

Trust and its Relationships with Knowledge Sharing and Virtual Team Effectiveness

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ABSTRACT

Virtual teams represent one form of organization structure that revolutionize the workplace and provide organizations with unprecedented levels of flexibility and responsiveness. However, implementing virtual teams could be quite challenging especially if it involves different languages, time zones, and communication styles. Most importantly, the autonomy of the virtual environment may cause team members to distort social and contextual information, and with limited proximal communication between team members, it can create a lack of trust among members of the virtual team members which can significantly reduce the effectiveness of these teams. Hence, this paper reports a study conducted to examine the relationship between trust and virtual teams effectiveness, by looking into the mediating effect of knowledge sharing. Results of hierarchical regression analysis indicated that knowledge sharing and all the three types of trust are significantly related to virtual team effectiveness. However, only personality-based trust and institutional-based trust are significantly related to knowledge sharing, but knowledge sharing only partially mediates the relationship between these two types of trust and team effectiveness.

Keywords: virtual team, knowledge sharing, trust, team effectiveness, virtual team effectiveness.

I INTRODUCTION

Advanced development in the world of information technology has provided the necessary infrastructure to support the development of new organizational forms. Virtual teams represent one of the forms of organization structure that revolutionize today's workplace and provide organizations with unprecedented levels of flexibility and responsiveness (Powell, Piccoli, & Ives, 2004). Virtual team also known as a geographically dispersed team, is a team formed through collection of individuals who are independent in their tasks but share responsibility for outcomes, see themselves and are seen by others as an intact social entity embedded in one or

more larger social systems, and manage their relationship across location boundaries (Cohen & Bailey, 1997). In other words, virtual team is a collection of co-workers who come from a variety of organizational departments or business units to achieve a common purpose or goal. They are often dispersed across space, time, and organizational boundaries.

Working in virtual environment, teams have a low frequency of face-to-face contact, but they collaborate through the use of emerging computer and communications technologies to accomplish a specific task or project (Cohen & Bailey, 1997). For example, team members communicate with other team members via emails, phone or teleconference. These new environmental characteristics make communication and collaboration even more critical to a team's success. In a face to face teams group, members can observe their fellow team members directly. They can see who attends meetings, or participates in conversations about projects and the group's progress; however these types of visual cues are not possible with virtual teams (Wielkie, 2008).

There are various reasons that lead organizations to adopt virtual team. Some of these reasons are: (a) to enable the hiring of the best employees which may be located anywhere in the world; (b) the needs to increase global workday to 24 versus 8 hours; or (c) to provide flexibility to support the globalization of trade and corporate activity in order to be more competitive and responsive to the marketplace.

Virtual teams face new challenges that make them more difficult to manage than traditional face-to-face teams. Challenges for virtual team members comes from the following reasons: (a) loss of many non-verbal cues; (b) reduced mechanisms for informal conversation; (c) reduced opportunities to build friendships; (d) time zone differences; (e) complicated, unreliable technology; (f) difficult to build consensus at a distance; (g) difficulty in establishing shared meaning at a distance; (h) different work processes; and (i) different cultures. Therefore, the challenges that face by virtual team

members includes difficulty in communicating effectively; members are required to work on odd hours to beat the challenges of differences in time zone and lack of trust due to the difficulty in build consensus at a distance (Nunamaker Jr., Reinig, & Briggs, 2009).

Nonetheless, in the wake of global expansion and outsourcing, organizations seek to cut the cost and working hard to minimize the hassle of bringing team members to a single location. On top of that, workers trending in demand of personal flexibility and they tend to be more productive as workings in virtual team require less commuting and travel time is another reason of the rise of virtual teams. Therefore, it is important to understand how to make virtual teams more effective (Nunamaker Jr., Reinig, & Briggs, 2009) because despite various researches have been done in the past, there is still uncertainty in relation to factors that contribute to virtual team effectiveness (DeRosa, 2009; Lin, Standing, & Liu, 2008).

One important factor that was said as crucial for virtual team success is trust, but to develop trust among virtual team members is a significant challenge since it requires interventions such as swift trust model, significant social communication as well as predictable communication patterns, substantial feedback, positive leadership, enthusiasm and early face-to-face (FTF) meetings (Piccoli, Powell, & Ives, 2004). Furthermore, Kanawattanachai and Yoo (2007) also pointed out that little is known of how virtual team members come to recognize one another's knowledge, trust one another's expertise, and coordinate their knowledge effectively. In short, most organizations that are implementing virtual teams are doing it without solid knowledge on how to make this form of organizational structure works effectively. Hence, the purpose of this study is to examine how two factors, i.e. trust and knowledge sharing relates to the effectiveness of virtual team.

II LITERATURE REVIEW

A. Virtual Team Effectiveness

First and foremost, it is important to be clear about the dimension of effectiveness that are being considered and the level at which they are being considered. This is because effectiveness at one level of analysis would interfere with effectiveness of another level. In essence, team effectiveness can be measured based on three major dimensions which are: (a) performance effectiveness assessed

in terms of quantity and quality of output; (b) member attitudes such as employee satisfaction and commitment; and (c) behavioral outcome such as absenteeism, turnover, and safety (Cohen & Bailey, 1997). In relation to that, effectiveness in a virtual team relates to the performance and satisfaction of the team members (Lin, Standing, & Liu, 2008).

B. Knowledge Sharing

In the age of knowledge economics, knowledge is seen as a critical resource. In general, knowledge sharing occurs when people who share a common purpose and experience similar problems come together to exchange ideas and information (Storey, 2001; as cited in McNeil, 2003). The process of knowledge sharing between individuals involve the conversion of the knowledge held by an individual into a form that can be understood, absorbed and used by other individuals (Ipe, 2003). It is basically a mechanism by which knowledge is transferred from one individual to another.

To enhance the value of knowledge, businesses have to promote knowledge sharing as a path to gaining competitive advantage. In more specific terms, in the context of team structure, it has been found that virtual team members are able to effectively share their knowledge due to their mutual influence, mutual commitment and mutual conflict (Wu, Lin, & Lin, 2006), and this leads to their effectiveness.

Nonetheless, for knowledge sharing to occur, trust among team members is essential (Abrams, Cross, Lesser, & Levin, 2003; Zarraga & Bonache, 2003). In the recent years, organizations rely on mobilizing more diverse sets of unevenly distributed knowledge resources through virtual teams, and effective knowledge sharing between members is more difficult in virtual teams than in traditional forms of organization. When a new virtual team is assembled for the first time, study indicates that it takes a few weeks before the members are able to fully recognize, trust, and coordinate their specialized knowledge in order to effectively perform the task (Prasert & Youngjin, 2007). Mutual commitment and conflict within the virtual team are some of the factors that influencing trust and knowledge sharing behavior (Wu et al., 2006)

C. Trust

Trust is frequently espoused as being critical to effective team processes and performance (Petersen, 2004). According to Sarker, Valacich, and Sarker, (2003) trust within virtual team can defined as the degree of reliance individuals have

on their remotely located team members taken collectively (i.e., as a group). There are total three dimensions in defining the virtual team trust, i.e. personality-based, institutional-based, and cognitive trust, with cognitive trust further subdivided into three dimensions: stereotyping, unit grouping, and reputation categorization.

Recent findings suggested that building trust in a virtual environment is problematic due to the fact that team members usually have no common past and no future to reference as a base to build trust, and have never even met face-to-face in the past. Building trust in virtual teams is complicated because time and geographical distance precludes most synchronous communication. The controls and coordination individuals are accustomed to in collocated team encounters are often lacking in a virtual environment, making trust development difficult. (Powell, Galvin, & Piccoli, 2006).

Furthermore, some researcher found that virtual teams has found five distinct stages: (1) establishing the team, (2) inception, (3) organizing, (4) transition, and (5) accomplishing the task. The challenge for managers and team leaders is to encourage the development of trust initially and to nurture trust throughout the team's life. This challenge is particularly daunting because evidence indicates that trust is based on different assessments at different stages in the team's life (Greenberg, Greenberg, & Antonucci, 2007). Nevertheless, durability of virtual teamworking depends largely on commitment and personal trust relationships, which may gradually dissipate over time without collocated, face-to-face social interactions (Nandhakumar & Baskerville, 2006).

In a trusting environment, people tend to believe that their behavior will result in favorable consequences because others are able to collaborate with them and are willing to extend assistance. When people trust one another, they believe that others are willing and able to share their knowledge, and that they will develop an obligation to share (Staples & Webster, 2008). As a result, they will share knowledge in order not to violate that obligation. Previous research also supported the impact of trust on knowledge sharing in virtual community (Zhang, Fang, Wei, & Chen, 2010). In short, it is argued that trust is of high importance in ensuring the occurrence of knowledge sharing between virtual team members, and also the effectiveness of virtual teams.

III RESEARCH FRAMEWORK

There are three main variables in this study. The dependent variables is virtual team effectiveness, trust within the team as the independent variable with knowledge sharing as the mediating variable and independent variable. The trust variable is consisted of three dimensions, they are personal based trust, institutional based trust and cognitive based trust. The relationships of the mentioned variables are depicted in Figure 1.

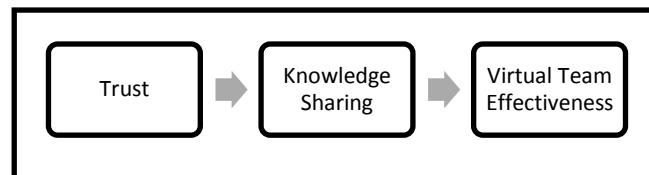


Figure 1 Research Framework

In order to test for mediation, there is a need to show that there is a significant relationship between trust and virtual team effectiveness, trust and knowledge sharing, and finally knowledge sharing and virtual team effectiveness (Baron & Kenny, 1986). As such, based on these requirements and the literatures reviewed, in this study it is hypothesized that:

- H1: *There is a significant positive relationship between trust (personal-based, institutional-based, and cognitive-based) and virtual team effectiveness.*
- H2: *There is a significant positive relationship between trust (personal-based, institutional-based, and cognitive-based) and knowledge sharing.*
- H3: *There is a significant positive relationship between knowledge sharing and virtual team effectiveness.*
- H4: *Knowledge sharing mediates the relationship between trust (personal-based, institutional-based, and cognitive-based) and virtual team effectiveness.*

IV RESEARCH METHODS

This is a quantitative study whereby data is collected in a cross-sectional manner using questionnaires. For further clarification on the formation and implementation of the virtual teams an unstructured interview were conducted with several respondents.

A. Data Collection Instruments

The questionnaire contains items for measuring three types of trust (personality-based, institutional-

based and cognitive-based), knowledge sharing and virtual team effectiveness. The items for measuring virtual team effectiveness (VTE) is adapted from Lurey and Raisinghani's (2001) study. This instrument contains nine items and it captures and quantifies the level of team performance and satisfaction. For measuring the three types of trust, the instrument developed by Sarker, Valacich and Sarker (2003) was used. This instrument consists of four items for measuring personality-based trust (PBT), six items for measuring institutional based trust (IBT) and seven items for measuring cognitive-based trust (CBT). Finally, the five items for measuring knowledge sharing (KS) is adopted from a research by Staples and Webster (2008). Cronbach alpha coefficient was calculated to determine the reliability of this instrument, and the result is shown in Table 1. All variables are measured with 4 points scale, whereby 1 represents "strongly disagree", 2 represents "disagree", 3 represents "agree", and 4 represents "strongly agree". One item from the knowledge sharing instrument is excluded from the analysis as it reduce the reliability of the instrument.

Table 1 Cronbach Alpha and Descriptive Statistics

Variables	α	Mean	S. D.
VTE	0.802	2.058	0.283
Trust			
<i>PBT</i>	0.678	2.056	0.330
<i>IBT</i>	0.822	2.055	0.343
<i>CBT</i>	0.919	2.150	0.428
KS	0.802	2.008	0.348

B. The Respondents

The study was conducted at a multinational company located at the northern region of Malaysia. There are about 9300 employees working at this company, but only about 2838 employees worked in virtual environment. A total of 338 questionnaires were randomly distributed to these employees (Krejcie & Morgan, 1970). The random sampling procedure were conducted using EXCEL

(http://www.public.iastate.edu/~vardeman/book_site/excel/random_sample/random_sample.html).

However, only 167 were returned, and 61 of them were discarded due to incomplete responses. Hence, only 106 questionnaires were used for data analysis.

In general, 13.2% of the respondents are the team leads or project managers, while the rest are individual contributors or in other words virtual

team members. 55.7% of the respondents indicated that they are currently involved in project teams. When the virtual team formed as project team, the team existence is for the purpose of completing a project for a defined period of time. Tasks are usually non-routine, the results are specific and measurable and the team has the decision making authority. 44.3% of the total respondents are involved in functional teams and when the virtual team formed as functional team, the team members are usually from one function and perform regular and ongoing work in one function.

V RESEARCH FINDINGS

Table 2 shows the correlations between the variables and it demonstrates that multicollinearity is not a problem since the largest correlation is 0.635, which is below the .80 cutoff point recommended by Nunnally(1978).

Table 2 Correlations of Variables

Variables	1	2	3	4	5
VTE	1.00				
Trust					
<i>PBT</i>	0.624**	1.00			
<i>IBT</i>	0.635**	0.595**	1.00		
<i>CBT</i>	0.489*	0.465**	0.470**	1.00	
KS	0.619**	0.473**	0.502**	0.361**	1.00

Multiple regression analysis was used to test the hypothesis. Steps were taken to ensure that all assumptions for multiple regression, mainly normality, linearity, constant variance of the error terms and independent of the error terms, were met. Results of this analysis are presented in Table 3.

Table 3 Results of Multiple Regression Analysis

IV \ DV	Hyp 1	Hyp 2	Hyp 3	Hyp 4
	VTE (β)	KS (β)	VTE (β)	VTE with KS (β)
Trust				
<i>PBT</i>	0.334***	0.214*		0.291**
<i>IBT</i>	0.358***	0.310**		0.294**
<i>CBT</i>	0.165*	0.103		
KS			0.619***	
R^2	0.517	0.307	0.384	0.575
Adj. R^2	0.502	0.286	0.378	0.563
F-Value	36.335***	15.029***	64.710***	46.040***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As shown in Table 3, all three trust dimensions, specifically personal-based trust, institutional-based trust and cognitive-based trust, are significant predictors of virtual team effectiveness. In fact, the results showed that, these three types of trust explain 50% variance in virtual team effectiveness. Therefore, Hypothesis 1a, 1b and 1c are supported. However, results also indicated that only personal-based trust and institutional-based trust are significant predictors of knowledge sharing. Hence, Hypothesis 2 is partially supported, whereby Hypothesis 2a and 2b are supported while Hypothesis 2c is not supported. Knowledge sharing is a significant predictor of virtual team effectiveness ($\beta=.619$, $p<.001$), and hence Hypothesis 3 is supported.

Finally, to test the mediation effect of knowledge sharing on the relationship between trust and virtual team effectiveness, the four step approach suggested by Baron and Kenny (1986) were applied. This procedure is applied to the relationship between personal-based trust and institutional-based trust, and virtual team effectiveness only as cognitive based trust is not a significant predictor of knowledge sharing. As shown in Table 3, knowledge sharing is only a partial mediator to these relationships.

VI DISCUSSION AND IMPLICATIONS

The purpose of this study was to examine the relationship between three dimensions of trust (i.e. personal-based, institutional-based and cognitive-based) and virtual team effectiveness, and also investigating the role of knowledge sharing as a mediator to this relationship. Indeed, it was found that the current study concurs with previous findings (Sarker, Valacich, & Sarker, 2003; Staples, et al, 2005), whereby these three types of trust are very important in ensuring virtual team effectiveness.

Virtual team members work in a very special hi-tech environment. As is with any conventional team, each member is highly dependent on other team members in order to complete the task or project that is assigned to them. However, unlike the conventional team, virtual team members do not frequently meet face-to-face or sometimes do not meet at all, and as such they are unable monitor each other's work directly. Working in such an environment requires a lot of trust among the members because without trust, conflict might arise and this can jeopardize the success of the team.

Personal-based trust is the type of trust that develops over time, during which an individual knows the other person better and better. As suggested by the current study, the performance or effectiveness of a virtual team could be improved or impaired by the level of personal-based trust between the team members within a virtual team. Unfortunately, members of virtual teams do not get to meet each other often or possibly not at all, and therefore developing such trust could be very difficult. Nonetheless, it is still crucial for virtual team effectiveness. Therefore, building trust at the personal level between virtual team members and maintaining rapport could be done through regular communication between team members via email, audio conference and other types of communication devices.

As institutional based trust is playing a significant role in impacting the virtual effectiveness, formal team structure to enable knowledge sharing will help in improving the knowledge sharing between team members in virtual team. For example, setting up a virtual team repository such as Windows SharePoint Services helps to encourage team members to share knowledge

The current study also found that cognitive based trust was significantly associated with virtual team effectiveness. Cognition-based trust is built by self-perception and self-interest on the cues of performance and the fact of accomplishments through direct interactions with a partner. The basis of cognition-based trust is cognitive reasoning (McAllister as cited in Kim, 2005). Therefore, the current study implied that self-perception or self-interest of team members are important aspects of trust that cannot be neglected.

In relation to knowledge sharing, the results of regression analysis in this study indicates that personal-based trust and institutional-based trust weresignificantly related to knowledge sharing. However, cognitive-based trust is not considered as the predictor of knowledge sharing behavior as the coefficient value is not significant. The finding partially supports the findings by Staples (2008) that to achieve the same level of sharing, trust may have to be higher in distributed teams, and the degree of trust can affect the sharing of knowledge. Therefore, it is important for the virtual team to invest effort in building trust within the virtual team members during the start-up of a virtual team and continue to sustain the trust relationship between the team members to enhance practice of knowledge sharing within the virtual team. It is

also suggested that in order to encourage knowledge sharing structure, it is important to develop more platforms that cultivates institutional-based trust.

Finally, findings also indicated that knowledge sharing only partially mediates the relationship between personal-based and institutional-based trust, and virtual team effectiveness. In essence, this means that both personal-based and institutional-based trusts not only affect virtual team effectiveness directly, but they also cause virtual team members to share knowledge with each other and this enhances the teams' effectiveness.

In short, efforts must be put in to build trust in virtual team and subsequently maintaining it to achieve the intended effectiveness of a virtual team. Regular pulsing of trust level in the team helps to give guides on action needed to sustain trust in virtual team. DeRosa (2009) suggested that to enhance the virtual team effectiveness, leaders of virtual teams should consider the following guidelines, grouped into two categories: Team Processes, Communication, and Technology and Support, Engage and Recognition, focus on moving from task based trust to interpersonal trust by communicating openly and honestly, leading by example, employing consistent team interactions, and being accessible and responsive.

VII CONCLUSION

This study contributes to the growing literature on the influence of trust and knowledge sharing on the virtual team effectiveness. It provides empirical evidence to support the conceptual model that link virtual team effectiveness with trust and knowledge sharing. Specifically, this study identifies that team effectiveness are positively associated with trust and knowledge sharing. This finding also provides a guide to the organization to continue work on organization support structures that increase trust, which will then, helps to promote knowledge sharing and finally brings up the virtual team effectiveness. Knowledge sharing was found to be positively related to virtual team effectiveness and it is also a mediator in the relationship between trust and virtual team effectiveness.

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