Technology, Culture, and Conflict in Virtual Teams: A Case Study

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Abstract

Increased global competition and the opportunities presented by electronic communication have fuelled the use of virtual team structures. Global virtual teams have considerable potential for conflict as members have to work across geographical, cultural, and time boundaries. This study investigates how cultural differences and electronic communication technology contribute to conflict in global virtual project teams. Case study data in the form of interviews, email archives, web discussion archives and documentary evidence was gathered from three virtual project teams of size ranging from seven to eleven members, over a period of nine months. The findings indicate that cultural differences are important sources of conflict in such teams. Features of communication technology such as high volume of information and lack of immediacy of feedback were found to contribute to conflict.

Keywords

Cultural differences, Computer mediated communication systems, Conflict, Group performance.

INTRODUCTION

The threat of intensified competition due to globalization coupled with the opportunities presented by electronic networking, have led to the emergence of virtual organizational structures. These structures typically consist of small, globally dispersed, ad hoc teams that reshape themselves as environmental conditions or customer requirements change (Quinn 1992). The formation of such teams allows talent to be drawn quickly from different functions, locations, and organizations. By virtue of their flexibility, virtual teams can enable organizations to position themselves effectively in an increasingly competitive environment.

Although there are a number of advantages of virtual teams, certain characteristics of these virtual forms make the development of effective team dynamics, including conflict management, complex and challenging. Firstly, team diversity is high due to presence of members from diverse cultures and nationalities. This can decrease team cohesion and increase perceptions of conflict (Knoll and Jarvenpaa, 1996). Secondly, communication delays, time zone mismatch and lack of face-to-face contact due to space-time dispersion may exacerbate disagreements, giving rise to conflict situations (Duarte and Snyder 1999).

While a lack of conflict can lead to groupthink, predisposing catastrophic decisions (Janis 1982), inappropriate or poorly managed conflict is also dysfunctional (Tjosvold and Johnson 1983). It inhibits effective problem solving and results in participants' dissatisfaction with the processes and outcomes. Therefore, to take advantage of team strengths, conflict must be handled in a way that diverse perspectives are not stifled yet members' commitment is

maintained and group cohesiveness is built. Nadler and Tushman (1999) stress the importance of conflict management as one of the eight core competencies in which future organizations have to become proficient.

Unfortunately, the sources of conflict and the relationship between conflict and team performance are not well understood and studied in the context of virtual teams. Therefore, the purpose of this research is to obtain a better understanding of the nature of conflict in these teams particularly focussing on the cultural and technology factors, and performance outcomes. To this end, we conducted a case study of virtual teams of students working on sponsored projects in a graduate course setting. The research made extensive use of qualitative methods for analyzing interviews with project team members and faculty, email archives, meeting transcripts, and documentary evidence.

PRIOR RESEARCH

Group conflict is defined as disagreement, both manifest and latent, among group members and implies incompatible goals or interests. It has been studied under the framework of: sources of conflict, types of conflict, conflict management styles and interventions, and conflict management outcomes (Rahim 1992). In the organizational literature, researchers have reported group diversity as a source of intra-group conflict (Austin 1997; Jehn et al. 1999; Pelled 1996). Elements of diversity studied include members' age, gender, race, nationality, education, and tenure in organization (Jehn et al. 1999; Pelled 1996; Earley and Mosakowski, 2000). Differences along dimensions of national culture were not investigated as sources of conflict.

Conflict has been broadly classified into two types: relationship or affective conflict and substantive or task conflict (Rahim 1992). Relationship conflicts are disagreements and incompatibilities among group members about personal issues. Task conflicts are disagreements among group members' ideas and opinions about the task being performed. Several studies (Amason 1996; Jehn 1995) have reported that moderate levels of task conflict are beneficial whereas relationship conflict is detrimental to team performance. However, the relationship between conflict type and group performance is moderated by type of task (Jehn 1995). Jehn (1995) reported that task conflict was negatively related to performance in routine task groups but had a positive effect in non-routine task groups. She also reported that the effect of relationship conflict on performance was greater in highly interdependent task groups than those with low interdependence tasks.

The effect of technology on group conflict processes has been studied in the GSS literature (Miranda and Bostrom 1994; Sambamurthy and Poole 1992). These studies have mainly compared conflict management in unsupported, manually supported, and GSS supported groups or investigated the effect of different GSS characteristics. Although these studies have helped to elucidate the effects of different GSS technology capabilities on the conflict process and outcomes, they have been conducted in experimental settings with synthetic decision-making tasks. Therefore, they have not dealt with the spectrum of tasks typically performed by work groups. Further, since GSS technology may provide different features for communication support and additional features for consensus support than generic electronic communication technology like email that are available to virtual teams, these results cannot be directly extended to virtual teams.

RESEARCH QUESTIONS

Although there is much discussion about inter-cultural communication and how to manage cultural differences in the popular management literature, there is a lack of empirical and

theoretical studies on how cultural differences lead to team conflict. Again, although there is a large amount of literature on the different communication technologies available and suited for particular tasks to be performed by virtual teams, there is little work that studies how communication technology can contribute to team conflict. Our study seeks to address the gaps in existing literature. The specific research questions of our study are:

- How do cultural differences contribute to conflict in virtual teams?
- How does electronic communication technology contribute to virtual team conflict?

How do cultural differences contribute to conflict in virtual teams?

Culture has been defined as the collective programming of the mind that distinguishes one group of people from another (Hofstede 1991). Each member in a global team brings his or her own cultural beliefs and assumptions, which affects his or her behavior and actions. When members belong to different countries, the differences that manifest most are the national culture differences. Hofstede (1991) categorized the dimensions of national cultural as individualism-collectivism, masculinity-feminity, uncertainty avoidance, and power distance. Individualism is the degree to which people prefer to act as individuals rather than as members of groups. People from individualistic societies value personal time and the freedom to take individual approaches to their work. On the other hand, in collectivistic societies people value a strong identity with the group and tend to put the needs of the group before their own. The masculinity-feminity dimension describes the extent to which a masculine orientation – concerned with things such as earnings, signs of visible success, and possessions - has priority over a more feminine orientation which involves nurturing, caring, and sharing. Uncertainty avoidance is the extent to which members of a culture are comfortable with uncertainty. Members from high uncertainty avoidance cultures seek details about plans, desire closure, and prefer more predictable routines and formalization of team members' roles, than members from low uncertainty avoidance cultures Power distance refers to the degree of inequity among people that the population expects and accepts. In high power distance societies, the relationship between a project leader and project member is more hierarchical.

Hall (1976) identified two other cultural parameters along which people differ: context and time-orientation. In high context cultures, people prefer more background information and subjective opinions in contrast to low context cultures where objective, precise information is preferred. On the basis of time-orientation, cultures can be classified as monochronic or polychronic. Monochronic cultures prefer executing activities sequentially whereas polychronic cultures have preference for executing multiple activities in parallel. Lewis (1996) presents a cultural categorization of countries on a linear-active, multi-active, reactive scale. This classification pertains to communication styles, i.e. talking and listening behavior. In linear-active and reactive cultures members are more introverted, patient, quieter and better listeners than multi-actives who are more extrovert, impatient and talkative. Austin (1997) has reported that cultural differences can lead to incongruence of values and opinions among group members and consequently decrease group cohesion and increase group conflict. In this study, we are interested in empirically investigating how the differences along specific cultural dimensions manifest and contribute towards conflict among team members.

How does electronic communication technology contribute to virtual team conflict?

In order to investigate the effects of the electronic communication technology, we employed the technology characteristics identified in the Computer Mediated Communication literature, i.e. volume of communication, concurrency of communication, immediacy of feedback, and

multiplicity of cues (Dennis and Kinney 1998). Volume of communication refers to the amount of communication possible in a communication medium. Problems associated with high volume include information overload and difficulty in organizing information. Concurrency is defined as the extent of simultaneous communication possible. Inadequate concurrency can lead to problems in following multiple dialogs and delay in responding to many messages. Immediacy of feedback refers to the rate of communication clarification possible. Sustaining this capability may be costly and inconvenient when members operate in different time zones. Multiplicity of cues refers to the range of communication cues possible. Trying to replicate all the cues of a face-to-face meeting may be costly and infringe on members' privacy. In this study we investigated how these features of the communication technology contribute to conflict in global virtual team settings. The technologies that we studied are those that are commonly used for communications in virtual teams, i.e. email, web discussion, shared databases, video and teleconferencing.

RESEARCH METHOD

To examine the research questions, we conducted case studies of virtual project teams consisting of students from three universities around the globe (USA, Sweden, and Singapore). Since our study attempted to investigate "How" type research questions, the case study methodology was deemed appropriate (Yin 1994; Benbasat et al. 1987). Further features of case study inquiry which our work possessed are: many variables of interest compared to data points, multiple sources of evidence, and benefiting from prior development of theoretical propositions to guide data collection and analysis. The virtual teams consisted of students from the three universities participating in a Global Project Coordination course run over a four-month period. The student teams were required to work on real-life projects sponsored by large multi-national organizations and present their results at the end of the course. The participants were mostly Masters level students from a variety of disciplines such as industrial engineering, management, computer science, and information systems. The teams met face-to-face for a week at the beginning of the course and again at the end of the course to present their final results. The rest of the time, the team members communicated and collaborated electronically to achieve their goals. On account of the corporate involvement in formulating and evaluating the team projects, the project tasks were highly realistic as compared to other virtual team studies.

Case Study Design

The main unit of analysis of our study was the virtual team. The embedded units were the individual members, sub-groups, and conflict episodes. In order to compare conflict parameters and performance across teams undertaking different project tasks, we performed a multiple case study. We chose one team (A) undertaking a routine, performance task and two teams (B and C) that were assigned non-routine, creativity tasks. The three teams exhibited variation in national culture composition. Team A had a mixture of six national backgrounds, Team B five, and Team C four national backgrounds. All teams had the same communication technology available to them although each team was free to use whichever media they preferred. The multiple case replication served as a way for addressing external validity (Yin 1994). Reliability for the case study was addressed by using a detailed case study protocol in the data collection and data analysis phases. Triangulation of sources of evidence was a way of addressing construct validity in our study.

Data collection

Our study began from the start of the course in February 1999 and continued beyond the end of the course in June 1999. During the course, the first author and an assistant observed and recorded the group meetings of the three teams over videoconference or teleconference. Archives of the email and web discussion messages for all three teams were obtained. The students were evaluated on a mid-term lessons learned paper and their final project performance. Our documentary evidence included course materials, the lessons learned papers, and excel worksheets containing the members' national background information and team grades. In September-October 1999, after the completion of the course, in-depth semi-structured interviews of team members and faculty were conducted to obtain first-person accounts of conflict episodes in the teams and overall team conflict ratings. The overall conflict parameters, i.e. level of task conflict and relationship conflict, were assessed through a questionnaire amalgamated from previous conflict literature (Jehn 1997; Miranda and Bostrom 1994). For each team, a key informant was identified with the help of the faculty. The faculty interview helped to verify the conflict incidents recounted by the key informants and give a comparative rating of the conflict parameters of the three teams.

Data Analysis

For each team we performed two types of data analysis. Firstly, two researchers independently identified the cultural and technology sources of conflict by qualitative methods, i.e. conceptual coding (Miles and Huberman 1994) of interview transcripts, lessons learned papers, email archives, and web discussion messages. Source of conflict was conceptually coded according to any of the cultural dimensions of individualism-collectivism, masculinity-feminity, uncertainty avoidance, power distance, high-low context, time-orientation, and linear-reactive/multi-active, and any of the technology characteristics of volume of communication, concurrency of communication, multiplicity of cues, and immediacy of feedback. There was agreement between the researchers on the codings. Secondly, we determined the overall ratings of task conflict and relationship conflict for the whole team. This was obtained quantitatively by computing the means of scores for the items relating to these constructs in the interview questionnaire. The levels were rated on a scale of 1 (corresponding to lowest level of conflict) to 7 (corresponding to the highest level of conflict). Team performance was evaluated as the project grade awarded to each team at the end of the course. This grade was a combination of the grades assigned by the sponsor organization and the faculty of the course.

Background of Cases

Team A

Team A, sponsored by a leading international consulting organization, worked on a project to obtain information about risk measurement, monitoring, and management throughout the value chain of leading global companies by interviewing top executives in a variety of industries. The sponsor company had pre-designed and provided the risk assessment questionnaire for their use. The task was mainly that of gathering data from high-level executives according to the questionnaire on behalf of the sponsor. The team members confined their interviews to chief executives from companies in their own region. The project task required little coordination and collaboration except in preparing for the team presentations. Therefore, the task could be classified as a routine, performance task (McGrath 1991) with low interdependence requirements (Van de Van et al. 1976). This team had the largest number of members (eleven) with students from all three universities. It had a mix of six national backgrounds. The team relied mainly on email messages to communicate and e-

circles (an online community website) for file sharing. They seldom used the course web discussion board.

Team B

The team sponsored by a communication giant was commissioned to investigate the mobile data market from an internet service provider (ISP) point of view. Their task required interviewing ISPs and identifying significant mobile applications, the potential for these applications, charging mechanisms, and technologies. The task was non-routine since the team had to brainstorm to prepare the ISP questionnaire and identify new mobile applications for the future. The sponsor was located in Sweden and communicated to the other two countries through the team members in Sweden. Therefore, the task interdependence requirements were high. This team was of intermediate size (nine members) and had participants from all three universities. It had a mix of four national backgrounds, the least of all the teams. This team relied less on email messages to communicate and did not use e-circles file-sharing. They mainly used the web discussion area to share information and regularly posted the minutes and agenda of their weekly meetings there.

Team C

Team C was sponsored by a leading multinational computer vendor to analyze their current financial analyst structure in the Asia Pacific region and come up with a more cost-effective organization model. In this case, the task involved more than gathering data from the financial analysts. The teams deliverable was to propose alternative solutions which would increase effectiveness and reduce costs of the finance organizations while providing support for the Asia Pacific business management, knowledge sharing, back-up and career path of the analysts, as well as support more product lines. The sponsor contact person was located in Singapore and conveyed information to the other team members through their teammates in Singapore. Therefore the task could be classified as predominantly non-routine with high degree of interdependence. This team was the smallest we analyzed with seven members from two universities. It had a mix of five national backgrounds. They relied mainly on email messages to communicate and used ICQ and phone-conference for their weekly meetings. They used the course web discussion board moderately and e-circles file-sharing to a very limited extent.

	A	**B**	**C**
Team Size	11	9	7
Gender Mix	7 Male 4 Female	5 Male 4 Female	4 Male 3 Female
Participating members	4 from Swedish Univ. 2 from Singapore Univ. 5 from American Univ.	3 from Swedish Univ. 2 from Singapore Univ. 4 from American Univ.	3 from Singapore Univ. 4 from American Univ.
Country of origin	1 from Canada 1 from Egypt 2 from India 1 from Singapore 4 from Sweden 2 from USA	1 from China 1 from Hong Kong 3 from Sweden 4 from USA	1 from China 2 from France 1 from Indonesia 2 from Singapore 1 from Tunisia

Table 1: Characteristics of the teams

RESULTS

The observational data from the three teams will be discussed on a case-by-case basis. For each case, we first describe the cultural and technological sources of conflict. Then we provide an overall team level description of the types and levels of conflict and team performance.

Team A

Cultural differences as sources of conflict:

According to Hofstede's (1991) cultural scores, U.S.A ranks high on individualism, Sweden intermediate, and Singapore low. This difference was apparent in Team A. Several members including two Americans reported that the American members were more individualistic and worked more for themselves rather than for the group. In contrast, the Swedish and Singaporeans members were found to contribute more towards helping others. This led to disagreements in the team as to whether the American members were contributing sufficiently towards the whole team effort. According to Lewis' (1996) scale, Singaporeans are classified as reactive, Swedish as occasionally reactive, and American sub-cultures, such as Indian and Egyptian, as multi-active. This difference was evident in the team. Several members noted that the American members were more impatient and talkative as compared to the Swedish and Singaporean team members who were more patient and good listeners. This difference led to cases of conflict where the American members (who talked more during meetings) were not aware of how much work the other members had accomplished and thought they were not contributing adequately.

Electronic communication technology characteristics as sources of conflict:

Communication technology was found to impact on conflict both through the high volume of communication and lack of immediacy of feedback. Firstly, the large volume of email communication led to information overload. A consequence of information overload was that the contributions made by certain members got buried. A conflict situation occurred when a student reported that his viewpoint was ignored under the barrage of emails and accused other members of repeating his view as if it was their own. Secondly, minor conflicts were caused by the lack of immediacy of feedback in email. Delays in receiving and sending email, and lost messages, resulted in accusations being traded of not having sent information on time.

Team conflict parameters and outcome:

The various sources of evidence point to a high degree of relationship conflict and moderate degree of task conflict in this team. These subjective ratings are supported by the questionnaire ratings from the faculty interview. The relationship conflicts related to disagreements about appropriate dress, behavior towards members of the opposite sex, and expectations about how much time the team members should spend together. The task conflicts related to disagreements about selection of speakers for the team presentations, willingness to help others, doing fair share of work, and responding to messages on time. Overall, this team performed moderately in terms of their project grade. Due to the task having low interdependence requirements, the high level of relationship conflict did not excessively hamper the performance. At the same time, the moderate level of task conflict did not boost the performance for their routine task. These findings agree with the literature on the moderating effect of task type (Jehn 1995).

Team B

Cultural differences as sources of conflict:

Hofstede (1991) rated Singapore as a high power distance society and U.S. as a low power distance society. Members of high power distance societies are likely to be more respectful towards authority figures. This difference led to a conflict situation when one of the American team members put her feet up on the table during a presentation to the sponsor. A Singaporean teammate objected to her behavior because she felt it showed lack of respect for the sponsor.

Electronic communication technology characteristics as sources of conflict:

Lack of immediacy of feedback was indicated as a source of conflict in this team. One of the members thought he had posted his response on the web discussion board but it had actually not got through. The rest of the team blamed him for delaying his response. Eventually he was able to repost his reply.

Team conflict parameters and outcome:

All sources of evidence indicate that the overall level of task conflict in this team was low. In the email archives, there was little discussion about task alternatives. As compared to the other teams, very little scheduling conflict took place for setting up the weekly teleconference group meetings. However a moderate amount of relationship conflict was indicated. These subjective ratings agree with the faculty questionnaire ratings on levels of conflict. This team had the lowest performance out of all the three teams under study. Their non-routine task suffered from the lack of task conflict and creative brainstorming. Relationship conflict also impacted negatively on their performance of the high interdependence task as predicted by the literature (Jehn 1995).

Team C

Cultural differences as sources of conflict:

In high context cultures (Hall 1976) like Singapore, people prefer more historical information and more subjective personal opinions. This is in contrast to people from low-context cultures like U.S.A who prefer more objective and fact-based information. This difference manifested when the Singaporean members wanted to provide more background and contextual information in the team's final presentation than the American members. In monochronic time cultures (Hall 1976) like the U.S., people tend to adhere more strictly to time schedules and let relationships subordinate to schedule. On the other hand, in polychronic cultures like Singapore, appointments and schedules are more approximate and subject to giving time to others, i.e. completing the task or communication is more important than adhering to a schedule. Due to the difference in time orientation, the Singaporean members were inclined to give a lengthier presentation than their American teammates. In high power distance cultures (Hofstede 1991) like Singapore, the sponsor or faculty is considered a higher authority in the hierarchy of relationships. The Singaporean team members felt it necessary to reveal all possible information to the higher authorities during the team presentation. On the other hand, for members from a low power distance, low context and monochronic culture like U.S. it was more important to provide only the necessary information within the time scheduled for the presentation.

Electronic communication technology characteristics as sources of conflict:

In this team, lack of immediacy of feedback in email was reported as contributing to conflict. An email sent by a Singaporean team member to her American teammates communicating the

sponsor's instructions was delayed. This caused a fair amount of anxiety among the American students who were waiting for the sponsor approval before proceeding to conduct interviews that had already been scheduled. The American members thought that their Singaporean counterparts had delayed in sending information to them, causing conflict between the two parties.

Team conflict parameters and outcome:

All sources of evidence in the team point to considerable task conflict and insignificant relationship conflict. Numerous instances of task conflict cropped up in the email exchanges regarding who to include in the internal mailing list, when to prepare the questionnaires for the financial analysts, what to include in the questionnaires, who should interview which analysts, the content of the final report and presentation slides. A number of team members reported the lack of relationship conflict in their lessons learned papers. The faculty ratings of levels of task and relationship conflict confirm with the members' perceptions. The overall performance of the team was highest among all the teams in terms of grade awarded. The high level of task conflict benefited their non-routine task while the low levels of relationship conflict was beneficial due to the high interdependence of their task (Jehn 1995).

The results from all the teams are summarized in Table 2 below.

	A	**B**	**C**
Task type	Performance	Creativity	Creativity
Task interdependence	Low	High	High
ECT used	Email Tele-conference E-circles	Email Tele-conference Web Discussion Board	Email Tele-conference Web Discussion Board ICQ
Cultural Sources of Conflict	Individualism/ Collectivism Linear active/ Reactive/ Multi-active	Power Distance	High/ low context Time-orientation Power Distance
ECT Sources of Conflict	High volume of communication Lack of immediacy of feedback	Lack of immediacy of feedback	Lack of immediacy of feedback
Relationship conflict	High	Moderate	Low
Task conflict	Moderate	Low	High
Performance	Intermediate	Lowest	Highest

Table 2: Team results

DISCUSSION, IMPLICATIONS, AND FUTURE WORK

How do cultural differences contribute to conflict in virtual teams?

Cultural differences were cited as sources of conflict in all three virtual teams under study. However, the particular dimensions along which disagreements occurred varied from team to team. In Team A conflicts were indicated along individualism-collectivism dimensions and linear-active/multi-active/reactive dimensions. For both these dimensions, differences surfaced between the same two sub-groups, i.e. the Americans in one group and the Swedish and Singaporeans in the other. Sub-group formation was also evident in the other two teams. In Team B, the power distance differences leading to conflict occurred between the American

sub-group and the Singaporean sub-group. The cases of cultural intolerance occurred between the American members and the Swedish members. Therefore in this group we see two-way divides. In Team C, there was a divide between the American and Singaporean members along dimensions of power distance, time-orientation, and context. Here there was a clustering of the cultural dimensions that resulted in the polarization between the two groups.

The influence of cultural diversity on group interactions is best explained by similarity attraction (Byrne 1971) and social identity effects (Tajfel and Turner 1973). Similarity attraction theory suggests that people prefer similarity in their interactions, i.e. they prefer to interact with people similar to themselves. According to social identity theory, group members establish positive social identity by affiliating with members of their own social category. Social category membership, i.e. by race, gender, and ethnicity, provides natural occurring fault-lines (Lau and Murnighan 1998) along which conflicts can be drawn. Our observations indicate the social identity and similarity attraction effects in the formation of sub-groups. However, the sub-groups amongst which conflicts occurred appear to be not purely based on race, gender or ethnicity. Rather the fault-lines appeared to be between combination or clusters of social categories and cultural dimensions. Thus, within all the three teams we saw formation of sub-groups of American members, Singaporean members, Swedish members, and in some cases a coalition of Singaporeans and Swedes.

A point to note is that the adopted national cultural background appeared to have a dominant effect on the team members' behavior. Although most members indicated several countries of origin, the adopted national culture was most salient in determining their group affiliations. Thus, the students from the American university irrespective of their countries of origin exhibited cultural orientations of their adopted country, i.e. U.S. Similar effect was noted in the other two participating universities. The inter-cultural differences along individualism, power distance, linear vs. multi active vs. reactive, high vs. low context, and time-orientation dimensions were as predicted in the inter-cultural literature (Hofstede 1991; Hall 1976; Lewis 1996). However, differences along masculinity-feminity and uncertainty avoidance dimensions did not appear to lead to conflict within these teams. The reason could be that the differences along these dimensions were not strong enough to trigger conflict.

How does electronic communication technology contribute to virtual team conflict?

Our study also indicated the role of technology in triggering conflict in virtual teams. The most predominant electronic communication technology used by all the teams was the electronic mail. Out of the four communication technology characteristics, i.e. volume of communication, concurrency of communication, immediacy of feedback, and multiplicity of cues, reported in the Computer Mediated Communication literature, two characteristics appeared as sources of conflict in the teams under study. These are the high volume of communication and the lack of immediacy of feedback in email exchanges.

High volume of email communication in Team A (this team had the largest number of email exchanges) resulted in information overload. Cognitive flexibility theory (Spiro et al. 1992) suggests that limited memory and processing capability of the human brain results in cognitive overload when there is too much information available. The consequences of information overload were the burial of contributions made by some members leading to dissatisfaction on their part. In all three teams, lack of immediacy of feedback in email was cited as a source of conflict. The lack of immediacy of feedback in email as compared to a medium like teleconference or videoconference acted in two ways. Firstly there were delays in the transmission and receipt of messages and lost messages due to the unreliability of the

technology. Secondly, there were delays in recipient response to emails. Both these effects resulted in communication breakdowns that sometimes aggravated into conflict situations.

Two features of electronic communication technologies that did not appear as sources of conflict are the inadequacy in concurrency of communication and lack of multiplicity of cues. The inadequacy of concurrency of communication is particularly relevant for technologies like ICQ and video-conferencing where it is difficult to support multiple dialogs for more than three or four persons. Since these technologies were rarely if at all used by the teams under study, we did not observe conflicts due to limitations in concurrency of communication. Regarding multiplicity of cues, previous literature indicates that lack of multiplicity of cues in email does not deter users from choosing this media (Huang et. al., 1996). Also, the problems associated with having too many cues, i.e. lack of privacy, did not surface in these teams since they rarely used the technologies that provide multiplicity of cues e.g. videoconferencing, for reasons of cost and difficulty of coordination across time zones.

The findings of this study have implications for managers and participants in virtual teams. Firstly, team members need to be sensitized to the cultural differences in their teams to prevent them from escalating. Secondly, the social category and cultural background of team members should be considered during selection of participants in virtual teams. In terms of communication media, it is important to find technology solutions that can improve on the lack of immediacy of feedback and high volume of email while maintaining cost-effectiveness. In fact, teleconferencing supplemented by email was rated by members as an effective communication mode for their purposes.

The above relationships can be summed up in the form of a model shown in Figure 1. We propose this as a research model for use in future research on conflict in virtual teams.

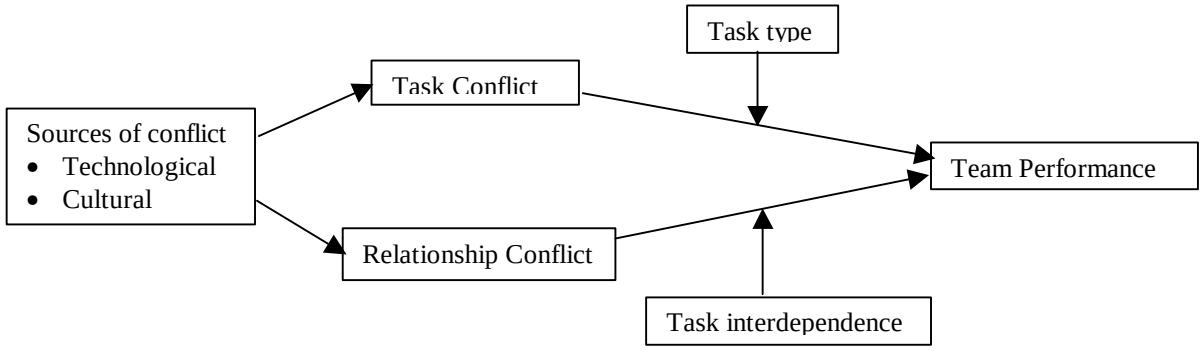

Figure 1: Research Model

CONCLUSIONS

Our study is significant in extending conflict theory to global ad-hoc virtual project teams. Cultural differences and communication technology characteristics, specifically the high volume of communication and the lack of immediacy of feedback in email, have been identified as sources of conflict. The moderating effect of task type on the relationship between conflict and team performance has been supported. However, these results are limited to the student context with the use of email as the main medium of communication. Future work should address the specific relationships between the cultural and technological sources of conflict and the types of conflict generated and should also attempt to extend to organizational virtual teams with a variety of communication media.

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