Group Atmosphere, Shared Understanding, and Perceived Conflict in Virtual Teams: Findings from an Experiment

Completed Research Paper

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Abstract

In this paper, we present a theoretical model on the relationships among group atmosphere, shared understanding, and perceived task conflict in virtual teams. We validate the theoretical model by analyzing data that was collected in a laboratory experiment on virtual teams. We find that cultural diversity of virtual team adversely affects group atmosphere and group atmosphere has a positive influence on the development of shared understanding in these teams. We also find that the development of shared understanding weakens perceived task conflict in virtual teams. However, we do not find a strong support for the moderating effect of avoidance conflict management style on the relationship between shared understanding and perceived task conflict.

Keywords

Cultural diversity, group atmosphere, shared understanding, perceived conflict, avoidance conflict management style.

Introduction

Virtual teams are groups of geographically, organizationally and/or temporally dispersed individuals brought together by information and telecommunication technologies to accomplish one or more organizational tasks (Powell, Piccoli, and Ives, 2004). The use of advanced communication and information technology has enabled geographically dispersed individuals to interact with each other. Virtual teams allow organizations to procure skills and talents across geographical boundaries and organizations are increasingly using these teams. However, there are quite a few challenges in managing virtual teams. As virtual teams cut across organizational, national, and functional boundaries, diversity is an inherent aspect of these teams. Members of culturally and functionally diverse virtual teams have differences in norms, beliefs, and experiences. Building trust, achieving cohesion and harmony in these teams are challenging tasks. Moreover, the members of virtual teams interact using communication media some of which do not support the transmission of non-verbal cues (such as, gestures, facial expressions) and constrain team members to rely primarily on written interactions to perform tasks. In the absence of a physical work environment, the technology mediated interactions shape team members' perceptions of the group atmosphere. Jehn and Mannix (2001) demonstrated that work atmosphere mediates the relationship between group value consensus and conflict in face-to-face work groups. The members of virtual teams cannot directly observe the team diversity. They experience the effects of diversity through computer-mediated interactions. Does this experience shape the perception of group atmosphere in virtual teams?

Another important construct for virtual teams is shared understanding (Hinds and Wiseband, 2003). Development of shared understanding about the goals of a group work and the process to reach the goals is challenging in teams whose members may not meet face and rely on technology mediated interactions to perform group work. Hinds and Wiseband (2003) suggest that shared understanding helps the team members to avoid conflict and improve team performance. The extant literature on virtual teams stresses the importance of shared understanding (Malhotra and Majchrzak, 2004; Griffith, Sawyer, and Neale, 2003; Chudoba, Wynn, Lu, and Watson-Manheim, 2005). However, there is a dearth of empirical studies on shared understanding in virtual teams.

Gaining knowledge on the group atmosphere and shared understanding in virtual teams will enrich the current body of research on virtual teams and help managers to make effective utilization of virtual teams. We attempt to address this by proposing and validating a theoretical model in this paper. The model focuses on the following research questions:

- Does team diversity affect group atmosphere in virtual teams?

- Does group atmosphere affect the development of shared understanding in virtual teams?

- Does the development of shared understanding influence perceived conflict in virtual teams?

Prior Research and Theory Development

In this section we develop a theoretical model that links cultural diversity, shared understanding, and perceived conflict in virtual teams. The proposed theoretical model is shown in figure 1. We discuss prior research on the constructs of the model in the sub-sections below.

Diversity in Virtual Team

Diversity within a work group refers to its composition in terms of the distribution of demographic traits and cognitive differences manifested as surface-level and deep- level attributes (Chidambaram, 2005). Harrison, Price, and Bell (1998) classified diversity as surface level and deep level diversity. Surface level diversity is defined as the difference among team members in overt demographic characteristics, which include age, gender, and race/ ethnicity. Deep level diversity refers to the difference among team members' psychological characteristics, including personalities, values, and attitudes (Jackson, May, and Whitney, 1995; Harrison, Price, and Bell, 1998).

As the members of virtual teams may not meet face-to-face, they do not immediately perceive the surface level diversity. However, they may perceive differences in ethnicity through the language used in their technology mediated interactions. D'Anglegan and Tucker (1973) observed that even sophisticated bilinguals in Canada sometimes fail to interpret correctly a monolingual's message. There are several sources of deep level diversity in virtual teams, such as cultural diversity, functional diversity. In this research we focus on cultural diversity in virtual teams.

Culture is defined as the set of deep level values shared by an identifiable group of people (Maznevski, Gomez, DiStefano, Noorderhaven, and Wu, 2002). Cultural values influence the perceptual filter through which a person interprets information needed to make decisions (Adler, 1997; Hofstede, 1980). Thus, in a virtual team, different members' analyses and interpretation of facts and events can differ significantly depending on his/her national cultural background. Hofstede (1980) defines national Culture as the collective programming of the mind, which distinguishes one group or category (nation) from another.

Prior research highlights both positive and negative effects of diversity on the functioning of the small groups (Jackson, 1991). Heterogeneous groups are more creative and are more likely to reach high quality decisions than homogeneous groups (McLeod and Lobel, 1992). Diversity in groups reduces the probability of groupthink (Janis, 1982), a phenomenon that occurs when homogeneous and cohesive groups focus on unanimity and do not explore full range of available solutions in decision making tasks (Janis, 1982). However, there is evidence that diversity is related to lower levels of interpersonal attraction, more stress, and more turn over in organizations. Diversity has the effect of greatly increasing the complexity of group dynamics (Adler, 1990). Diversity has a negative impact on communication and interpersonal attraction (Adler, 1990); it adversely affects the social integration of the team members (Tsui and Gutek, 1999) and shapes intra-group conflict (Pelled, Eisenhhardt, and XDin, 1999).

Virtual Team Diversity and Group Atmosphere

Members of virtual teams do not operate in a single physical work environment. They interact using collaboration technology. The technology-mediated interactions shape the individual member's perception of the group atmosphere. Jehn and Mannix (2001) identify trust, cohesion, openness, and respect as four underlying dimensions of the perception of the group atmosphere. The importance of these factors in virtual teams has been discussed in the literature (Jarvenpaa and Leidner, 1998; Jarvenpaa and Leidner, 1999; Cartwright, 1968; Edmondson, 1999).

The formation of a favorable perception of the group atmosphere in culturally diverse global virtual team is a challenging task. IT-enabled relationships that are ad hoc, temporary, and not tied to a known physical location, are void of prior social history. In these relationships, trust may not reach the same level that can normally be attained in face-to-face interactions (Kramer, 1999).

Triandis (2003) mentions that cultural distance is greater when members of two cultures speak very different languages, have different social structures, religions, standards of living, and values. Perceived similarity results in positive emotions and inter-group attitudes while perceived dissimilarity has the reverse set of consequences (Triandis, 1994). The situation appears to be more complex for virtual teams as cultural diversity becomes an additional barrier in the formation of trust.

Cultural values also influence members' preferences for social interaction norms (Bettenhausen and Murnighan 1991; Earley, 1993). Communication difficulties in the diverse group can result in reduced attraction and cohesion (Adler, 1990; Jackson, 1991; O'Reilly, Caldwell and Barnett, 1989). Conversely, similarity in beliefs, attitudes, and values contribute to cohesiveness (Yukl, 1981) and heterogeneous groups are generally less cohesive (Adler, 1990; Shaw, 1981). Thus, it is reasonable to expect that cultural heterogeneity will hinder the development of favorable trust, cohesion, openness, and respect among the members of virtual teams. Hence:

> *Hypothesis 1: Perceived group atmosphere of culturally homogeneous virtual teams will be more favorable than that of culturally heterogeneous teams.*

Members of virtual teams lack shared work context (Hinds and Bailey, 2003). Contextual information/knowledge is held uniquely and is distributed unevenly among team members (Alavi and Tiwana, 2002). Failure to share and explain individual information/knowledge may lead to misunderstanding in virtual teams (Alavi and Tiwana, 2002). It is important that the members of virtual teams develop shared understanding of the goal and the process of group work.

Shared Understanding

"Shared understanding is a collective way of organizing and communicating relevant knowledge, as a way of collaborating" (Hinds and Wiseband, 2003, page 23). Factors that contribute to the development of shared understanding are having similar backgrounds and experiences, communicating openly, sharing information and experiences, and developing team spirit (Hinds and Weisband, 2003). Team spirit and openness in communication are the dimensions of group atmosphere. Thus, it is reasonable to expect that favorable group atmosphere will facilitate the development of the shared understanding in virtual teams. Hence:

> *Hypothesis 2: In virtual teams, perceived group atmosphere will have a positive influence on the development of shared understanding among the team members.*

Hinds and Weisband (2003) suggest "shared understanding in teams can lead to improved performance by helping teams to anticipate the behavior of others, better coordinate their work by improving implementation, and increase team members' motivation" (page 34). In new groups, attempts to share task related information, may generate diverse views and result in task conflict (Klimoski and Mohammed, 1994). However, as groups develop shared mental models, conflicts get resolved (Klimoski and Mohammed, 1994).

Shared Understanding and Intra-group Conflict

Conflict is broadly defined as perceived incompatibilities or perceptions by the parties involved that they hold discrepant views or have interpersonal incompatibilities (Boulding, 1963). Conflict in any team is concerned with relationship and task related issues (Guetzkow and Gyr, 1954; Jehn, 1997). Relationship conflicts arise from difference in personal taste, political preference, values and ideology, whereas task conflicts are conflicts about the distribution of resources, about procedures and policies, and about judgments and interpretation of facts (De Dreu and Weingart, 2003). Relationship conflict is based on emotional or interpersonal issues and is detrimental to the functioning of a team. On the contrary, task conflict can be beneficial and can enhance team effectiveness (Van de Vilert and De Dreu, 1994). Task conflict is the disagreement on task content and/or process. A moderate level of task conflict is positively associated with team performance because it causes team members to consider more alternatives. Considering diverse opinions and strategies enable a group to arrive at a better solution (Pelled et al., 1999). Jehn (1997) found that type of task group members perform shapes whether conflict helps, hinders, or has no significant impact on individual and group performance.

In the virtual teams, the members are physically separated from one another and the scope of their social interaction is also limited. Thus, conflict in virtual teams is expected to be different from that of face-to-face teams. According to Hinds and Bailey (2000), virtual teams experience two direct consequences of their virtuality: mediated communication and unshared context. Mediated communication causes higher levels of affective and task conflict as group members neglect to censor their comments and to accommodate the preferences of their team members. Short, Williams and Christie (1976) argue that mediated communication reduces the extent to which participants and the interpersonal relationships are salient in the interaction. Similarly, Sproull and Kiesler (1991) argue that computer-mediated communication depersonalizes the interaction, leading to greater concentration on the message rather than the interacting persons. Thus, in virtual teams, relationship conflict is expected to be less prevalent than task conflict. In their study of short-duration virtual teams, Paul and Ray (2010) provide support for this proposition. In this paper, we focus on task conflict in virtual teams.

Jehn and Mannix (2001) found that group value consensus affects intra-group conflict and the relationship is mediated by group atmosphere. However, Jehn and Mannix (2001) studied the conflicts in face-to-face groups that interacted for 12-14 weeks. They did not find any support for their hypotheses in early phase (1-5 weeks) of the group work. Moreover, they measured conflict through questionnaire, which captured team members' perception of conflict. Based on the findings of Jehn and Mannix (2001) it can be argued that groups need time to develop shared understanding and have similar values regarding work; however, once shared understanding is developed, group members perception of conflict decreases. Hence:

> Hypotheses 3: In virtual team, the development of shared understanding will lower the perception of task conflict.

The dynamics of conflict episodes, proposed by Pondy (1967) provides a reasonable explanation of the nature of conflict that can exist in work groups. Pondy (1967) suggest that conflict can be perceived when no latent conflict exists. This happens when parties misunderstand each other's true position (Pondy, 1967). Pondy (1967) also suggests that suppression mechanism (i.e. individuals' tendency to block conflicts that are mildly threatening) limits the perception of conflict. Thus, when the members of virtual team attempt to avoid conflict, the negative effect of shared understanding on perceived conflict will be weakened. Hence:

> Hypotheses 3A: In virtual team, the avoidance to resolve conflict positively moderates the negative relationship between shared understanding and perceived conflict.

The Theoretical Model:

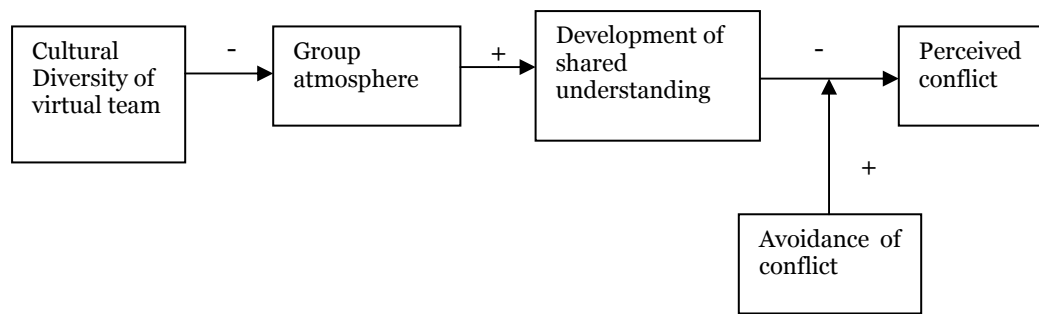The expected relationships among the study variables are shown in a theoretical model (Figure 1).

Figure 1. Theoretical Model

Research Method

Subjects and Tasks

We used the data collected in a laboratory experiment to test our research model. Volunteer subjects enrolled in graduate business programs at a major Midwestern US university participated along with graduate students from a major management school in India. All subjects were experienced with information and communication technology and familiar with the use of web-based systems. The students enrolled at the US university represented different cultural and ethnic backgrounds, in addition to students who were born and raised in the US. Each participant was trained on Lotus Sametime, a collaboration tool from IBM. In the training sessions, the participants used Lotus Sametime to work on a task that was similar to the experimental task. Altogether 27 three-member groups participated in the experiments. The data from a session was not recorded properly and was dropped from the analyses. Each group was assigned to one of the following two categories:

Homogeneous – Participants were from same national cultures.

Heterogeneous - Participants were from different national cultures.

Due to the nature of the study, the approximate 10 ½ hour time differences between the two countries, and the schedules of the students in each location, complete random assignment of subjects to groups was not possible. However, once the availability of the students in each location was known, accounting for the time differences, class schedules, etc., students were randomly assigned to either homogeneous or heterogeneous groups.

The groups were asked to assume the role of an advisory committee that would recommend to the administration of a fictitious university 5-6 proper uses of the technology fees that were collected from the students of the university.

Experimental Procedures

The subjects used IBM's Lotus Sametime to work on the experimental task. Sametime is a collaboration tool that integrates instant messaging, online meeting, and group decision making. Anonymity among group members was maintained. Each group was under the control of a facilitator, who communicated using the "instant messaging" option of Lotus Sametime. The facilitator monitored the discussions and dealt with any technical software questions; the facilitator did not interject anything into the discussion regarding the task and the computer use fee options. Each session consisted of the following:

- Activity 1: Commenting on advantages and disadvantages of each option of using technology fees

- Activity 2: Selecting 5-6 options of using technology fees

- Activity 3: Allocating technology fees to the selected options (only fourteen groups performed this activity)

- Activity 4: Voting the final decision

- Activity 5: Completing questionnaires used to collect data of the experiment.

The groups were instructed to follow the sequence of activities. A facilitator monitored the activities of each group. Thirteen groups performed activities 1, 2, 4, and 5 and their solution set consisted of diverse options of using the technology fees. The remaining fourteen groups performed all five activities of the experiment. Activity 3 involved allocation of technology fees to different options. The fourteen groups that performed all five activities had a larger solution set which consisted of the options of using technology fees and possible allocation schemes of the fees. Thus, the fourteen groups that performed all five activities were engaged in a more complex task than the thirteen groups that did not perform activity 3.

Variable Identification

The operationalization of the study variables is presented in table 1. Group atmosphere, perceived task conflict, and avoidance to resolve conflict were measured using 5-point Likert scale questionnaires with values ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). We adapted our measures from the validated instruments of the constructs. We used objective measures to calculate the other variables used in this study. We examined Lotus Sametime discussions for the evidences of shared understanding in each session. One of the researchers of the study analyzed the discussion logs to identify the episodes of shared understanding which were characterized by initial disagreements or misunderstandings that were subsequently resolved through sharing and explanation of contextual information held by individual members.

Variable	Operationalization	Source of Data
Cultural Diversity	Heterogeneous: The members are from different national cultures Homogenous: The members are from same national cultures	Objective data
Shared Understanding	Number of instances of the development of shared understanding in each session, identified through content analyses of team members' discussions.	Objective data
Group Atmosphere	Average score of ten indicator items measuring trust, respect, cohesiveness, and open conflict discussion norms. Scales were adapted from Jehn and Mannix (2001).	Self-reported data (Questionnaire)
Perceived Task Conflict	Average score of three indicator items measuring task conflict. Scales were adapted from Jehn (1994).	Self-reported data (Questionnaire)
Avoiding to resolve conflict	Average score of two indicator items measuring avoidance conflict management style. Scales adapted from Montoya-Weiss, Massey, and Song (2001).	Self-reported data (Questionnaire)

Table 1. Variables and Their Measurements

Results

Reliability and validity

Reliability assessments were calculated for the self-reported variables. Since the measurement scales used had not been tested and validated adequately for virtual teams, a cut-off value 0.70 was considered acceptable (Nunnally, 1978). To examine convergent validity, factor analyses employing VARIMAX orthogonal rotation was carried out.

The items of group atmosphere scale loaded on three factors, which were identified as trust, team spirit, and openness. Group atmosphere was measured as the average of trust, team spirit, and openness. This approach is consistent with the operationalization of group atmosphere in prior research (Jehn and Mannix, 2001). The items of perceived task conflict scale loaded on one factor. The items of avoidance to resolve conflict also loaded on one factor.

Hypothesis Testing

The hypotheses were tested using analysis of covariance (ANCOVA) and regression analyses with a level of significance of 0.05. Any weak significance level in the range of .05 to .10 was treated as suggestive of the nature of relationship between the variables. Some teams were based either in the US or in India while other teams had members from two countries. Thus, we considered geographical dispersion as a control variable in this research. Two different versions of the task were used in the experiment (i.e. thirteen groups performing the basic version of the task and the remaining fourteen groups performing an additional component of allocating technology fees to the selected options). We used general linear model (GLM) of SAS to ascertain that the study variables did not differ significantly across two categories of task.

In order to test hypotheses 1 we conducted analysis of covariance (ANCOVA) considering the cultural diversity as the categorical variable and geographical dispersion as the control variable. We found support for hypothesis 1. Group atmosphere was more favorable in homogeneous virtual teams than in their heterogeneous counterparts [$\bar{x}$ heterogeneous= 3.86, $\bar{x}$ homogeneous=4.10, p=0.02]

Multiple regression analyses were employed to test the hypotheses 2 and 3. The regression results demonstrated the positive influence of group atmosphere on shared understanding in the study teams (β=2.714; p=0.05), thus supporting hypothesis 2. As hypotheses 3 involve the moderating effect of avoidance to resolve conflict, we tested this hypothesis in three steps. First, we regressed the dependent variables on the main effect (perceived task conflict). Next, we regressed the dependent variables on the main effect and the moderator effect (avoidance to resolve conflict). Finally, we included the interaction between the main and moderator effects in the regression model. We tested the significance of the interaction effect by comparing the three regression models. We found support for hypothesis 3 and a weak support for hypothesis 3A. Shared understanding had a negative effect on perceived task conflict (β=-0.113; p=0.02). However, the moderating effect of the avoidance to resolve conflict was weakly supported in this study (β=0.033; p=0.08).

Discussion

We found support for most of the hypotheses of this study. Group atmosphere was perceived to be more favorable by the members of culturally homogeneous groups than by those of culturally heterogeneous groups. This seems to imply that in technology mediated interactions, team members culturally homogeneous teams form favorable perceptions of trust, cohesiveness, respect, and openness because they have similar values and beliefs.

We also found that group atmosphere had positive effect on the development of shared understanding. This confirms that the proposition of Hinds and Weisband (2003) that developing team spirit and communicating openly contribute to the development of shared understanding. Finally, we found the support for our hypothesis on the negative effect of shared understanding on perceived conflict. However, the moderating effect of the avoidance to resolve conflict was weakly supported in this study. The virtual teams in our study were engaged in short duration tasks. As the members had to make a decision at the end of the meeting, they could not afford to avoid conflict completely.

Conclusion

Development of shared understanding in virtual teams is a challenging task as these teams are high in diversity and this heterogeneity affects the perception of group atmosphere. In this paper, we present a theoretical model that focuses on group atmosphere, shared understanding, and perceived conflict of virtual teams. The theoretical model is validated by using the data collected in a laboratory experiment. The outcome of the study can help business organizations to develop guidelines that facilitate the development of shared understanding among the members of virtual teams. Although no generalization

can be made from the findings of one experiment, the results provide enough motivation to pursue in-depth research on group atmosphere and shared understanding in cross-cultural virtual teams. We intend to extend this research by examining the effects of group atmosphere and shared understanding on perceived and manifested task conflicts in virtual teams. Pondy (1967) explains the difference between perceived and manifested conflicts. We will measure manifested task conflict by analyzing the contents of the each discussion log of our experiment.

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