

Leveraging the Benefits of Multiple-Team Membership in Virtual Teams

Short Paper

Xinlin Yao

School of Management, Fudan
University
Shanghai, China
xinliny@fudan.edu.cn

Lionel P. Robert, Jr.

School of Information, University of
Michigan, Ann Arbor
Ann Arbor, Michigan, United States
lprobert@umich.edu

Abstract

Multiple-team membership (MTM), defined as simultaneous involvement in multiple teams, is becoming prevalent in organizational practice and may escalate two tensions that are crucial to team performance. However, only a handful studies directly address the effect of MTM and fewer concerned the virtual context. Theories on MTM proposed that its effects would occur and countervail through various social-cognitive processes, but few studies provided empirical evidence. In this study, we will apply theories from MTM and team learning to explain the influences of MTM on virtual team performance, emphasizing the mediating role of the creative team process. Furthermore, we will investigate the concurrent influences of MTM in the virtual context, an area that has not been studied. Two characteristics of virtual teams — geographic dispersion and reliance on electronic communication — could moderate the relationship between MTM and the creative team process. We will conduct a survey to empirically examine this proposed model.

Keywords: Multiple-team membership, virtual teams, creative process, geographic dispersion, electronic communication, team performance

Introduction

Multiple-team membership (MTM) in virtual teams is an important and understudied topic. MTM refers to teams having members who are on more than one team simultaneously (O’Leary et al., 2011). Prior researchers on virtual teams often assumed that team members were on only one team (for an exception see Cummings and Hass, 2012). MTM has been a prevalent arrangement that co-occurs within virtual teams. It was reported that that 65% to 95% of knowledge workers were members of more than one team at the same time in the United States and Europe (Mortensen et al., 2007; O’Leary et al., 2011; Zika-Viktorsson et al., 2006). Organizations adopt MTM because it allows for more efficient allocation of resources and facilitates knowledge transferring across teams and organizations (Bertolotti et al., 2013; Milgrom and Roberts, 1992).

However, multiple-team membership may escalate two tensions that are crucial to team performance. First, MTM may escalate the tension between more accessible information resources and limited team attentions. Theories on MTM have asserted that its effects were countervailing and occur through various social cognitive processes (Hinsz et al., 1997; O’Leary et al., 2011; Wilson et al., 2007). On one hand, MTM may

have positive impacts on teamwork. As MTM increases, teams have potentials to access to more sources of unique knowledge derived from their members' experiences with other teams (O'Leary et al., 2011; Wilson et al., 2007). On the other hand, MTM may also lead to negative impacts on teamwork. As MTM increases, it becomes more difficult for teams to share and integrate these unique sources of knowledge (O'Leary et al., 2011; Wilson et al., 2007). Second, MTM may escalate the tension between needs of more efficiently getting access to team members who are not physically collocated and in more complex coordinating sets. Scholars have recognized that MTM was more common in virtual teams than in collocated teams (Cummings and Hass, 2012). Despite this, little research has addressed the effects of MTM in virtual teams. The concurrent arrangement of MTM and virtuality creates a complex setting of interplays of new organizing forms, geographic dispersion, and technology-mediated communication that are more complex than previously theorized and understudied yet.

Although previous studies provided some insights, they failed to include any potential mediators that might capture the effects of MTM on team performance, especially in the virtual context. The importance of including a mediator lies in untangling exactly how MTM arrangements would be translated into team performance. Furthermore, considering the virtual context would provide answers to when geographic dispersion and reliance on electronic communication may support rather than hinder MTM in virtual teams. This is particularly important because despite some negative effects of dispersion and electronic communications (see Bertolotti et al., 2015; Cummings and Hass, 2012), both have been shown to facilitate the social cognitive processes associated with the benefits of MTM (Dennis, 1996; Siegel et al., 1986). Mixed previous findings suggested that we did not sufficiently understand the impacts of either geographic dispersion or electronic communication on the theories used to explain the effects of MTM. Given the unstudied tensions that would be escalated by MTM and the lack of theorizing regarding MTM in virtual teams, it is imperative for IS scholars to further explore the impacts of MTM in the virtual team context.

To fill this void, we will examine (1) the creative team process as the mediator to link the team-level MTM and the virtual team performance, and (2) the moderation effects of geographic dispersion and reliance on electronic communication on the relationship of the team-level MTM and the creative team process. Creative team processes represent the novelty associated with the way the team accomplishes its work (Drazin et al. 1999). Creative team processes materialize through collaborative and creative actions based on the ideas and perspectives of a team's members (Tiwana and McLean, 2005), which can be used to represent the degree to which teams are exploiting the unique knowledge derived from MTM. This is because we should expect knowledge from MTM to benefit a team when it is linked to alternative and imaginative approaches to carrying out that team's work. In addition, by examining the moderation effects of geographic dispersion and electronic communication, we can determine whether they support or hinder the social cognitive processes needed to leverage the benefits of MTM.

To achieve our purpose, we proposed a model based on theories of MTM. We will empirically test this model by administering a survey for members of geographically dispersed project teams. This study will make several theoretical contributions by providing a deeper understanding of MTM in virtual teams. We identify the creative team process as a key mediator of the impact of MTM on virtual team performance. In doing so, we will contribute to the literature by opening the black box to show how the effect of MTM translates into team performance in virtual teams. This study will extend theories related to MTM by further clarifying the role of geographic dispersion and electronic communications, which would have important managerial implications as well.

Theoretical Background and Hypotheses

Our research model was presented in Figure 1 and indicated the mediating role of the creative team process between MTM and virtual team performance. Two characteristics of virtual teams — geographic dispersion and reliance on electronic communication — moderated the effects of MTM on the creative team process.

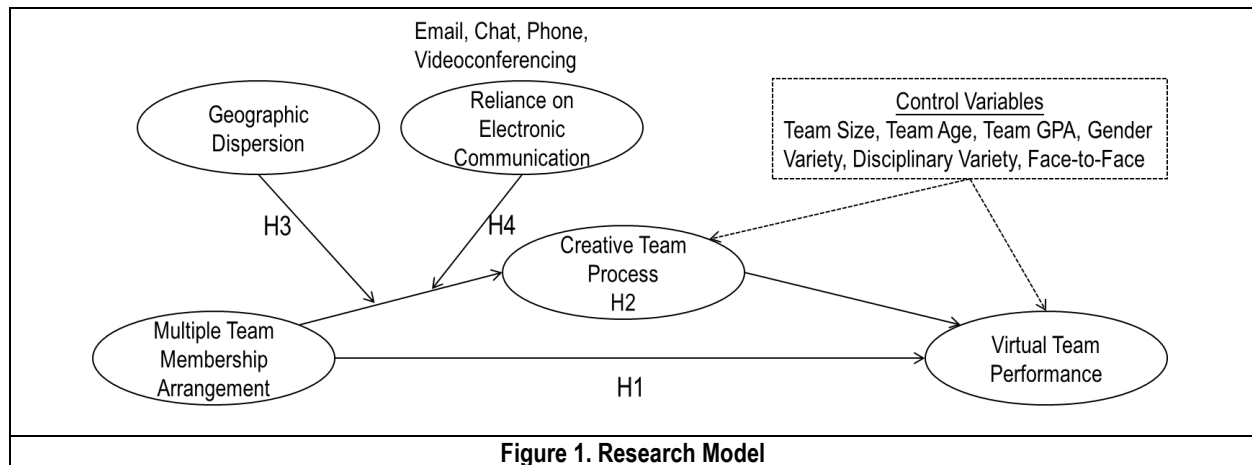


Figure 1. Research Model

Multiple-team Membership and Virtual Team Performance

Theories on MTM have asserted that its effects were countervailing and occur through various social cognitive processes. These social cognitive processes were often related to some form of knowledge-sharing and integration (Hinsz et al., 1997; O’Leary et al., 2011; Wilson et al., 2007). This idea has also been used to explain why teams can perform better than individuals (Dennis, 1996). Research has shown that teams were often more creative and more effective decision-makers than individuals because they have access to more unique knowledge (Harrison and Klein 2007). When a team considered all the unique knowledge from its members, it would yield a more comprehensive understanding of a problem or situation and generates more creative and viable solutions to address a problem or situation (Okhuysen and Eisenhardt 2002).

However, there is no guarantee that teams will benefit from access to more and unique knowledge. Knowledge can only benefit a team if it was processed through various socio-cognitive processes, such as integration and application (Dennis, 1996). Both knowledge integration and application were important components in the creative process (Gilson and Shalley, 2004; Zhang and Bartol, 2010). Knowledge integration entails the process of sharing and combining members’ knowledge so that the team reaches a shared or common understanding to draw from when making decisions (Robert et al., 2008). Knowledge application involves putting the knowledge into operation. Knowledge integration allows teams to make sense of their members’ knowledge while knowledge application ensures that the knowledge translates into actionable outcomes.

Knowledge integration is particularly important as MTM increases in teams. In the case of MTM, each member has the potential to provide a unique perspective on how work can be accomplished (Chan, 2014). Knowledge integration allows teams to convert their members’ unique individual knowledge to common team knowledge. This unique knowledge in MTM is often procedural knowledge on ways of accomplishing work or addressing problems that arise throughout the team’s tenure (O’Leary et al., 2011). To integrate this knowledge, teams must merge multiple interpretations of the work processes provided by their members (Mathieu et al., 2000; Robert et al., 2008). This process is aided by the degree to which members already have a common ground to facilitate communications (Krauss and Fussell, 1990). But once this is achieved teams can derive new insights from their members’ knowledge (Kraut et al., 2002). In the case of MTM, teams will not only be able to compare approaches to determine which are more effective but will also be able to create new approaches to accomplishing work.

Knowledge application can be thought of as employing knowledge to achieve a particular goal or objective. Teams have to apply new insights gained from knowledge integration to actually benefit from their knowledge (Robert et al., 2008). Knowledge application can be rather simple when teams are applying knowledge derived from one context to a similar context (O’Leary et al., 2011). However, it can also be rather complex when teams have to apply knowledge from one context to a different context (Chan, 2014). Knowledge application requires some degree of experimentation and learning (Tiwana and McLean, 2005). When teams are able to fully leverage their knowledge this often translates into the application of more and novel ideas and approaches (Gilson et al., 2005).

Research on team creativity and decision-making has consistently shown that teams are more likely to be more creative and make better decisions when they integrate and apply their members' unique knowledge (Dahlin et al., 2005; Dennis, 1996; Robert et al., 2008; Van Knippenberg et al., 2004). Likewise, when teams fail to accomplish their unique knowledge they are unable to leverage it for effective performance (Kraut et al., 2002; Mathieu et al., 2005; Robert et al., 2008). Unless teams integrate and apply their members' unique knowledge, they fail to optimize their potential as a team (Homan et al., 2008; Kearney et al., 2009). Therefore, it is no surprise that knowledge integration and application have been linked to team outcome variables such as software quality, team creativity, product innovation and decision quality (Hilmer and Dennis, 2001; Lin and Chen, 2006; Tiwana and McLean, 2005).

Although MTM benefits team performance, there should be a point above which an increase in MTM actually challenges knowledge integration and application, thereby reducing team performance. The challenges for teams are best described by integrative complexity theory. Theories of integrative complexity posit that integrative complexity is a function of the amount and diversity of information needed to integrate, the time given to integrate it and the emotional and attentional resources available during knowledge integration (Driver and Streufert, 1969; Suedfeld, 2010). In general, as the amount and diversity of information increase, the availability of time and emotional and attentional resources decrease and integrative complexity increases. As integrative complexity increases, teams are not able to integrate knowledge. When this occurs, increases in knowledge should be negatively related to team performance. Therefore, at high levels of integrative complexity, additional knowledge drags down team performance (Driver and Streufert, 1969).

Integrative complexity is brought on by very high levels of MTM, making it difficult for teams to integrate knowledge for several reasons. One, these teams have more members who hold different mental frameworks regarding how work should be done (Dahlin et al., 2005). This requires teams to integrate not only more information but more ways of thinking in the form of mental frameworks (Robert et al., 2008). This in turn increases the effort needed to reconcile the differences between these mental frameworks and to understand how to apply new mental frameworks. At very high levels of MTM, these teams have less common ground to aid them in this pursuit (Grisé and Gallupe, 1999). Two, these teams have less opportunity to meet to process this information (Cummings and Haas, 2012). This is because as the number of members on multiple teams increases it becomes harder for teams to find times to meet to engage in knowledge integration and application (O'Leary et al., 2011). Teams high in MTM have to integrate more knowledge in the limited time they do have to meet. This essentially increases the integration complexity by providing less time for teams to integrate and apply their knowledge (Eppler and Mengis, 2004). Three, as the number of members on multiple teams increases the team's attentional and emotional resources decrease (Cummings and Hass, 2012). For example, switching among teams can strain the attentional and emotional resources of teams. Members of teams high in MTM must manage multiple tasks requiring them at time to hold different roles among teams (Chan, 2014). They also have to manage multiple sets of relationships within each team. This increases the possibility of having to handle conflicts that could develop in any team. This leaves less mental and emotional energy to integrate and apply unique knowledge. We therefore hypothesize:

Hypothesis 1 (H1). MTM has an inverted U-shaped effect on virtual team performance.

The Mediating Role of Creative Team Processes

"Creative team process" refers to team members' creativity-relevant methods and processes for connecting knowledge from multiple sources, delving into unknown areas to find better solutions to a problem, or generating novel ways of performing a task (Amabile, 1996; Drazin et al., 1999; Gilson and Shalley, 2004; Torrance, 1988). Although most literature has defined creativity as an outcome in examinations of the production of novel and useful ideas concerning products and services (Amabile, 1996; Shalley et al., 2000; Srinivasan et al., 2012; Zhou, 1998), more studies have shifted to emphasizing the value of creative processes whereby individuals come to develop creative ideas (Drazin et al., 1999; Gilson and Shalley, 2004; Zhang and Bartol, 2010).

In the context of MTM, we expect a positive relationship between creative team processes and virtual team performance. Successful performance typically requires the incorporation of novel and useful ideas, especially for complex work (Alnuaimi et al., 2009; Srinivasan et al., 2010, 2012; Drazin et al. 1999). At the team level, the engagement of creative processes has long been proposed as an important driver of team

performance (Kanter, 1988; Woodman et al., 1993), yet empirical evidences were limited. For instance, Gilson et al. (2005) found that teams that sought out novel and different approaches to work have higher performance. Knowledge-intensive teams with creative processes that allow more variety and experimentation have been found to have improved team performance (Anand et al. 2003; Gersick and Hackman, 1990; Newell et al., 2008; Robert and Romero, 2015). In MTM teams, members have to switch among project teams that are characterized by different tasks, members, technologies and routines (O'Leary et al., 2011), which would provide great potentials to generate innovative ideas and bring in new perspectives (Drazin et al., 1999; Gilson and Shalley, 2004; Reiter-Palmon and Illies, 2004). For instance, analogical thinking, a creative approach that enables people transfer knowledge across settings, has been showed to facilitate innovation and increase performance when applied across boundaries and contexts (Gassmann and Zeschky, 2008; Holyoak and Thagard, 1995). Previous creativity literature has showed that analogical thinking was a basic mechanism underlying creative process, in which people transfer information from a familiar or existing setting and use it for the construction of new ideas in the new setting (Dahl and Moreau, 2002; Gassmann and Zeschky, 2008). First, analogies are the basis for developing new connections between divergent ideas. Searching analogies involve comparing divergent ideas by drawing on existing knowledge, thus it shaping new ways of understanding problems (Hargadon, 2002; Harvey, 2014). Second, searching analogies enhance team communication by helping members reframing and reshaping their ideas back and forth, which leads to more creative ideas (Harvey, 2014). As a result, we expect engagement in analogical thinking or other creative activities would enable MTM members to enjoy the cross-fertilization of ideas, knowledge, and solutions across team contexts, which eventually would improve virtual team performance.

We further expect that MTM has an inverted U-shaped effect on engagement of the creative team process for several reasons. First, MTM will facilitate engaging in the creative team process because it allows team members to provide a broader range of knowledge to the focal team than could be had if members were on a single team, and this is a necessary condition for creative processes (Gilson and Shalley, 2004; Woodman et al., 1993). Previous literature has emphasized that a particularly important characteristic for creative processes is the amount of knowledge team members could access for a task (Gilson and Shalley, 2004). This was because diverse knowledge provided more useful components that in turn led to more ingenious exchanges and greater attempts to combine innovation ideas (Taylor and Greve, 2006). On the contrary, creativity would be dampened if all team members drew from the same pool of information, and there would be little value in the exchange and the integration process (Amabile, 1988). Further, MTM will facilitate engaging in the creative process due to the increased complexities (Amabile et al., 1996) compared to the single-team context. Empirical evidence has shown that increased complexity would motivate individuals to respond to the complexity by developing more creative ideas (Shalley et al., 2004). According to the team information-processing theory and team-learning literature, the diversity and complexity of input in teams would enhance team cognition and encourage engagement in creative processes (Amabile et al., 1996; Hinsz et al., 1997; O'Leary et al., 2011; Wilson et al., 2007). Hence, dynamics and complexities from MTM would motivate team members to engage in the creative process to seek out more relevant information or adopt new practices to respond to problems.

However, increased number of MTM not only brings benefits to teams, but also undermines the creative process for two reasons. First, the positive effect of increasing MTM would reach a saturation point because the introduced knowledge becomes too diverse to relate and integrate (Dahlin et al., 2005; O'Leary et al., 2011). Previous studies found that analogical thinking was beneficial only when participants recognized the similarity between the analogy and target problem (Holyoak, 1984; Reeves and Weisberg, 1994). Therefore, beyond the saturation point, new information or knowledge gained from MTM would become too diverse to identify analogies that could be applied, which eventually lowered the team learning rate and led to withdrawal from creative activities. Second, high levels of MTM would lead to excessive workload and frequent switching that exhaust members' attentions. The creative process is a complex phenomenon that concerns many time-consuming and strenuous cognitive activities like problem identification, information retrieval and encoding, and alternative generation (Reiter-Palmon and Illies, 2004). Empirical evidences have shown that engaging in the creative process requires dedicated cognitive effort and that lack of time for those activities impairs their quality and originality (Hampton, 1997; Redmond et al., 1993; Reiter-Palmon et al., 1997). Therefore, when switching among teams occurs too frequently because of high levels of MTM, it will consume members' attentions and impair their abilities to process and encode information, resulting in withdrawal from the creative process.

Taken together, MTM will facilitate engagement of the creative team process because team members may get access to a broader range of knowledge and embrace the increased complexities to some extent. Beyond the point, team members will withdrawal from the creative team process due to the low effectiveness and inadequate attentions. Thus, we hypothesize that:

Hypothesis 2 (H2). Creative team process will partially mediate the inverted-U shaped effect between MTM and virtual team performance, specifically, MTM has an inverted U-shaped effect on creative team processes, and creative team process is positively related to virtual team performance.

The Moderating Role of Geographic Dispersion

Geographic dispersion has been widely recognized as a fundamental component of virtual teams (Cummings, 2004; Gibson and Gibbs, 2006; Kirkman and Mathieu, 2005) and could be conceptualized in the spatial, temporal, and configurational dimension (O’Leary and Cummings, 2007). Despite the significance of geographic dispersion, studies of geographic dispersion in relation to MTM were still scant. To our knowledge, only Cummings and Haas (2012) empirically explored the moderating effect of geographic dispersion on the relationship between MTM and team performance. Their results indicated that MTM had a strong positive effect on team performance in collocated teams but was weakly related to team performance in dispersed teams, suggesting that collocated teams benefit more from MTM than dispersed teams do.

However, we focus on the spatial dimension of geographic dispersion and expect that geographic dispersion will attenuate the negative effect of MTM in terms of the creative team process. The first reason is because increased physical distance would reduce the likelihood of face-to-face communication among team members, which provided more time and flexibility for members to deal with the complexity caused by MTM. Previous studies have shown that engaging in the creative process is time-consuming and required dedicated cognitive efforts, while lacking time for those creative activities would impair the quality and originality of the creative process (Hampton, 1997; Redmond et al., 1993; Reiter-Palmon et al., 1997; Reiter-Palmon and Illies, 2004). Furthermore, communication through virtual media due to geographic dispersion could decrease influences of social norms and group pressures that inhibit information sharing (Mesmer-Magnus et al., 2011), which was essential to the creative process. Therefore, geographically-dispersed teams should be more likely to effectively engage in the creative team process than collocated teams in response to intermediate MTM. Second, increased geographic distance among team members would improve the analogical learning that could facilitate knowledge integration and application across team contexts. According to construal-level theory (Trope and Liberman, 2010; Trope et al., 2007), people would construe targets (e.g., persons, events, objects) at higher levels when they were more psychologically distant. Spatial and temporal distances are two fundamental dimensions that contribute to increasing psychological distance. Per the construal-level theory, high-level construals are schematic, decontextualized representations that convey core and essence (Trope et al., 2007). Previous studies have emphasized that analogical learning would be beneficial only when participants recognized the similarity between the analogy and the target problem (Holyoak, 1984; Reeves and Weisberg, 1994), suggesting the requirement of abstraction and decontextualization. Therefore, geographically dispersed teams are more likely to effectively engage in the creative team process compared with collocated teams in response to intermediate MTM. Taken together, we hypothesize that (see Figure 2a):

Hypothesis 3 (H3). Geographic dispersion moderates the inverted-U shaped relationship between MTM and the creative team process such that dispersed teams will more effectively engage in the creative team process in response to intermediate MTM than teams are collocated.

The Moderating Role of Electronic Media

The reliance on technology-mediated communication is another fundamental component of virtual teams (Gibson and Gibbs, 2006; Kirkman and Mathieu, 2005), and electronic communication tools (e.g., e-mail, telephone, chat, videoconferencing) are increasingly used in organizations to support collaboration and knowledge transfer among individuals and teams (Bélanger and Allport, 2008; Munson and Robert, 2014; Robert and You, 2013; Wakefield et al., 2008). Despite the long tradition of focusing on electronic communication in virtual teams, few studies have examined the moderating role of electronic media in the

MTM literature, with one exception (Bertolotti et al., 2015), indicating the need for a fuller picture concerning the influences of both MTM and virtual contexts.

In this study, we expect the use of electronic media, particularly asynchronous media (i.e. e-mail), to moderate the relationship between MTM and the creative team process. On one hand, using asynchronous media would reduce the influences of cues, social distances, and group pressures that can inhibit interpersonal communication (Dennis and Kinney, 1998; Mesmer-Magnus et al., 2011) and lead to “groupthink” (Janis, 1982). Through asynchronous media, MTM members could share innovative knowledge or bring different perspectives into the focal team, which would lead to engaging in the creative team process. On the other hand, using asynchronous media could improve the team capacity of information processing to deal with the increased complexity caused by MTM. According to the theory of media synchronicity (Dennis et al., 2008), media differ in their capacity to transmit and process information, thus users would benefit from media whose capabilities fit the requirements of communication processes. Asynchronous media (i.e. e-mail) are proposed to be characterized with having high parallelism, high rehearsability, and high reprocessability but low synchronicity (Dennis et al., 2008). As a result, using asynchronous media would enable team members to carefully encode, store and process information, and then simultaneously transmit that information to multiple receivers; in that way, asynchronous media would allow MTM members to have more time to process and integrate relevant knowledge, and collaborate more effectively. Therefore, we hypothesize that (see Figure 2b):

Hypothesis 4 (H4). Asynchronous media (i.e. e-mail) use moderates the inverted-U shaped relationship between MTM and the creative team process such that teams that highly use asynchronous media will more effectively engage in the creative team process in response to intermediate MTM than teams that use asynchronous media less.

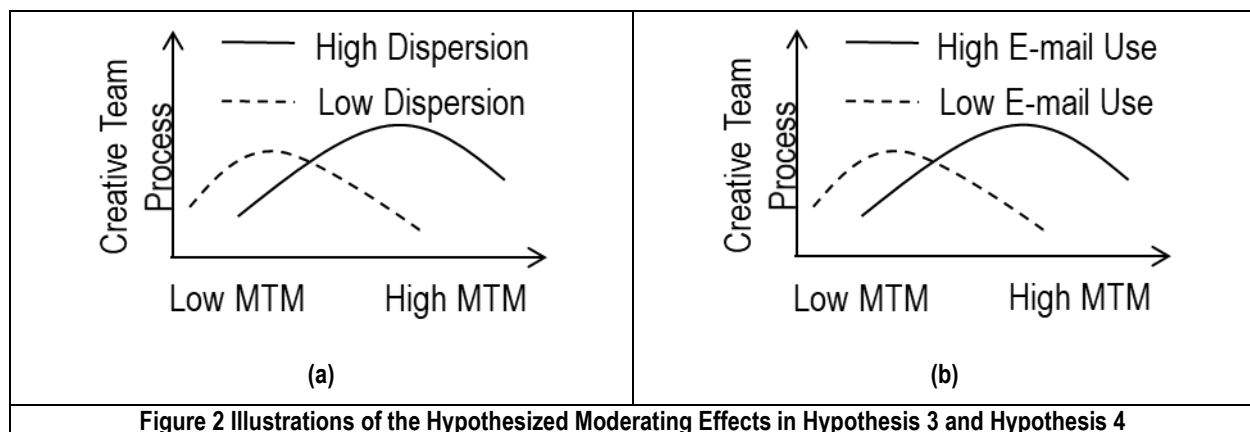
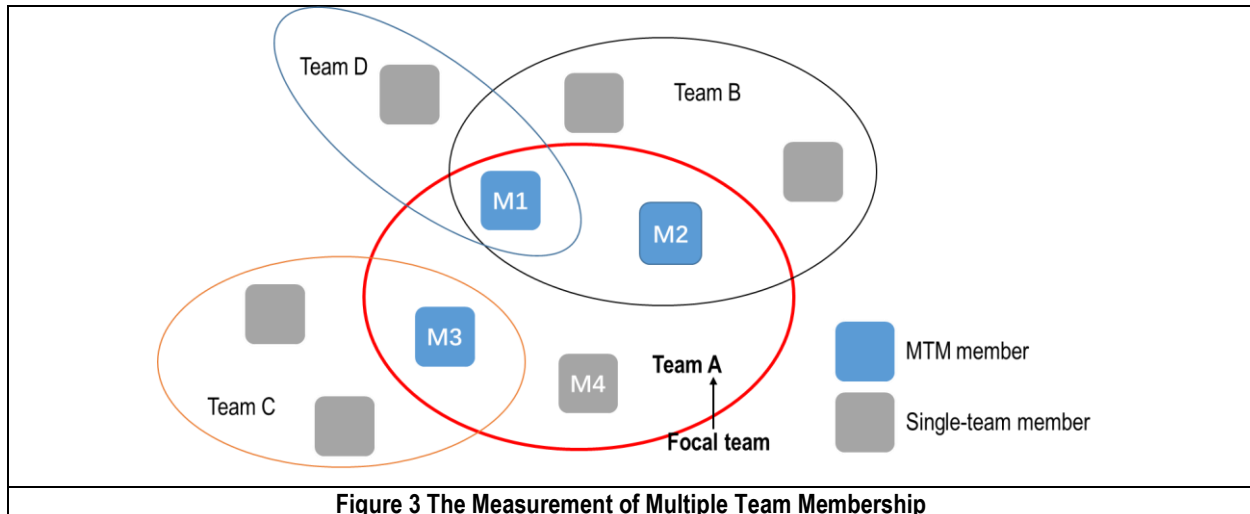


Figure 2 Illustrations of the Hypothesized Moderating Effects in Hypothesis 3 and Hypothesis 4

Methodology

We intended to target virtual IS development teams of a single organization as the subjects because the projects usually required to leverage various information and knowledge that were embedded in individuals. Furthermore, it is common that some individuals will involve multiple projects simultaneously in a given period. To empirically test this proposed model, we will conduct the analysis at the team level. In addition, all members of a team will be surveyed to generate the team-level scores of studied variables. Next, we discuss in detail the measurements to be used in this study.

Independent Variables. We will operationalize the team-level MTM as a measurement of the number of unique and overlapping teams in which focal team members are simultaneously involved. We will measure multiple-team membership as depicted in Figure 3, where in terms of the focal Team A, there are three MTM members who are involved in at least one team other than Team A, for example. In this way, we can see that three unique teams (teams B, C, and D) are overlapped with the focal Team A because of MTM members. Therefore, the level of MTM is 3 for Team A, indicating members of Team A have potential to leverage knowledge from three other teams and deal with the corresponding complexity as well.



We will also measure the creative team process. To do so, we will employ three items adapted from Tiwana and McLean (2005), who took a process perspective to define team creativity. An example item is, “Our team frequently experiments with alternative ways to carry out our work.” These items will be rated using a 5-point scale.

Geographic dispersion is a multidimensional concept in virtual team research, and physical distance is the most commonly used dimension of dispersion in previous literature (O’Leary and Cummings, 2007). Thus, we will employ the geographic distance to measure geographic dispersion in this study. We will employ spatial index in O’Leary and Cummings (2007) to measure average geographic distance at the team level. We will calculate distance by measuring direct line distance between home ZIP codes provided by team members.

To measure the reliance on electronic communication tools, we will ask participants to assess their interactions through e-mail, chat, phone calls, and videoconferencing on frequency, openness, and scale of information-sharing using items adapted from Banker et al. (2006).

Dependent Variable To minimize potential common method biases (Podsakoff et al. 2003), we will ask the external managers to assess team performance for each team on quality, work excellence and overall achievement with the 5-point scale (Van Der Vegt and Bunderson 2005).

Control Variables We will control for several characteristics of virtual teams that prior research identified as potentially influencing team performance and creative processes. For instance, greater face-to-face communication among team members is thought to facilitate trust-building and improve interpersonal relationships. We will control team idiosyncrasies like team size, members’ average age and grade point average. We will use the Blau index (1977) to measure gender variety and disciplinary variety, which are the most commonly employed measures for variety (Harrison and Klein, 2007). However, the sample size might limit the number of control variables we can employ.

Conclusion

Multiple-team membership (MTM), defined as being simultaneously involved in multiple teams, is becoming prevalent in organizational practice. Multiple-team membership could be a source of both opportunity and challenges because it may escalate two tensions that are crucial to team performance. However, only a handful studies directly addressed the effect of MTM on team performance, and even fewer have investigated MTM in the context of virtual teams. The purpose of this study is to provide a deeper understanding of how and under what conditions multiple-team membership impacts virtual team performance. To answer these questions, we apply theories from MTM and team learning to propose a research model to explain the influences of the team-level MTM on virtual team performance, and the mediating role of the creative process. Furthermore, we expect that two fundamental features of virtual teams — geographic dispersion and reliance on electronic communication — will moderate the relationship

between the team-level MTM and the creative team process. That is, higher levels of geographic dispersion and reliance on asynchronous communication will help members to have higher levels of engagement in the creative process.

We expect this study will make several theoretical contributions. First, it will contribute to theory by shedding additional lights on the relationship between MTM and team performance. Second, it will contribute to theory on MTM by identifying a key mediator to explain the theoretical linkage between MTM and team performance. Third, through this study we will extend current theories regarding MTM to the context of virtual teams by clarifying the boundary conditions of its effect on the creative team process associated with both geographic dispersion and reliance on electronic communication. Finally, this study will contribute to the literature on virtual teams by enriching the understanding of team creativity from a process perspective.

References

- Alnuaimi, O., Robert, L., and Maruping, L. 2009. "Social loafing in brainstorming CMC teams: The role of moral disengagement," *System Sciences, (HICSS). 42nd Hawaii International Conference on*, IEEE, pp. 1-9.
- Anand, V., Clark, M.A., and Zellmer-Bruhn, M. 2003. "Team knowledge structures: Matching task to information environment," *Journal of Managerial Issues* (15:1), pp. 15-31.
- Amabile, T.M. 1988. "A model of creativity and innovation in organizations," *Research in Organizational Behavior* (10:1), pp. 123-167.
- Amabile, T.M. 1996. *Creativity in context: Update to the social psychology of creativity*. Boulder, CO: Westview.
- Amabile, T.M., Conti, R., Coon, H., Lazenby, J., and Herron, M. 1996. "Assessing the work environment for creativity," *Academy of Management Journal* (39:5), pp. 1154-1184.
- Banker, R.D., Bardhan, I., and Asdemir, O. 2006. "Understanding the impact of collaboration software on product design and development," *Information Systems Research* (17:4), pp. 352-373.
- Bélanger, F., and Allport, C.D. 2008. "Collaborative technologies in knowledge telework: an exploratory study," *Information Systems Journal* (18:1), pp. 101-121.
- Bertolotti, F., Mattarelli, E., Mortensen, M., O'Leary, M., and Incerti, V. 2013. "How many teams should we manage at once? The effect of multiple team membership, collaborative technologies, and polychronicity on team performance," *International Conference on Information Systems*. Association for Information Systems, Milan, Italy.
- Bertolotti, F., Mattarelli, E., Vignoli, M., and Macrì, D.M. 2015. "Exploring the relationship between multiple team membership and team performance: The role of social networks and collaborative technology," *Research Policy* (44:4), pp. 911-924.
- Blau, P.M. 1977. *Inequality and heterogeneity: A primitive theory of social structure*, New York: Free Press.
- Chan, K. 2014. "Multiple project team membership and performance: empirical evidence from engineering project teams," *South African Journal of Economic and Management Sciences* (17:1), pp. 76-90.
- Cummings, J.N., and Haas, M.R. 2012. "So many teams, so little time: Time allocation matters in geographically dispersed teams," *Journal of Organizational Behavior* (33:3), pp. 316-341.
- Cummings, J.N. 2004. "Work groups, structural diversity, and knowledge sharing in a global organization," *Management Science* (50:3), pp. 352-364.
- Dahl, D.W., and Moreau, P. 2002. "The influence and value of analogical thinking during new product ideation," *Journal of Marketing Research* (39:1), pp. 47-60.
- Dahlin, K.B., Weingart, L.R., and Hinds, P.J. 2005. "Team diversity and information use," *Academy of Management Journal* (48:6), pp. 1107-1123.
- Dennis, A.R. 1996. "Information exchange and use in small group decision making," *Small Group Research* (27:4), pp. 532-550.
- Dennis, A.R., and Kinney, S.T. 1998. "Testing media richness theory in the new media: The effects of cues, feedback, and task equivocality," *Information Systems Research* (9:3), pp. 256-274.
- Dennis, A.R., Fuller, R.M., and Valacich, J.S. 2008. "Media, tasks, and communication processes: A theory of media synchronicity," *MIS Quarterly* (32:3), pp. 575-600.

- Drazin, R., Glynn, M.A., and Kazanjian, R.K. 1999. "Multilevel theorizing about creativity in organizations: A sensemaking perspective," *Academy of Management Review* (24:2), pp. 286-307.
- Driver, M.J., and Streufert, S. 1969. "Integrative complexity: An approach to individuals and groups as information-processing systems," *Administrative Science Quarterly* (14:2), pp. 272-285.
- Eppler, M.J., and Mengis, J. 2004. "The concept of information overload: A review of literature from organization science, accounting, marketing, MIS, and related disciplines," *The Information Society* (20:5), pp. 325-344.
- Gassmann, O., and Zeschky, M. 2008. "Opening up the solution space: the role of analogical thinking for breakthrough product innovation," *Creativity and Innovation Management* (17:2), pp. 97-106.
- Gersick, C.J., and Hackman, J.R. 1990. "Habitual routines in task-performing groups," *Organizational Behavior and Human Decision Processes* (47:1), pp. 65-97.
- Gibson, C.B., and Gibbs, J.L. 2006. "Unpacking the concept of virtuality: The effects of geographic dispersion, electronic dependence, dynamic structure, and national diversity on team innovation," *Administrative Science Quarterly* (51:3), pp. 451-495.
- Gilson, L.L., and Shalley, C.E. 2004. "A little creativity goes a long way: An examination of teams' engagement in creative processes," *Journal of Management* (30:4), pp. 453-470.
- Gilson, L.L., Mathieu, J.E., Shalley, C.E., and Ruddy, T.M. 2005. "Creativity and standardization: complementary or conflicting drivers of team effectiveness?" *Academy of Management Journal* (48:3), pp. 521-531.
- Hampton, J. A. 1997. "Emergent attributes in combined concepts," In *Creative thought: An investigation of conceptual structures and processes*, Washington, D. C., APA, pp. 83-110.
- Hargadon, A.B. 2002. "Brokering knowledge: Linking learning and innovation," *Research in Organizational behavior* (24), pp. 41-85.
- Harrison, D.A., and Klein, K.J. 2007. "What's the difference? Diversity constructs as separation, variety, or disparity in organizations," *Academy of Management Review* (32:4), pp. 1199-1228.
- Harvey, S. 2014. "Creative synthesis: Exploring the process of extraordinary group creativity," *Academy of Management Review* (39:3), pp. 324-343.
- Hilmer, K.M., and Dennis, A.R. 2001. "Stimulating thinking in decision making: cultivating better decisions with groupware one individual at a time," *Journal of Management Information Systems* (17:3), pp. 93-114.
- Hinsz, V.B., Tindale, R.S., and Vollrath, D.A. 1997. "The emerging conceptualization of groups as information processors," *Psychological Bulletin* (121:1), pp. 43-64.
- Holyoak, K.J. 1984. "Analogical thinking and human intelligence," *Advances in the Psychology of Human Intelligence* (2), pp. 199-230.
- Holyoak, K.J., and Thagard P. 1995. *Mental Leaps*. Cambridge, MA: MIT Press
- Homan, A.C., Hollenbeck, J.R., Humphrey, S.E., Van Knippenberg, D., Ilgen, D.R., and Van Kleef, G.A. 2008. "Facing differences with an open mind: Openness to experience, salience of intragroup differences, and performance of diverse work groups," *Academy of Management Journal* (51:6), pp. 1204-1222.
- Janis, I.L. 1982. *Groupthink: Psychological Studies of Policy Decisions and Fiascoes*. 2d ed. Boston: Houghton Mifflin.
- Kanter, R. M. 1988. "When a thousand flowers bloom: Structural, collective, and social conditions for innovation in organizations," In *Research in Organizational Behavior*, vol. 10. Greenwich, CT: JAI Press.
- Kearney, E., Gebert, D., and Voelpel, S.C. 2009. "When and how diversity benefits teams: The importance of team members' need for cognition," *Academy of Management Journal* (52:3), pp. 581-598.
- Kirkman, B.L., and Mathieu, J.E. 2005. "The dimensions and antecedents of team virtuality," *Journal of Management* (31:5), pp. 700-718.
- Krauss, R.M., and Fussell, S.R. 1990. "Mutual knowledge and communicative effectiveness," *Intellectual Teamwork: Social and Technological Foundations of Cooperative Work*, pp. 111-146.
- Kraut, R.E., Fussell, S.R., Brennan, S.E., and Siegel, J. 2002. "Understanding effects of proximity on collaboration: Implications for technologies to support remote collaborative work," *Distributed Work*, pp. 137-162.
- Lin, B., and Chen, C. 2006. "Fostering product innovation in industry networks: the mediating role of knowledge integration," *The International Journal of Human Resource Management* (17:1), pp. 155-173.

- Grisé, M., and Gallupe, R.B. 1999. "Information overload: Addressing the productivity paradox in face-to-face electronic meetings," *Journal of Management Information Systems* (16:3), pp. 157-185.
- Mathieu, J.E., Heffner, T.S., Goodwin, G.F., Cannon Bowers, J.A., and Salas, E. 2005. "Scaling the quality of teammates' mental models: Equifinality and normative comparisons," *Journal of Organizational Behavior* (26:1), pp. 37-56.
- Mathieu, J.E., Heffner, T.S., Goodwin, G.F., Salas, E., and Cannon-Bowers, J.A. 2000. "The influence of shared mental models on team process and performance.," *Journal of Applied Psychology* (85:2), p. 273.
- Mesmer-Magnus, J.R., DeChurch, L.A., Jimenez-Rodriguez, M., Wildman, J., and Shuffler, M. 2011. "A meta-analytic investigation of virtuality and information sharing in teams," *Organizational Behavior and Human Decision Processes* (115:2), pp. 214-225.
- Milgrom, P. and J. Roberts. 1992. *Economics, Organization and Management*, Englewood Cliffs, NJ: Prentice Hall.
- Mortensen, M., Woolley, A.W., and O Leary, M. 2007. "Conditions enabling effective multiple team membership," in: *Virtuality and virtualization*, Springer, pp. 215-228.
- Munson, S.A., Kervin, K., and Robert, L.P. 2014. "Monitoring email to indicate project team performance and mutual attraction," *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*, ACM, pp. 542-549.
- Newell, J., Maruping, L., Riemenschneider, C., and Robert, L. 2008. "Leveraging e-identities: The impact of perceived diversity on team social integration and performance," *ICIS 2008 Proceedings*, p 46.
- O'Leary, M.B., and Cummings, J.N. 2007. "The spatial, temporal, and configurational characteristics of geographic dispersion in teams," *MIS Quarterly* (31:3), pp. 433-452.
- O'Leary, M.B., Mortensen, M., and Woolley, A.W. 2011. "Multiple team membership: A theoretical model of its effects on productivity and learning for individuals and teams," *Academy of Management Review* (36:3), pp. 461-478.
- Okhuysen, G.A., and Eisenhardt, K.M. 2002. "Integrating knowledge in groups: How formal interventions enable flexibility," *Organization Science* (13:4), pp. 370-386.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J., and Podsakoff, N.P. 2003. "Common method biases in behavioral research: a critical review of the literature and recommended remedies.," *Journal of Applied Psychology* (88:5), pp. 879-903.
- Redmond, M.R., Mumford, M.D., and Teach, R. 1993. "Putting creativity to work: Effects of leader behavior on subordinate creativity," *Organizational Behavior and Human Decision Processes* (55:1), pp. 120-151.
- Reeves, L., and Weisberg, R.W. 1994. "The role of content and abstract information in analogical transfer.," *Psychological Bulletin* (115:3), pp. 381-400.
- Reiter-Palmon, R., and Illies, J.J. 2004. "Leadership and creativity: Understanding leadership from a creative problem-solving perspective," *The Leadership Quarterly* (15:1), pp. 55-77.
- Reiter-Palmon, R., Mumford, M.D., O'Connor Boes, J., and Runco, M.A. 1997. "Problem construction and creativity: The role of ability, cue consistency, and active processing," *Creativity Research Journal* (10:1), pp. 9-23.
- Robert Jr, L.P., Dennis, A.R., and Ahuja, M.K. 2008. "Social capital and knowledge integration in digitally enabled teams," *Information Systems Research* (19:3), pp. 314-334.
- Robert, L., and Romero, D.M. 2015. "Crowd size, diversity and performance," *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, ACM, pp. 1379-1382.
- Robert, L., and You, S. 2013. "Are you satisfied yet? Shared leadership, trust and individual satisfaction in virtual teams", *iConference 2013 Proceedings*, pp. 461-466.
- Shalley, C.E., Gilson, L.L., and Blum, T.C. 2000. "Matching creativity requirements and the work environment: Effects on satisfaction and intentions to leave," *Academy of Management Journal* (43:2), pp. 215-223.
- Shalley, C.E., Zhou, J., and Oldham, G.R. 2004. "The effects of personal and contextual characteristics on creativity: Where should we go from here?" *Journal of Management* (30:6), pp. 933-958.
- Siegel, J., Dubrovsky, V., Kiesler, S., and McGuire, T.W. 1986. "Group processes in computer-mediated communication," *Organizational Behavior and Human Decision Processes* (37:2), pp. 157-187.
- Srinivasan, S., Maruping, L. M., and Robert, L. P. 2010. "Mechanisms Underlying Social Loafing in Technology Teams: An Empirical Analysis," *ICIS 2010 Proceedings*, 183.

- Srinivasan, S., Maruping, L.M., and Robert, L.P. 2012. "Idea generation in technology-supported teams: A multilevel motivational perspective," *System Science (HICSS), 45th Hawaii International Conference on*, IEEE, pp. 247-256.
- Suedfeld, P. 2010. "The cognitive processing of politics and politicians: Archival studies of conceptual and integrative complexity," *Journal of Personality* (78:6), pp. 1669-1702.
- Taylor, A., and Greve, H.R. 2006. "Superman or the fantastic four? Knowledge combination and experience in innovative teams," *Academy of Management Journal* (49:4), pp. 723-740.
- Tiwana, A., and McLean, E.R. 2005. "Expertise integration and creativity in information systems development," *Journal of Management Information Systems* (22:1), pp. 13-43.
- Torrance, E.P. 1988. "The nature of creativity as manifest in its testing," In *The Nature of Creativity*, New York: Cambridge University Press, pp. 43-75.
- Trope, Y., and Liberman, N. 2010. "Construal-level theory of psychological distance.," *Psychological Review* (117:2), pp. 440-463.
- Trope, Y., Liberman, N., and Wakslak, C. 2007. "Construal levels and psychological distance: Effects on representation, prediction, evaluation, and behavior," *Journal of Consumer Psychology* (17:2), pp. 83-95.
- Van Der Vegt, G.S., and Bunderson, J.S. 2005. "Learning and performance in multidisciplinary teams: The importance of collective team identification," *Academy of Management Journal* (48:3), pp. 532-547.
- Van Knippenberg, D., De Dreu, C.K., and Homan, A.C. 2004. "Work group diversity and group performance: an integrative model and research agenda.," *Journal of Applied Psychology* (89:6), pp. 1008-1022.
- Wakefield, R.L., Leidner, D.E., and Garrison, G. 2008. "Research Note—A Model of Conflict, Leadership, and Performance in Virtual Teams," *Information Systems Research* (19:4), pp. 434-455.
- Wilson, J.M., Goodman, P.S., and Cronin, M.A. 2007. "Group learning," *Academy of Management Review* (32:4), pp. 1041-1059.
- Woodman, R.W., Sawyer, J.E., and Griffin, R.W. 1993. "Toward a theory of organizational creativity," *Academy of Management Review* (18:2), pp. 293-321.
- Zhang, X., and Bartol, K.M. 2010. "The influence of creative process engagement on employee creative performance and overall job performance: a curvilinear assessment.," *Journal of Applied Psychology* (95:5), pp. 862-873.
- Zhou, J. 1998. "Feedback valence, feedback style, task autonomy, and achievement orientation: Interactive effects on creative performance.," *Journal of Applied Psychology* (83:2), pp. 261-276.
- Zika-Viktorsson, A., Sundström, P., and Engwall, M. 2006. "Project overload: An exploratory study of work and management in multi-project settings," *International Journal of Project Management* (24:5), pp. 385-394.