Study the Global Virtual Team: Leadership, Trust, Training, Communication and Performance in Taiwan

Shyue-Ping Chi, Phd. student, Graduate Institute of Business Administration, Fu Jen Catholic University
Ming-Hsien Yang, Professor and Dean of College of Management, Fu Jen Catholic University
Chi-Ming Tsou, Assistant Professor of Department of Information Management, Lunghwa University of Science and Technology, Taiwan

ABSTRACT

The emergence of global teams have been caused by the globalization of the world economy. Multinational corporations carry out communication with their customers and employees in different nation, language, time zone, and geography that cause the formation of global virtual team (GVT). However, GVTs encounter many management challenges and conflicts as well. This study explores the approach of improving the effectiveness of a global team management practice. The study conducts a survey by issuing a list with 200 questionnaires to the members of global virtual teams in Taiwan. Some conclusions are as follows:

1. There is a positive relationship between leadership and decision quality, between trust and decision quality, and between training and decision quality.
2. Training has a significant positive effect on the team performance.
3. Synchronous communication has a better team performance than those of asynchronous communication.

Keywords: Global Virtual Teams, Trust, Computer-Mediated Communication, Team Performance

INTRODUCTION

Owing to the globalization of economy, which brought the new-era of cross-boundary enterprises. Taiwanese companies have also gradually moved to the internationalization in terms of resource, geography, and world market. Therefore, more and more organizations have been leveraging new technologies to foster collaboration and teamwork on the internet (Townsend et al., 1998). The organizations have established “virtual teams” where team members from location around the country, and sometimes around the world, collaborate to accomplish some tasks (Lipnack and Stamps, 2000). Virtual teams are to develop new products, conduct strategic planning reviews, support customers, and resolve other crucial organizational problems (Mohrman et al, 2003). Organizations establish virtual teams to capitalize on the diverse talents of organizational members and to save the time and travel expenses associated with gathering people in one location for meetings. Some virtual teams work at the “same time from different places” through e-mail, instant messaging, teleconferencing, and videoconferencing. Other virtual teams employ more sophisticated technologies to work at “different times from different places” using web-based work-spaces, threaded discussions, and shared document repositories (Malhotra et al. 2007). These approaches enable team members to work on common documents at their convenience and allow for the identification of individual contributions to the team’s work.

A virtual team, via various computer-based media (e.g. email, groupware) and noncomputer-based media (e.g. telephone), can interact and collaborate though separated by distance and time. However, there is no guarantee that virtual teams will always work well (Potter and Balthazard, 2002). A number of challenges exist in the virtual environment that can threaten virtual team effectiveness, include coordinating team activities, establishing effective working relationships under unseen and perhaps uncertain situation. Furst et al. (2004) observed some team members became discouraged by scheduling conflicts, missed virtual meetings, and unreturned e-mails and phone calls. Gibson and Manuel (2003) found the unknown teams allow member to provide mates, overcoming communication and cultural barriers, and substantive advice of mastering new technologies.
Although global virtual teams thereinafter refer to as GTVs) show enormous promise for global organizations, opportunities for non-conformance and dysfunctional team activities/performance are always present (Harvey, 2005). The purpose of this study is to explore the relationship between GVTs’ characteristics and performance improvement through investigating 200 global virtual teams of Taiwan enterprises.

**Global Virtual Team**

Virtual teams consist of geographically dispersed individuals who interact on interdependent tasks guided by a common purpose with links strengthened by web of communication technologies (Lipneack, 1997). Extending to global becomes the global virtual team. GVT means the virtual team works and lives in different countries (Edwards, 2005). Global team performance is also lower than the performance of virtual or co-located teams. Malhotra et al. (2007) advised on successfully managing virtual team productivity online, include establishing a virtual team charter, setting meeting blackout periods, reviewing communication etiquette, seeking team member input, creating team profiles, embracing diversity, rewarding positive team behavior, assessing team performance, and watching out for conflict. Since research on global virtual team is still in an early stage, due partly to the novelty, the performance of global virtual team is considered in this paper as an individual-level output variable, and the discussion that follows examining some of the critical virtual team factors expected to affect it. Based on virtual team research, computer mediated communication literature, and a series of in-depth interviews with a group of global virtual team leaders, three virtual team characteristics are identified as meaningful antecedents: team leaders’ leadership, trust, and training. To verify whether virtual team differs in terms of the effects of these antecedents, the property of virtual team is introduced as a moderating variable between the antecedents and the performance of global virtual team.

**Leadership**

Kayworth et al. (2001) indicated virtual team leaders act in a mentoring role and exhibit a high degree of understanding (empathy) toward other team members. At the same time, effective leaders are also able to assert their authority without being perceived as overbearing or inflexible. Therefore, effective leaders are found to be extremely effective at providing regular, detailed, and prompt communication with their peers and in articulating role relationships (responsibilities) among the virtual team members. Strang (2007) indicated the effective project team leadership theory is explored from the perspective of leader traits, skills, roles, and behaviors, project leaders exhibited self-management theory and applied specific leader behaviors according to the situation. Team leaders in particular face these challenges because they are primarily responsible for effective team management.

The practitioners among virtual team members often depend on the leaders’ efforts, such as visioning, caring for other members, goal setting, task design, or team-based incentives and devoting themselves to their virtual team. They also argued that a passionate leader can induce members to be highly committed to team activities, the actions of team leaders may not be critical for increasing team membership. Thus GVT leaders’ leadership is expected to help global virtual team members feel greater membership toward their team. We propose the following hypothesis:

Hypothesis 1: There is a positive relationship between leadership and decision quality of team performance.

**Trust**

Polzer et al. (2006) found that geographic faultlines heightened conflict and reduced trust. Stewart and Gosain (2006) indicated that trust and communication in turn impact OSS team effectiveness. Edwards (2005) indicated that trust between the teams and well-defined task structure positively influence the efficiency, effectiveness, and satisfaction level of global virtual teams. Harvey (2005) indicated that four critical capitals (i.e. human, social, political and cross-cultural) are deemed to be essential for effectiveness of GVT. Kirkman et al. (2006) found the team trust effects the relation between teams' individual training proficiency on a computer-assisted training program and team performances. Lack of trust can also affect members’ satisfaction with the team and their willingness to continue working with the team. Similarly, without a foundation of trust, members are unlikely to openly share information about problems, which can interfere with their ability to learn from team experiences. Based the trust perspective mentioned above, we propose:
Hypothesis 2: There is a positive relationship between trust and decision quality of team performance
Hypothesis 3: There is a positive relationship between trust and decision quantity of team performance
Hypothesis 4: There is a positive relationship between trust and outcome satisfaction of team performance

Training
Rosen et al. (2006) proposed the effective use training will increase high-quality virtual team performance. Some researchers suggested to generate the areas of technology training, communication and group dynamics training, and cross cultural training to improve and arise the virtual team effectiveness (Furst et al., 2004). In addition, Kirkman et al. (2006) found teams' average training proficiency had a positive association with customer satisfaction when geographically distributed teams were higher, we introduce the following two hypotheses:
Hypothesis 5: There is a positive relationship between training and decision quality of team performance
Hypothesis 6: There is a positive relationship between training and outcome satisfaction of team performance

Computer Communication
Technological mediation of organization communication has grown tremendously over past two decades (Lin et al., 2006). Daft and Lengel (1986) proposed an Information Richness Theory which was the ability of information to change understanding within a time interval. There are three critical factors for people to select the media to communication: media evaluations, task evaluation and situational factors. Usually, Computer mediated communication (CMC) rapidly becomes a common mode of interaction, it can be thought of as either synchronous or asynchronous. Synchronous CMC (also known as “interactive messaging” and popularly referred as “chat”) occurs when all parties to the communication are online at the same time. Overbaugh (2008) found asynchronous communication have quite successful at providing quality education at a distance. Ocker (2005) indicated the asynchronous communication will create the better performance of virtual teams. There are not as widely used as asynchronous methods such as e-mail and electronic bulletin boards in which electronic message transmission, storage, and access are temporally displaced (Patterson, 2000). Heninger et al. (2006) indicated the previous research shows that synchronous text discussion through group support systems can improve the exchange of information within virtual teams, but this improved information exchange usually does not improve decisions because participants fail to process the new information they receive. Kock (2001) emphasized the highly natural communication among team members, include a high degree of synchronicity the ability to observe and convey facial expressions, the ability to observe and listen to speech will enhance the virtual team performance. Summary the above theory reviewed, we proposed the hypothesis as follows:
Hypothesis 7: The relationship between team characteristic and team performance is stronger for synchronous communication than for asynchronous communication.

Survey and Data Collection
The instruments of the study are based on the global virtual team literature and on interviews with the leaders of diverse virtual team and the members of virtual teams of the largest international companies in Taiwan. Pretest was conducted with 15 companies in Taipei, Taiwan. The pretest respondents were asked to evaluate the relevance of the questionnaire items related to each variable of the study. The questionnaire was modified in accordance with the pretest feedbacks. A list of 50 virtual companies were willing to participate in the study. The leaders of the selected 44 virtual companies were contacted, and 200 paper-based questionnaires were distributed, assigning five questionnaires to each leader. The virtual team leaders were requested to randomly distribute the assigned questionnaires to five of other team members and to collect them back after completing.

From the 200 questionnaires distributed, 172 questionnaires (86%) were received. 51.7 % of the respondents communication language were English, and 23.2% were Chinese, and 19.2% were Taiwanese. 53% of the respondents were enrolled in synchronous originated virtual teams, and 47% were asynchronous originated virtual team. Detailed descriptive statistics of the respondents’ characteristics are shown in Table 1.
Measurement
Performance of Global Virtual Team
As mentioned above, the performance of GTV has three dimensions: decision quality, decision quantity, and outcome satisfaction. Decision quality is defined as “feelings of team doing their task and decision efficient. Team member get along well and easy communication”. Decision quantity is defined as “Does the GVT make decision quick? and the number of task finished in a certain period”. Outcome satisfaction reflects the GVT member’s behavior is defined as “the satisfaction to the team outcome, the problem solution, report result does it statement detail/clear, error eliminate etc.” (Salas, 1992).

Table 1: Descriptive Statistics of Respondent Characteristics

<table>
<thead>
<tr>
<th>Measures</th>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Position</td>
<td>Leader</td>
<td>81</td>
<td>47%</td>
</tr>
<tr>
<td></td>
<td>Membe</td>
<td>r</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>172</td>
<td>100%</td>
</tr>
<tr>
<td>Communi. Language</td>
<td>Taiwan</td>
<td>ese</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>89</td>
<td>51.7%</td>
</tr>
<tr>
<td></td>
<td>Chinese</td>
<td>40</td>
<td>23.2%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>10</td>
<td>5.8%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>172</td>
<td>100%</td>
</tr>
</tbody>
</table>

All dimensions of team performance were measured using a 5-point Likert scale. The Cronbach’s alpha values for decision quality, decision quantity, and outcome satisfaction were 0.925, 0.864, and 0.893, respectively.

Antecedents and Moderating Variable
The communication medium was developed based on computer-mediated communication theory (Walther, 1992). The study uses on-line and off-line activities variable which was developed based on studies related to sociology and media-richness theory (Daft, 1987).

The leaders of each virtual team provided the moderating variable, communication medium. The virtual team leaders were requested to select (1) synchronous originated virtual team or (2) asynchronous originated virtual team. The means, standard deviations, and reliabilities of all the research variables are shown in Table 2. For instance, values of mean, standard deviation, and Cronbach’s alpha of leadership were 4.323, 1.855, and 0.826, respectively.

ANALYSIS AND TESTING

Factor Analysis
Each variable was measured by multiple items, hence a factor analysis was conducted to evaluate their uni-dimensionality. To test for the construct validity of the performance of virtual team, a principal-component factor analysis was conducted with varimax rotation as well.

Table 2: Research Variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Reliability</th>
<th>items</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision Quality</td>
<td>172</td>
<td>0.902</td>
<td>4</td>
<td>4.108</td>
<td>1.857</td>
</tr>
<tr>
<td>Decision Quantity</td>
<td>172</td>
<td>0.855</td>
<td>4</td>
<td>3.193</td>
<td>1.354</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>172</td>
<td>0.871</td>
<td>4</td>
<td>4.285</td>
<td>1.406</td>
</tr>
<tr>
<td>Leader’s Leadership</td>
<td>172</td>
<td>0.826</td>
<td>3</td>
<td>4.323</td>
<td>1.855</td>
</tr>
<tr>
<td>Trust</td>
<td>172</td>
<td>0.913</td>
<td>3</td>
<td>3.296</td>
<td>1.279</td>
</tr>
</tbody>
</table>
The team performance yielded three distinct factors: decision quality, decision quantity, and outcome satisfaction. All items were loaded on each distinct factor as expected, and the factor loadings for the items were all greater than 0.600. The eigenvalues of the three factors were 5.607, 2.599, and 1.106, respectively. These three factors explained 77.6 percent of the total variance.

A principal-component factor analysis was also conducted to investigate the differences between the antecedents in terms of leaders’ leadership, trust, and training. As expected, three factors were extracted that explained 74.9 percent of the total variance with eigenvalues greater than 1.000. The three factors emerged with no cross-construct loadings above 0.500, indicating satisfactory discriminant validity. The instrument also demonstrated high convergent validity with all factor loadings exceeding 0.700. These results imply that each of the constructs in the study is unidimensional and all the items used to form a construct are loaded onto a single factor.

Hypothesis Testing

The effects of global virtual team characteristics on the performance were examined with three regression analyses. Simple correlations among the research variables are shown in Table 3. The Pearson correlation was calculated for the variables measured by interval scales. Potential multicollinearity among the antecedents was checked before the multiple regression analysis because some of the variables were significantly correlated to others (e.g., leadership and asynchronous activities). Although several variables showed significant correlations, their tolerance values ranged from 0.685 to 0.883, indicating that multicollinearity is not likely a threat to the parameter estimates.

| Table 3: Correlation Analysis Between Research Variables |
|-------------|---|---|---|---|---|
| Model       | R² | F   | β    | Results |
| Decision Quality (Q) | 0.64 | 62.563*** | Leadership | 0.274*** | H1 supported |
|              |     |     | Trust | 0.448*** | H2 supported |
|              |     |     | Training | 0.241*** | H5 supported |
| Decision Quantity (D) | 0.478 | 38.502*** | Leadership | 0.008 | — |
|              |     |     | Trust | 0.674*** | H3 supported |
|              |     |     | Training | 0.135** | — |
| Outcome Satisfaction (S) | 0.266 | 12.971*** | Leadership | -0.006 | — |
|              |     |     | Trust | 0.196 | H4 not supported |
|              |     |     | Training | -0.362*** | H6 supported |
|              |     |     | Computer Mediated | 0.245*** | — |

*p < 0.1; **p < 0.05; ***p < 0.01.

Table 4 displays the results of the multiple regression analysis with a control variable, computer mediated communication against the testing of the six hypotheses. The results indicate that the first three regression models are significant at p < 0.01 (F = 62.563, 38.502, and 12.971, respectively) and the predictors of each model explain 60 percent, 48 percent, and 24 percent of the total variance, respectively.
related to the increase of $R^2$ duals from regressing the multiple regression analysis found that $R^2$ (p < 0.01). Therefore, between-relationship between virtual team performance intervention of trust, quantity, and outcome satisfaction was effective in increasing influence for synchronous communication than for asynchronous communication ($\beta = 0.196, p < 0.01$). Therefore hypotheses 7 was supported: The relationship between virtual team characteristics and team performance is affected by the computer mediated communication. These utilized the residual centering method, which uses residuals from regressing the cross-product term on its two original component variables.

When computer mediated communication was the moderator and team performance was the dependent variable, the addition of the interaction terms with the antecedents to the regression equation yielded a significant increase in $R^2$ (F change = 5.235, p < 0.01). It is worthy to note that leaders’ leadership appeared to be more effective for synchronous communication than for asynchronous communication ($\beta = 0.137, p < 0.01$).

Similar moderated regression analyses with respect to influence yielded a 3.7 per cent increase of $R^2$ (F change = 13.906, p < 0.01). The results of the moderated regression analyses showed that the intervention of trust was more effective in increasing influence for synchronous communication than for asynchronous communication ($\beta = 0.196, p < 0.01$). Therefore hypotheses 7 was supported: The relationship between virtual team characteristics and team performance is stronger for synchronous communication than for asynchronous communication.

### CONCLUSIONS AND DISCUSSIONS

The GVT performance construct was confirmed to have three valid dimensions: decision quality, decision quantity, and outcome satisfaction. The multiple regression analyses conducted with 172 responses samples from global
virtual team members of Taiwan reveal virtual team characteristics affecting the team performance accompanied with the decision quality. Decision quality was significantly affected by leaders’ leadership, trust, and training.

Whereas outcome satisfaction was influenced only by training, perceived decision quality was significantly affected by trust. However, trust was not seemed to be a significant factor affecting outcome satisfaction.

A major finding of this study was the critical role of trust in the member performance in virtual team. Since most virtual team activities take place with synchronous communication, the trust variable was not expected to have the strong impact on team performance that was found in our results. This evidence shows that synchronous meeting plays a critical role in enhancing the inherently low social presence of computer-mediated environments. We suggest a further research is required to explore in the future.

Last, the moderated regression analyses verified that relationships between global virtual team characteristics and the team performance are moderated by computer mediated communication. The respondents from synchronous communication revealed the more medium richness, the more team performance than those from asynchronous communication.

REFERENCES


