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Modeling the Antecedents of Perceived Performance in Partially Distributed Teams

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ABSTRACT

Global distributed teams are increasingly common as organizations collaborate in the global economy. Partially distributed teams are often formed to gather expertise from different locations to accomplish the organizational goals. A PDT is a team in which there is at least one collocated subteam which is geographically distant from other subteams and communicates with the other subteams through electronic media. In this paper we build and test a model of the antecedents of perceived performance. The research shows that conflict and shared identity predict trust which predicts levels of perceived performance of PDTs. Surprisingly, we did not find support for the hypotheses that cultural or temporal distance predicts either conflict or shared identity. We posit reasons for this and suggest future research to further investigate the influences on perceived performance in a PDT.

Keywords

Partially distributed teams, PDTs, conflict, shared identity, trust, culture.

INTRODUCTION

Global distributed teams are increasingly common as organizations collaborate over distance. Partially distributed teams (PDTs) are often formed to gather expertise from different locations to accomplish the organizational goals. A PDT is a team in which there is at least one collocated subteam that meets face-to-face at least sometimes, but is geographically distant from other subteam(s) in the team. PDTs therefore have some of the characteristics of traditionally collocated teams, some of fully distributed virtual teams, and some unique to their structure. The structure of a PDT, whereby rich face-to-face communications are engaged in within the subteam and only electronic communication is used between subteams, can result in “faultlines” (Lau and Murnighan, 2005) which can create strong ingroup/outgroup divides impeding the processes and negatively impacting the outcomes of the team processes. Conflict can be increased and shared team identity development impeded. In this research, we propose that these effects can influence the development of trust which, in turn, can negatively impact performance.

REVIEW OF THE LITERATURE

Trust- is important for effective functioning of teams. In this research, we adopt Mayer, Davis and Schoorman’s (1975, p. 712) definition of trust: “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party.” Trust can reduce transaction costs, increase cooperation, and promote a respect for authority that enables management to manage without constantly having to explain themselves (Kramer, 1999). This may be especially important when the team members are distant from management as in virtual teams. However, it is difficult to establish trust in virtual teams (Jarvenpaa and Leidner, 1998). In a prior study (Plotnick, Hiltz, and Ocker, 2009) we found trust in PDTs to be two-dimensional: process related trust and personal trust, which align respectively with the task process dimension and socio-emotional process dimension found by Mitchell and Ziguers (2009).

Conflict- can occur along three basic dimensions – process, task, or relationship. High levels of conflict are normally detrimental to team performance (Jehn, 1997). Social Identity Theory (SIT) would predict that cultural differences can lead to conflict and, in fact, cultural diversity, both linguistic and national, has been found to be an antecedent of both relationship and task conflict more in virtual teams than in collocated teams. The literature also supports the proposition that the extensive use of technology for communication in virtual teams can result in conflict (Hinds and Bailey, 2003; Kankanhalli, Tan, and Wei, 2006-7). For example, asynchronous communication can result in delays that lead to conflict when they are misunderstood and attributed to work process or individual intentions.

Shared Identity- According to Social Identity Theory (SIT), people classify themselves and others through social categorization (Ashforth and Mael, 1989). The sense of belonging to a group (i.e. the existence of the group) is enough, by itself, to trigger in-group/out-group discrimination (Tajfel and Turner, 1986). In a PDT, geographic faultlines can develop and impair team functioning (Polzer, Crisp, Jarvenpaa, and Kim, 2006) thus contributing to the in-group/out-group dynamics

between subteams. In-group/out-group dynamics are exacerbated because there is a tendency to evaluate one's own group positively, and conversely the out-group negatively, in an attempt to differentiate the in-group from the out-group (Tajfel and Turner, 1986). In a global PDT, team shared identity may be more difficult to achieve because members are likely to have strong subteam identification because of cultural diversity between the subteams (Fiol and O'Connor, 2005) which accentuates the comparison between subteams, thus reinforcing the in-group/out-group dynamics.

Cultural Distance- Cultural differences may cause misunderstandings and, therefore, negatively affect performance (Bezrukova, Jehn, Zanutto, and Thatcher, 2009). Hofstede (2001) has identified five dimensions of cultural distance (Power Distance, Uncertainty Avoidance, Individualism, Masculinity, and Long-Term Orientation) and assigned indexes for each of those dimensions to 72 countries surveyed. Cultural distance, then, can be evaluated as the distance between the index scores.

Temporal Distance- refers to the number of time zones that separate two sites. Coordination costs, comprised of communication, delay, clarification and rework costs, can be increased because of temporal distance (Espinosa and Carmel, 2003).

HYPOTHESES

We propose that distance affects performance through the intervening variables of conflict, shared identity and trust. Misunderstandings due to cultural differences may result in conflict between the subteams in a PDT, as members fail to understand each other's procedures for working, task focus, and socio-emotional interactions. Therefore:

H1: The greater the cultural distance between subteams in a PDT, the higher the level of conflict.

Faultline distances caused by the diversity of cultural differences may promote subgroup identification and impede the development of whole team identity (Fiol and O'Connor, 2005); thus:

H2: : The greater the cultural distance between subteams in a PDT, the lower the level of shared identity.

We propose that temporal distance can also cause conflict because the greater the temporal distance, the more difficult it is to schedule synchronous communication, and to coordinate work. With temporal distance, coordination costs can be increased (Espinosa and Carmel, 2003) which can lead to conflict over process and task. Members of one subteam may interpret delays actually due to time differences as unresponsiveness or lack of work ethic.

H3: The greater the temporal distance between subteams in a PDT, the higher the level of conflict..

Temporal distance can reduce synchronous communication between subteams which can impede the development of a shared identity. Subteams have rich face-to-face communication which can promote development of subteam identity but total reliance on mediated communication can make it more difficult to achieve shared (whole team) identity (Fiol and O'Connor, 2005). We hypothesize:

H4: The greater the temporal distance between subteams in a PDT, the lower the level of shared identity.

Ocker, Zhang, Hiltz, and Rosson (2009) found that when there is higher shared identity, there is less conflict in PDTs. Therefore, we expect that:

H5: Shared identity will decrease the level of conflict in a PDT.

Conflict can further reduce effective communication which is critical for trust development. Thus we hypothesize:

H6a: The higher the level of conflict between subteams in a PDT, the lower the level of Personal Trust.

H6b: The higher the level of conflict between subteams in a PDT, the lower the level of Process Trust.

Shared identity increases team cohesion (Jehn, 1997) and can overcome the negative effects of faultline distances (Bezrukova et al., 2009). Thus, shared identity may overcome the obstacles to the development of trust between subteams in a PDT and we hypothesize:

H7a: The higher the level of shared Identity in a PDT, the higher the level of Personal Trust between subteams .

H7b: The higher the level of shared identity in a PDT, the higher the level of Process Trust between subteams .

Trust is the lubricant that enables groups, especially distributed groups, to work together effectively. It has previously been shown to be positively associated with perceptions of performance in PDTs (Plotnick et al, 2009) and so we hypothesize

H8a: The higher the level of Personal Trust between subteams in a PDT, the better the team performance.

H8b: The higher the level of Process Trust between subteams in a PDT, the better the team performance.

METHOD

Subjects

Seven hundred and thirteen undergraduate students from 15 universities in eight countries were formed into 80 teams. The universities were in the countries of Germany, Ireland, Lithuania, Mexico, Singapore, Spain, Switzerland, and the USA. Each team had two subteams of about five members each. Each subteam had members of a collocated face-to-face class. While the collocated students had prior experience with one another, it is

highly unlikely they had any previous interaction with their distant team members as the teams were comprised of subteams from different universities, with at least one subteam from the U.S. The participants were students in software engineering or a course closely allied to it.

Task

Each team worked independent of the other teams on determining the functional requirements, high level design, and related management decisions for an emergency management information system (EMIS). The teams prepared their final proposal, due at the end of the five week project, as if they were analysts responding to a Request for Proposal. A template was provided for the final proposal and intermediate tasks were used to guide them in preparation of the final proposal. The participants were motivated to do a good job as the grade on the final proposal contributed a significant percentage (around 20%) to their final course grade.

Communications Media

Each team was provided with private space on a free and open-source course management system (Moodle), known to the participants as the PDT System. The system provided threaded discussion, project calendar, and file-sharing. Participants were required to post all deliverables to it, but were otherwise free to use any communication medium.

Procedures

Training and teaming tasks were designed to help the participants prepare their proposal and to guide them to work effectively in a PDT. Task related activities were completed in weeks 2,3,4, and 5; teaming activities were completed in weeks 1,2, and 3. Participants also completed a background survey, post survey, and personal reflections.

Measures

Ten 7-point semantic differential scale items were used to measure trust between subteams at the end of the five-week study. Four items were adapted from Jarvenpaa, Knoll, and Leidner (1998) and six questions were adapted from Cummings and Bromily (1996). Conflict- was measured at the end of the study by five 7-point semantic differential scale items adapted from Mortensen and Hinds (2001). Conflict scale items measured process, task, and relationship conflict. Shared identity was measured at the end of the study by three 7-point semantic differential scale items adapted from Mortensen and Hinds (2001). Perceived team performance was measured at the end of the study by ten 7-point semantic differential scale items adapted from Mortensen and Hinds (2001). (Objective performance was measured by grades awarded the projects, but these were so skewed towards high

grades that it was not useful as a variable.) Time zone differences were used to calculate the temporal distance of each subteam from their other subteam in a team. Cultural distance between subteams of a team is measured by a composite score of the scores of the five dimensions of culture proposed by Hofstede (2001). There were no Hofstede cultural scores for Lithuania. Therefore, we chose neighboring Poland as a proxy to obtain cultural dimension scores

Reliability and Validity of Constructs

Factor analysis, with varimax rotation, was performed for each construct, and reliability of the factors was assessed by Cronbach's alpha. There were one-factor solutions for Perceived performance ($\alpha = .976$), Shared identity ($\alpha = .940$) and Conflict, with one question removed ($\alpha = .906$). The results of the factor analysis of trust show a two-factor solution, identified as in previous studies as Personal Trust ($\alpha = .919$) and Process Trust ($\alpha = .748$).

RESULTS: PARTIAL LEAST SQUARES TEST OF THE MODEL

We tested the hypotheses using partial least squares (PLS) using the software application SmartPLS (Ringle, Wende, and Will, 2005). PLS is an approach to Structural Equation Modeling (SEM) with minimal demands on the measurement scales (e.g. sample size, distribution-free). While using a technique such as HLM (Hierarchical Linear Modeling) to nest individual responses within subteam and team would be desirable, our far from normal data distributions (for which transformations failed to achieve normality), do not meet the requirements for this.

Figure 1 shows the model of hypothesized relationships with the path correlations and variance accounted for by each hypothesized set of relationships. Paths were determined to be significant by using the bootstrapping technique where a path is significant if $t > 1.647$. N , for this model, was 713. Table 1 summarizes the tests for the path coefficients.

Note the high levels of relationship for the paths between shared identity and trust, shared identity and conflict, and trust with perceived performance. The R^2 value of the final outcome measure, perceived performance, was 0.587, thus indicating that 59% of the variance of perceived performance is explained by the model. Relationships between distance and conflict and distance and shared identity were not significant. All other relationships were significant at the .05 level. Thus, hypotheses H5, H6, H7, and H8 are supported while H1, H2, H3, and H4 are not supported.

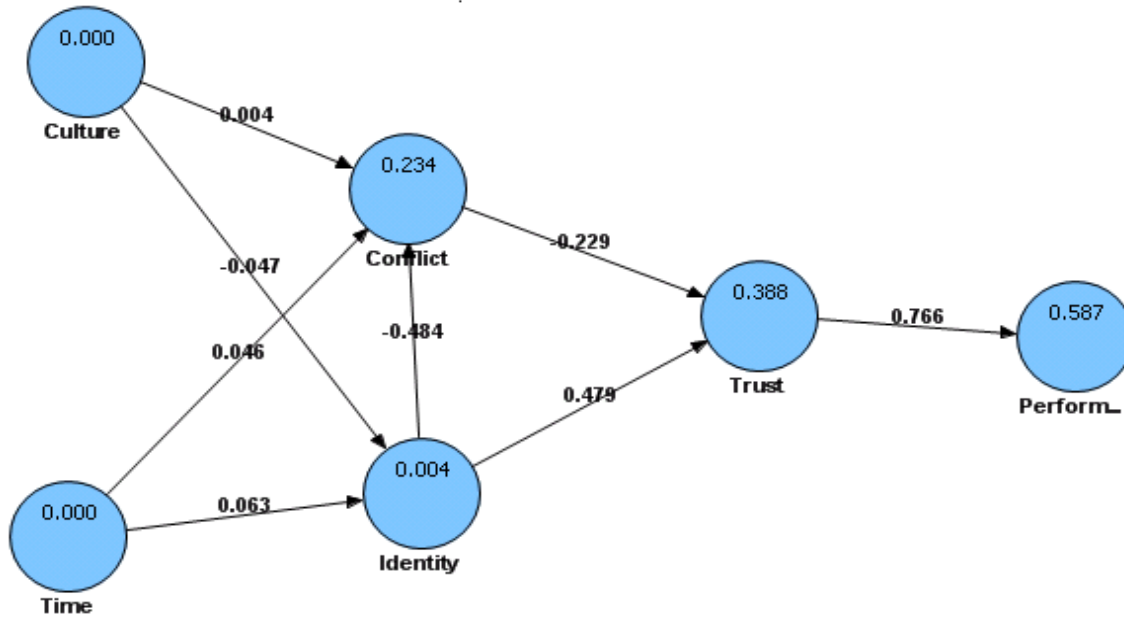


Figure 1. Model of Hypothesized Relationships

Hypothesis	β	t-statistic	Significant at .05?
H1: Cultural distance -> Conflict	0.004	0.118	NS
H2: Cultural distance -> Shared Identity	-0.047	1.120	NS
H3: Temporal distance -> Shared Identity	0.063	1.620	NS
H4: Temporal distance -> Conflict	0.046	1.202	NS
H5: Shared Identity -> Conflict	-0.484	11.976	Significant
H6: Conflict -> Trust	-0.229	4.865	Significant
H7: Shared Identity -> Trust	0.479	10.753	Significant
H8: Trust -> Perceived Performance	0.766	33.187	Significant

Table 1. Results of Hypothesis Testing by PLS

DISCUSSION AND CONCLUSIONS

In this research, support was found for the hypotheses that shared identity predicts conflict; both shared identity and conflict predict trust; and trust is a predictor of perceived performance. The lack of support for the hypotheses that distance (cultural and temporal) predicts conflict and shared identity is surprising. In this study, participants received team training with the goal of helping them work effectively across distance in a PDT. It may be that the training was effective in helping the members overcome any deleterious effects distance may have had. More research in this area is needed to see if the results are replicated and what explains them.

As with any research, limitations exist. That the subjects of this research were students may be a threat to generalizability. However, because the grade on the final proposal was a significant part of the course grade, motivation was high to produce a quality deliverable, thus alleviating some of that concern. However, an important challenge to improving the performance and productivity of a PDT in industry is that each team has slightly different interests and constraints. For example, while working on the same product, the development team cares about whether it is feasible to implement a feature, the usability team is concerned about whether this feature will be properly designed, whereas the marketing team focuses on whether having this feature will gain any market

shares over the competitors. Therefore, although the sample used in the field experiment reflected the distributed locations and the team collaboration, these undergraduate students could not properly represent the diversity of age, professional specialty, and various interests encountered in a real PDT project. The congeniality in participants' age, background, and goals in this study may also explain why strong evidence was not found to support the hypotheses #1 to #4.

What is clear from this research is that in order for teams to perform well, or at least perceive high performance, conflict should be addressed and dealt with while nascent and there need to be efforts at promoting shared identity, perhaps through team building exercises. Open communications between distant team members may be critical to achieve these goals and communications between distant team members should be encouraged. This suggests that choices of communication media need to be made with a goal of encouraging communication. Team leaders should be sensitive to, and respond quickly to signs of conflict.

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