have outperformed hierarchical structure (Urban et al., 1995; Bowers, Urban, & Morgan, 1992; Kleinman & Serfaty, 1989). For example, Urban et al. (1995) studied teams in the context of military training and found that those with nonhierarchical structures were associated with superior performance compared to hierarchical structures when working under a high workload. Team structures were associated with patterns of communication structures. The teams with hierarchical structures tended to rely on question-and-answer sequences to elicit information and resources more than nonhierarchical teams did. This communication pattern of hierarchical teams was less effective than that of nonhierarchical teams, which, because of their similar roles, could communicate more clearly or were able to anticipate each other's needs rather than waiting on the others to ask for information.

The contradictory results of the relationship between structure and performance in the extant literature may have reflected the effect of structure under different task environments. Structural contingency theory posits that no structure is better across teams in organizational settings. However, hierarchical structures may work better than nonhierarchical structures in less complex environments, while nonhierarchical structures may work better than hierarchical structures in complex environments (Moon et al., 2004). Research indicates that the

rules of structural contingency theory are equally applicable in a virtual organization whose members are bounded by a common goal and who ground their work in communications through information technology (Moon et al., 2004; Burns & Stalker, 1961).

In an unstable or dynamic environment, nonhierarchical, or informal, structure is argued to be an effective way of organizing virtual teams because it allows flexibility for workers to communicate according to the changing demands of the task (Burns & Stalker, 1961; Hinds & McGrath, 2006). Virtual environments are generally regarded to be associated with added complexity and uncertainty, though this is not always the case. In their study, Hinds and McGrath (2006) found that in a distributed virtual team environment, dividing tasks in a nonhierarchical, independent way (for example, reducing task interdependences between work sites) reduces the need for frequent communication and therefore minimizes the waiting time and miscommunications that are due to the nature of delayed feedback in virtual communications. In this study, following Hinds and McGrath's study (2006) and Urban et al. (1995), we hypothesize that in virtual groups that engage in complex problem-solving tasks (such as ill-defined problems with no clear-cut answers), teams with nonhierarchical structures may be able to communicate more efficiently (by minimizing waiting time) and more effectively (thanks to their shared knowledge, which allows them to anticipate each other's needs and explain information more thoroughly).

> *Hypothesis 1.* Nonhierarchical structures outperform hierarchical structures on their virtual team performance in complex task environments.

Trust

In this article, trust is defined as "an emergent state comprising team member intentions to accept vulnerability based on positive expectations of the intentions or behavior of another" (Rousseau, Sitkin, Burt, & Camerer, 1998, p. 395). The positive effect of trust on team outcomes is widely documented. For instance, trust can enhance collaboration among team members and reduce the cost of team operations by eliminating extra effort needed to monitor team members (Serva & Fuller, 2004). In addition, studies have consistently found that trust can have an influence on team effectiveness by way of its impact on team processes such as problem solving, decision making, and communication (Kiffin-Petersen, 2004). For example, Zand (1972, as cited in Kiffin-Petersen, 2004) found that teams with high trust demonstrated creative and diversified patterns of behavior that improved the team's problem solving. In contrast, low-trust teams showed a defensive pattern of behaviors that interfered with information flow within the team, thus negatively affecting the quality of problem solving. Lack of trust has proven to negatively influence team members' satisfaction with teamwork and their willingness to continue to work with the team (Golembiewski & McConkie, 1975). A work

relationship characterized by trust tends to enhance open communication and collaboration, reconcile conflict, and increase commitment to a team (Smith & Barclay, 1997).

Although some claim that working in virtual teams can produce additional challenges owing to the absence of social cues that can transfer interpersonal affections, including trust, research actually suggests that such absence does not necessarily hinder development of trust in virtual teams but may merely prolong the process of trust building (Walther, 1996; Henttonen & Blomqvist, 2005). Studies also suggest that trust can play the same important roles in the functioning of virtual teams as in traditional teams (Morris, Marshall, & Kelleyrainer, 2002; Henttonen & Blomqvist, 2005).

A synthesis of existing research suggests that development of trust is associated with continuous interactions and communications and repeated interpersonal exchange (Wilson, Straus, & McEvily, 2006; Crossman & Lee-Kelley, 2004). As in traditional teams, social communications (greetings, exchanges of personal information) can play an important role in developing trust in virtual teams (Henttonen & Blomqvist, 2005). Contemporary theory of "swift trust" (Jarvenpaa & Leidner, 1999) posits that highly active, proactive, and enthusiastic actions can strengthen trust.

Compared to nonhierarchical structures, we hypothesize that a hierarchically structured team whose members possess more specialized roles may have to engage in more frequent reciprocal information exchange and take a more active role in seeking information and providing responses to others; this is due to high interdependence among team members (Moon et al., 2004). Such actions may in fact expose team members to more communication and interactions and therefore foster the development of trust.

Hypothesis 2a. Trust will be positively associated with virtual team performance.

Hypothesis 2b. Trust will be positively associated with virtual team satisfaction.

Hypothesis 2c. Hierarchical teams have a higher level of trust than nonhierarchical teams.

Conflict Management

Conflict is an inevitable part of working in teams. In general, conflict refers to differences or discrepancies in team members' ideas, opinions, or ways of doing things. Modern organizational theories no longer view conflict as a negative sign of organizational issues but tend to regard it as an intrinsic component in organizational dynamics (Medina, Munduate, Dorado, Martínez, & Cisneros, 2004). A moderate amount of conflict is argued to be "essential for attaining and maintaining an optimum level of organizational effectiveness" (Rahim & Bonoma, 1979, p. 1325).

Whether conflict can be used for effective performance relies on strategic conflict-handling styles. It has been suggested that how conflict is handled is more important to the success of teams than the conflict itself (Paul, Seetharaman, Samarah, & Mykytyn, 2004). According to Rahim (1992) and Montoya-Weiss et al. (2001), there are various ways to manage conflict in a team: avoidance, accommodation, competition, collaboration, and compromise. An avoidance approach to conflict management is characterized by evasiveness and failure to directly address conflicting viewpoints. An accommodation conflict management style reflects obligations to others. A competition conflict management style is defined as pursuit of one's own interest without careful regard for others, while a collaboration management style attempts to identify and achieve outcomes for mutual benefit. A compromise management style is characterized by finding mutually accepted solutions through negotiating differences.

Past small group research indicates that more cooperative conflict management styles are more likely to be associated with positive individual and team outcomes than less cooperative conflict management styles (Lin, 2003; Paul et al., 2004). The same positive effects were also found in virtual teams. A study that examined a culturally diverse group supported by a groupware system concluded that the groups that lean toward a higher level of collaboration style of conflict management perceived higher quality in decision making. Integration of diverse views resulted in integrative decisions and thus improved group agreement (Paul et al., 2004). A competition management style is traditionally viewed as having a negative effect on team performance in that it can result in less social integration and team cohesion (Montoya-Weiss et al., 2001; Cohen & Bailey, 1997).

Montoya-Weiss et al. (2001) propose that conflict theory developed in face-to-face settings may not be fully applicable to asynchronous teams, owing to fundamental differences (communication protocols, reduced social presence, or media richness) in a virtual environment. For example, competition conflict management behaviors of a team member may not be conspicuous to other members of the team in an asynchronous virtual environment, and the negative effects may be mitigated in asynchronous virtual teams (Tan, Watson, Clapper, & McLean, 1998). In fact, it is possible that competitive behaviors such as aggressive emotions or competitive dominance may not be interpreted as such, but rather be viewed as a means of achieving efficiency and effectiveness in a lean, asynchronous communication environment (Montoya-Weiss et al., 2001; Lin, 2003).

> *Hypothesis 3a.* A collaboration conflict management style in virtual teams is positively associated with team performance.
> *Hypothesis 3b.* A collaboration conflict management style in virtual teams is positively associated with virtual team satisfaction.
> *Hypothesis 3c.* A collaboration conflict management style in virtual teams is positively associated with trust.

Hypothesis 3d. A competition conflict management style in virtual teams is not associated with virtual team performance.

Hypothesis 3e. A competition conflict management style in virtual teams is not associated with virtual team satisfaction.

Research Methodology

Research Setting

The present study was conducted in an online MBA program at a large midwestern university. The participants were enrolled in a capstone management course. Subjects were separated into project groups of four to six people to work on an online simulation project. Each team was asked to adopt the view of a senior manager responsible for running a business venture, assuming responsibility for a $100 million company in the electronic sensor manufacturing industry. The simulations required management teams to evaluate situations and make decisions to stimulate their company's growth. Teams set a strategy and applied strategic concepts and techniques in forming and implementing a business plan, and they were asked to integrate the firm's production, marketing, human resources, research and development, financial, and pricing plans. The project lasted four weeks.

Instruments

The 22-item questionnaire contained three dimensions: trust, conflict management resolution, and teamwork satisfaction.

Trust measured subjects' perceptions of trust between themselves and their teammates. Trust scales (10 items) were adapted from Jarvenpaa and Leidner (1999) and Mayer, Davis, and Schoorman (1995). Sample items included "I really wish I had a good way to oversee the work of other team members on the project" and "Overall, the people in my group are very trustworthy." Cronbach's alpha for the trust dimension was .851.

Conflict management resolution measured scores on two types of strategy used by a subject when working in a team: competition conflict management (five items) and collaboration conflict management (three items). Scales of conflict management solutions were adapted from previous research (Montoya-Weiss et al., 2001; Paul et al., 2004). The five items of the collaboration approach to conflict management measured the degree of team members' attempts to identify and achieve outcomes that integrated the interests of all parties involved. A sample item for the collaboration conflict management approach scale is "Team members seek a resolution that will be good for all of us." Subjects were asked to rate on a 5-point scale (1 = *strongly agree*, 5 = *strongly disagree*) the degree to which team members agreed with the five statements. For the competition approach to conflict management, there are three items measuring the degree to which the conflict was a win-lose situation and how each team member might pursue his or her own interest without

regard for others (such as "Team members treat conflict as a win-lose contest"). The coefficient alphas for the collaboration and competition scales were .826 and .806, respectively. Both variables were used as continuous variables in this article.

Aggregating individual scores of conflict management styles to the team level is logically justified because the question items were designed to measure the characteristics of the work team (Alper, Tjosvold, & Law, 2000). In addition, the James, Demaree, and Wolf TWG(J) procedure (1984) was used to estimate the interrater reliability of members within each team for the variables of competition and collaboration management conflict styles. The median TWG(J) for the two variables across the 44 teams were .96, and .90 respectively. Both are above .70, which is considered the indicator of sufficient agreement within a group. These test results indicated that the ratings of group members are reasonably homogeneous and can be aggregated to the group level.

Teamwork satisfaction included four items that measured subjects' degree of satisfaction with the teamwork process ("Looking back on the whole course, I am satisfied with our teamwork project"), team output ("I think I learned many meaningful lessons throughout team projects"), overall value ("Overall, I believe that the whole teamwork process of our team is valuable to driving us toward team goals"), and team decision-making quality ("Overall, I believe that our team came up with the best solution as we expected").

Team performance was measured by the final profit score from team simulations. This score presented an objective measure of team performance, reflecting the ability of the team to use knowledge and skills learned from the curriculum to make judicious decisions for their simulated industry.

Two kinds of *team structure* were used in the study: hierarchical and nonhierarchical. Teams that used hierarchical structure divided the individual work on the basis of the functionality of the company. Each member was responsible for one specialized area of the company, such as research and development, marketing, product development, finance, and so forth. Under this structure, each team member had a specialized role and needed to coordinate closely with other divisions to make a decision associated with a product. In a nonhierarchical structure, each team member was responsible for one product. Each member had to assume responsibility for all areas associated with that product. Under this structure, team members could make relatively independent decisions without consulting others but had to coordinate with others on the strategic goals of the company. Teams were randomly assigned to the two types of structure. Each team was asked to follow the instruction protocol of the structure assigned. The members of hierarchical teams were required to take specialized functional roles while those of nonhierarchical teams were asked to take a broader range of similar roles that covered several areas of a product.

A dummy variable was used to code the structure; *1* referred to hierarchical structure, and *0* was used to refer to nonhierarchical structure.

Data Collection

Data were collected from all 208 members of 44 teams. Six teams' data were later dropped from the study because the team did not follow instructions closely in structuring their teams. Seventeen teams used hierarchical structure, while 21 used nonhierarchical structure. The 22-item questionnaire that measured trust, conflict management resolution, and teamwork satisfaction was administrated during the midterm of the course. The return rate of the questionnaires was about 95%.

Findings

Table 1 shows correlations of all the variables measured or manipulated in this experiment. As indicated in the table, team structure was negatively correlated with team performance ($r = -.323, p < .05$). The nonhierarchical structure was associated with higher team performance. The trust level of the group was positively correlated with the collaboration conflict management style ($r = .754, p < .01$) and negatively associated with the competition conflict management style ($r = -.561, p < .01$). In addition, the level of trust had a positive relationship with team satisfaction ($r = .561, p < .01$). The competition management style was negatively correlated with the collaboration management style ($r = -.581, p < .01$).

In our first hypothesis (H1), we proposed that a nonhierarchical structure would outperform a hierarchical structure in a virtual working team; the data supported this hypothesis. Table 2 contains the ANOVA results that measured whether groups differed significantly in their performance and other variables measured. The results revealed that the

		M	1	2	3	4	5
1.	Structure	.55	1				
2.	Trust	4.11	.017	1			
3.	Collaboration conflict management	4.28	.129	.754(**)	1		
4.	Competition conflict management	1.72	.081	−.561(**)	−.581(**)	1	
5.	Team performance	$9,339	−.323(*)	.216	.195	.001	1
6.	Team satisfaction	4.15	−.057	.561(**)	.664(**)	−.310(*)	.493(**)

TABLE 1
Correlation Analysis Results

*$p < 0.05$. **$p < 0.01$.

TABLE 2

ANOVA Analysis Results

Dependent Variable	Mean (SD)		F, df	Significance Level
	Hierarchical Group	Nonhierarchical Group		
Trust	4.134	4.142	.011,1	.917
Collaboration conflict management	4.268	4.351	.661,1	.440
Competition conflict management	1.646	1.69	.237,1	.629
Team performance	$10,971	$7,498	4.204,1	.048*
Team satisfaction	4.15	4.12	.115,1	.736

*$p < 0.05$.

nonhierarchically structured groups had significantly better performance than hierarchical groups ($F = 3.88$, $p < 0.05$), thus supporting H1.

Hierarchical regression analyses (Table 2) were conducted to examine the effect of structure, trust, and conflict management variables on team performance, as well as satisfaction with teamwork. The results demonstrated a statistically significant effect of structure on team performance. The team structure variable accounted for an appreciable amount of total variance ($R^2 = .105$). However, structure did not have a significant effect on overall team satisfaction.

Our second hypothesis (H2a and H2b) focused on the relationship between trust and team effectiveness: performance and satisfaction. Table 3 shows that there is no direct effect of trust on team performance. Although this result did not support H2a, it did show a statistically significant effect of trust on team satisfaction ($R^2 = .394$), and trust accounted for a considerable amount of variance, thus supporting hypothesis H2b. From the correlation analysis (Table 1), a higher level of trust was associated with a collaboration conflict management style. This suggested that teams with a high level of trust and whose members placed high confidence in their teammates' abilities and behaviors tended to lean toward a more collaborative approach to solving conflicts. Table 2 suggests that the two groups did not differ significantly in terms of trust level, conflict management styles, or team satisfaction. Therefore, H2c was not supported.

Table 3 indicated a significant effect of the collaboration conflict management style on team satisfaction ($R^2 = .227$) but no significant effect on team performance. Thus H3a was refuted, and H3b was supported. According to Table 1 correlation results, the trust level of the group was positively correlated with its collaboration conflict management style ($r = .754$, $p < .01$). This result supported by H3c.

Table 3 showed that the competition conflict management style had no significant effect on either team performance or satisfaction, supporting H3d and H3e. Although a correlation analysis showed negative

	Team Performance		Team Satisfaction	
	R^2	β	R^2	β
Structure	.105*	−.042*	.003	−.149
Trust	.046	.030	.394**	.105
Collaboration conflict management	.049	.431	.227**	.709**
Competition conflict management	.057	.282	.000	−.009
R^2 Total	.257		.624	
F	2.837*		13.742**	
df	4,33		4,33	

TABLE 3
Hierarchical Analysis Results with Unique Contributions: R, β, F

*$p < 0.05$. **$p < 0.01$.

relationships between a competition conflict management style and team satisfaction, the regression analysis did not show a significant effect.

Discussion and Conclusion

There are several important findings of this study worthy of further discussion and investigation.

Structure

The results of this study indicated a significant effect of team structure on team performance. In the present study, the teams with a non-hierarchical structure outperformed those with a hierarchical structure, a finding consistent with Urban et al. (1995). Interpretation of this finding should not exclude considerations of the task environment. The teams worked in an asynchronous online environment, which is commonly believed to bring a higher degree of vagueness, complexity, and lack of structure (Workman, Kahnweiler, & Bommer, 2001) into virtual team-work process than face-to-face settings. These attributes may increase the degree of difficulty of communication in virtual teamwork. For hierarchically structured teams, each person held a specialized role, and extensive communication was needed for team members to make decisions and maintain routine operations of the team in order to achieve the goal of accomplishing a complex task such as running a simulated industry. Effective communication may be disrupted by possible misunderstandings and disputes stemming from a lack of visual cues in asynchronous virtual teaming environments. Thus it was possible that team members had to spend extra resources on maintenance of the team's daily communications that may not add to team performance. However, in nonhierarchical teams, each person had a higher degree of autonomy

and a wider range of responsibilities. This structure may require less information reciprocation, and therefore teams may spend fewer resources on coordination efforts while focusing on the key tasks that eventually contribute to team performance. Another benefit of a nonhierarchical structure is the increased possibility of knowledge negotiation—that is, negotiation of mutually acceptable knowledge—among team members with similar domain areas of knowledge associated with their roles. In nonhierarchical teams, members may be more likely to engage in dialogue about the knowledge that they hold in common. Such dialogue may further create new shared knowledge as well as a deeper understanding of their team process that contributed to team performance. The quality of decision making may be enhanced through increased opportunities of negotiation for problem solving. A further in-depth qualitative case study could gain more insight about the dynamics of the team work process and interaction patterns associated with different structures.

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Trust

This study found strong correlations between trust and team satisfaction. Trust accounted for 39.4% of total variance in team satisfaction. This once again demonstrated the robustness of the benefit of trust in the attitudinal behavior outcome of teamwork. In addition, trust was also positively associated with a heightened level of collaborative approach to conflict management. Teams with high trust were much more likely to cooperate with team members and expend efforts to find conflict solutions that integrated different views. This finding implies that although trust may not be directly related to team performance, it may affect team performance by interacting with many other aspects of team processes, such as communications and conflict management (Porter & Lilly, 1996). Future research should look into the interaction effects between trust and other key process variables, such as team coordination.

That trust was not positively associated with team performance, although disappointing, should not be the reason to neglect its role in facilitating effective team performance. As Dirks and Ferrin (2001, as cited in Kiffin-Petersen, 2004) propose, researchers should be cautious to assume that the benefits of trust are always transmitted in a straightforward manner, or even that the effects of trust and mechanisms through which it operates are the same regardless of organizational context. In their review of studies regarding the role of trust in organizations, Dirks and Ferrin hypothesize that whether trust plays a moderator or mediator role in performance depends on the situational strength of the context, the degree to which the situation offers clear cues and incentives for collaboration. Trust is more likely to have a main effect in a "weak

situation," where cues about how to behave are ambiguous and have no effect than in a "strong situation," where structural characteristics of the teamwork environment afford relatively clear cues and incentives for collaboration. In midrange situations, trust is more likely to play the moderator role with an indirect effect on team performance. The task context in this study, a structured game environment, may be counted as a midrange situation. The finding that there was no direct effect of trust on performance seemed to be consistent with Dirks and Ferrin's theory.

Conflict Management

A collaboration style of conflict management was found to be associated with team satisfaction. This result lent support to several studies that have tested the effect of a collaboration conflict management style on team satisfaction in virtual teams (Paul et al., 2004; Montoya-Weiss et al., 2001), generating additional evidence for the positive role of a collaborative approach in managing conflict in a virtual team context.

Consistent with our predictions, there is little relation between the competition style of conflict management and team performance or satisfaction. In traditional face-to-face environments, teams that lean toward competition conflict management are found to be associated with a lower level of team satisfaction or performance (Lin, 2003). Montoya-Weiss et al. (2001) have proposed that virtual environments mediated through asynchronous media tend to obscure the potential negative impact of a competition conflict management style on virtual team performance or satisfaction. The findings of this study seemed to be consistent with their observations.

Similar to the findings of trust in this study, there is no direct effect of collaboration conflict management solutions on team performance. Similar to our previous interpretations on the role of trust in team performance, it is possible for conflict management to play a moderator role in virtual team performance. For example, Alper, Tjosvold, and Law (2000) suggest that a collaboration conflict management approach could lead to conflict efficacy (defined as a team's beliefs in its ability to handle issues of team conflict), which in turn results in effective performance. In addition, a collaborative conflict management approach may also influence team performance indirectly through its role in resolving conflict, which is found to have negative effects on team performance (Medina et al., 2005). However, these interpretations need further empirical investigation.

Implications

The findings of this study have important implications for virtual team design in both educational and noneducational settings. First, the findings indicated the importance of considering team structure in designing virtual teams for improved team performance. In a context where teams

engaged in a complex task in an asynchronous communication environment, the choice of team structure needs to focus on designing a nonhierarchical structure and avoid a rigid hierarchical structure. Having team members share similar roles or responsibilities not only allows flexibility in the teamwork process by reducing the need for frequent communications in encountering difficult situations (for example, loss of a team member, disrupted communications) but also allows the decisions to be made by integrating different perspectives to improve the quality of decision making.

Second, the study indicated the importance of social processes such as trust or conflict management in virtual teamwork satisfaction. Although trust or conflict management does not have a direct effect on team performance, this study also indicated the possibility that trust or conflict management may play a moderate role in virtual team performance, a result that warrants further empirical investigation. Although there is increased awareness of the importance of trust or conflict resolution from recognition of their relationships with community building, few people actually take measures to facilitate social cohesiveness and interpersonal relationship building in virtual teams in corporate or educational settings. The crucial role of trust or conflict management revealed in this study suggests that it is imperative for virtual team facilitators to take measures to cultivate trust and collaborative conflict-management skills in virtual teams, and encourage teams to strive for integrated solutions in teamwork. Explicit considerations of conflict management, trust, and communication processes should be addressed from the start of virtual team design and planning. Rules for communicative behavior and conflict management should be developed and made clear to facilitate virtual teaming (Griffith, Mannix, & Neale, 2003).

Even in a virtual team that is formed for a short time, it is worthwhile to facilitate "swift" relationship building through proactive communicative actions and to develop shared goals to foster the development of trust.

Limitations

As is often the case, potential limitations of this study should be addressed and assessed in interpreting its findings. The participants in this study worked on business simulation cases, leading to questions of external validity when applied to teams in the real workplace. As in many other team-level studies, another limitation is associated with the relatively small sample in this study. The smaller sample size is likely to reduce the statistical power and may result in failure of some measures to reach statistical significance. However, the main effects that we observed in this study seemed to yield some positive and consistent findings on relationships between variables examined in this study; how the team was structured, the complexity of team tasks, and the nature of virtual teamwork environment in this study represent the strong authenticity of

real-world environments. We believe the findings of this study produce legitimate results for further discussion for studying project teams.

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