

Investigating the Impact of Boundaries on Knowledge Sharing in Global Virtual Teams

Research-in-Progress

Navneet Chattha

Cleveland State University

Monte Ahuja School of Business

Department of Computer and Information Science

n.chattha@vikes.csuohio.edu

ABSTRACT

The sharing of knowledge is critical in the virtual team configurations that mainly interact and coordinate through information and communication technologies. However, multiple boundaries are assumed to exist within virtual teams that may pose several challenges to effective knowledge sharing. This study distinguishes between functional, organizational, and cultural boundaries and investigates their impact on knowledge sharing practices in global virtual teams. Drawing from shared mental model and media synchronicity literature, this study also aims to identify the potential moderators that can influence this relationship. The implications for research and practice are discussed and provide insights into how virtual teams can be structured so that there is effective knowledge sharing between the team members.

Keywords

Knowledge sharing, global virtual teams, boundaries, shared mental model, media synchronicity

INTRODUCTION

Increasing globalization and advances in the technologies has led to the emergence of global virtual team (GVT) structures in many organizations. GVTs are structures where team members work across cultural, geographical, time and several other boundaries (Espinosa, Cummings, Wilson, and Pearce, 2003; Kankanhalli, Tan, and Wei, 2006). The existence of multiple boundaries in GVTs can both pose opportunities as well as challenges to effective teamwork. Because of greater diversity, GVTs draw upon greater sources of knowledge leading to creative problem solving and new idea generation (Griffith, Sawyer, and Neale, 2003; Kirchmeyer and Cohen, 1992). Regardless of the geographic location, organizations can form teams based upon best talent, skills and expertise available anywhere around the globe. However, as the organizations span multiple boundaries, giving firms access to wide array of intellectual resources, they also reduce the opportunities for face-to-face-interactions and thus reduce team cohesion and trust among team members (Malhotra, Majchrzak, and Rosen, 2007). The lack of face-to-face interactions in virtual teams can also give rise to various team and task related conflicts (Maruping and Agarwal, 2004) that can impact knowledge sharing practices. These issues are further aggravated when members of a team possess different educational backgrounds, professional skills, expertise and experiences.

To enhance knowledge sharing in teams, first it is important to study how diverse backgrounds of team members can affect knowledge sharing in virtual team structures. Existing research in virtual teams has mainly focused on coordination and control (see Piccoli, Powell, and Ives, 2004), conflicts arising within the virtual teams (see Maruping et al., 2004), identification of team member with the group or organization (see Wiesenfeld, Raghuram, and Garud, 1999), and trust building mechanisms (see Jarvenpaa and Leidner, 1999). While addressing the dimensions of virtuality, prior studies have mostly considered the spatial, configurational, temporal, and cultural dispersions in the team. There are limited studies that have addressed functional and organizational boundaries in knowledge sharing context.

Although, cultural dispersion has been investigated in multiple studies, its impact has mostly examined using Hofstede's cultural dimensions. This study instead considers Hall's contextual theory which categorizes the cultures into high-context (HC) and low-context (LC) according to the communication patterns of different members. Therefore, by providing a communication-oriented perspective on culture, this theory can provide a useful insight into how knowledge can be shared among members from different cultures with varying communication styles.

This research also identifies mental model of task, mental model of team, and media synchronicity as potential factors that moderate relationship between multiple boundaries and knowledge sharing. In doing so, it draws from the shared mental

model theory and media synchronicity to present a framework that incorporates these theoretical backgrounds. To the best of our knowledge, no prior study has theorized and empirically investigated how functional, organizational, and cultural boundaries interact with task and team mental models, and media synchronicity in their effects on knowledge sharing.

THEORETICAL BACKGROUND

Knowledge Sharing

Knowledge sharing is defined as the process of locating distributed knowledge in an organization and transferring it to another context where it is needed (Alavi and Leidner, 2001). Prior studies have shown that knowledge sharing is critical for effective functioning of a team (Staples and Webster, 2008) and can enhance the organizational performance (Velmurugan, Kogilah, and Devinaga, 2010).

Unlike traditional teams, communications in GVTs are mostly carried through electronic media with minimal or no face-to-face interactions. This can pose several challenges in effective knowledge sharing within the team. Moreover, GVTs are often short lived and assembled to address specific needs of the organizations (Chase, 1999). To fulfill the specific needs in limited duration of time, sharing of knowledge is critical in virtual teams. Despite its importance, very few studies have empirically investigated the process of knowledge sharing in global virtual team context (Cummings, 2004; Majchrzak, Rice, King, Malhotra, and Ba, 2000; Rafaeli and Ravid, 2003; Sole and Edmondson, 2002). This study attempts to address this research gap by studying the factors that impact knowledge sharing in GVTs.

Boundaries

Boundaries have been conceptualized as discontinuities in aspects of team's configuration, tasks, and relationships with other team members (Espinosa et al., 2003). Several studies have shown that there are multiple boundaries that can exist at same point of time like geographic, temporal, functional, identity, organizational, expertise related, cultural, historical, social and political (Espinosa et al., 2003). For example, Jehn et al. (1999) studied the impact of informational, social and value diversity on team outcomes. Their findings suggest that different forms of diversity evoke different forms of conflicts which can impact team performance. While studying virtual teams across spatial, temporal and cultural boundaries, Jarvenpaa et al. (1999) examined how trust is developed in global virtual teams. Similarly, other studies have investigated configurational and national boundaries (O'Leary and Cummings, 2007; Gibson and Gibbs, 2006) along with spatial, temporal and cultural boundaries (Aubert, Rivard, and Templier, 2011; Gopal, Espinosa, Gosain, and Darcy, 2011). Kankanhalli et al. (2006) investigated the role of cultural and functional diversities on conflicts and outcomes of team within GVTs. Their findings suggest that cultural diversities more likely to impact task and relationship conflict while functional diversities result in task conflicts. Similarly, few studies have also examined the role of cross-cultural boundaries on knowledge sharing culture (Zakaria, Amelinckx, and Wilemon, 2004; Velmurugan et al., 2010). Apparently, none of the studies have investigated functional, organizational, cultural boundaries, and knowledge sharing together in GVT context. Hence this research attempts to bridge that gap by developing and proposing a conceptual framework which focuses on examining the impact of aforementioned boundaries on knowledge sharing.

Functional Boundaries

Functional boundaries are said to be present in virtual teams when more than one area of functional expertise such as marketing, engineering, and manufacturing work together (Denison, Hart, and Kahn, 1996). These boundaries arise due to difference in educational background of team members, their work experiences, training, skills, and area of expertise (Jehn, Northcraft, and Neale, 1999; Kankanhalli et al., 2006). Functional boundaries increase the possibility of existence of diverse perspectives and opinions in a team.

Organizational Boundaries

Organizational boundaries are said to be present in a virtual team when its members belong to more than one organization (Espinosa et al., 2003). One of the critical factors that hold virtual teams together in any organization is organizational identity (Wiesenfeld et al., 1999). Identity refers to the norms and conventions that team members utilize to coordinate their behavior that in turn creates opportunities for sharing knowledge. Organizational identification is important in virtual organizations for motivating members and coordinating their efforts by increasing trust and cooperation between team members. Given that organizational boundaries are often under examined in research, it is important to investigate its effects on knowledge sharing.

Cultural Boundaries

GVTs can consist of team members from HC and LC cultures. According to contextual theory (Hall, 1976), individuals from HC cultures rely on external environment for behavioral cues and possess indirect communication styles. Individuals from

LC cultures rely on more direct communication and are explicit in their communication. Since previous studies have mainly focused on Hofstede's cultural dimensions (1991), it is worth exploring the cultural boundary through the lens of contextual theory and its impact on knowledge sharing.

Shared Mental Model Theory

The theory of shared mental models has long been used in many research studies. Shared mental models are defined as "knowledge structures held by members of a team that enable them to form accurate explanations and expectations for the task, and, in turn, to coordinate their actions and adapt their behaviors to demands of the task and other team members" (Cannon-Bowers and Salas, 1993, pg. 228). Shared mental models can refer to shared representations of tasks, equipment, working relationships and situations (Mohammed and Dumville, 2001). According to Mathieu et al. (2000), shared mental models are required to allow team members to draw on their previously held knowledge for performing actions that are consistent and coordinated with other team members. Researchers have proposed that multiple types of mental models exist among team members and have categorized these mental models into four types: equipment, task, interaction, and team mental models (Klimoski and Mohammed, 1994). However, to further simplify the concept of shared mental models, Mathieu et al. (2000) categorized them into two domains: task mental models and team mental models.

Task mental model

Task mental model represents the necessary knowledge required to perform a particular task in team. According to Cannon-Bowers et al. (1993), task models describe and organize knowledge about how the task is accomplished in terms of procedures, task strategies, likely contingencies or problems, environmental constraints and task component relationships (Cannon-Bowers, Salas, and Converse, 1993). This study investigates that when team members have shared understanding of technical concepts, similar terminologies, procedures, and task approaches; how this mental model facilitates team members in sharing their knowledge with other team members.

Team mental model

Team mental model represents information about other team members' knowledge, skills, their preferences, attitudes, strengths, weaknesses, tendencies, division of work and roles/responsibilities and so forth (Mathieu, Heffner, Goodwin, Salas, and Cannon-Bowers, 2000). Team mental models help team members to create a shared vision and common objectives. Further, they also have accurate perceptions of what other team members know, making knowledge sharing between members easier and effective.

Media Synchronicity

Virtual teams are highly dependent on electronic communication media to interact with other team members. Media synchronicity refers to the capabilities of a communication media that enable individuals to achieve synchronicity (Dennis, Fuller, and Valacich, 2008). A medium allows for high synchronicity when it has a high transmission velocity, offers more natural symbol sets, and has symbol sets better suited to the task at hand (Zigurs and Buckland, 1998), while at the same time having a lower degree of parallelism, rehearsability and reprocessability. As stated by Dennis et al. (2008), the use of different media capabilities is highly dependent on the context being studied. In some contexts, higher synchronicity media is beneficial, while in other contexts, media with lower synchronicity is appropriate. This article will investigate the use of higher and lower synchronicity media when functional, organizational, and cultural boundaries are present in virtual teams.

RESEARCH MODEL AND PROPOSITIONS

Functional Boundaries

When there is functional diversity in virtual teams, team members have different educational backgrounds, priorities, and approaches towards issues and opportunities. According to similarity-attraction theory people prefer similarity in their interactions (Byrne and Wong, 1962). In fact people may choose to associate with certain others because they have similar personalities. Similarly, team members are more likely to share knowledge with members that have similar understanding and backgrounds. For example, a team member from business background will like to interact and share knowledge more often with another member with similar background rather than with a member from engineering background. According to Espinosa et al. (2007), to coordinate collective action in a team, team members need to have certain level of overlap in their individual knowledge bases. Teams may also face difficulties in sharing knowledge due to differences in priorities, concerns and the terminology used in discussing various issues (Kauppila et al., 2011). Similarly, in another case study, Dougherty (1992) identified cross-functional teams as one of the barriers in new product innovation and argued that since team members from different departments have different funds of knowledge, sharing of ideas among them is difficult. Therefore, it is

argued that due to lack of mutual knowledge bases, GVTs that are functionally diverse will have difficulty in sharing knowledge.

P1: In GVTs, when functional boundaries are present, the extent of knowledge sharing will be lower.

Organizational Boundaries

When GVTs comprise of members that cross organizational boundaries, it is difficult to establish a shared sense of organizational identification among team members. When members do not identify themselves strongly with an organization, they may lose motivation to share knowledge with other team members (Wiesenfeld et al., 1999). According to Ratcheva (2009), strong, and trusting relationships within teams helps in coordination, and combination of individual expertise. Furthermore, strong relations facilitate close interactions amongst team members of different organizational origins (Kale, Singh, and Perlmutter, 2000). In GVTs, when organizational boundaries are present, team members have differing norms, values, and beliefs that exist in the teams as members are brought in together from various organizations. The difference in these underlying precepts will affect the knowledge sharing behavior of team members. Therefore, we propose that:

P2: In GVTs, when organizational boundaries are present, the extent of knowledge sharing will be lower.

Cultural Boundaries

In GVTs, when members from HC and LC cultures interact, they may face communication challenges due to difference in their communication styles and ways of thinking (Velmurugan et al., 2010). For example, members of LC cultures may easily communicate with other team members whom they have never met. However, due to the absence of non-verbal cues, members of HC have difficulties in initiating communication as they rely on proximity, gestures, and facial expressions. These discrepancies in communication styles can hinder knowledge sharing in GVTs.

P3: In GVTs, when team members are from HC culture, extent of knowledge sharing will be lower.

Task Mental Model

As GVTs cross functional boundaries, the integration of work methods, technologies, and goals increases in complexity. For example, a team member from marketing department will most likely have different work processes and ways of thinking about organizational issues as well as acquire unique subculture when compared to a more technical area of the organization such as engineering or information systems (Kankanhalli et al., 2006). According to Espinosa et al. (2007), familiarity with common tools, processes, and task domain may exist prior to the current task and further develops during the task. Therefore, when members of functionally diverse teams have prior knowledge of task domain, through training, prior experience, and other related mechanisms, the exchange of information among members becomes easier. Previous studies have also indicated that team's ability to share knowledge is influenced by commonalities in the knowledge held by individual members' functional and contextual knowledge (Dougherty, 1992; Vicenti, 1990). Therefore, shared understanding of the task among team members will provide a common ground because of shared vocabulary and familiarity with technical terms, making knowledge sharing easier and effective (Faraj and Sproull, 2000). Therefore, we hypothesize that:

P4: The relationship between functional boundaries and knowledge sharing is moderated by task mental model.

Team Mental Model

When GVTs cross organizational boundaries, lack of organizational identification weakens ties that bind team members together (Wiesenfeld et al., 1999). Furthermore, greater heterogeneity created due to diversity in norms, cultures, and values of team members from different organizations poses challenges for effective communication and sharing knowledge among members. For example, a field study by Zack and McKenney (1995) investigated the effect of social context by studying the interaction patterns of two organizations. Their study found that groups that were similar with respect to functional structure, technology, communication mode, and tenure, but had different social contexts with respect to organization culture, management philosophy, and cooperation, had similar patterns of interaction within their group, but very different patterns across groups. This led to different levels of communication and performance effectiveness. However, having knowledge about members of the team, their interaction patterns, behaviors and attitudes, team members can develop perceptions about what other teammates know and how they may respond to particular events and circumstances. When team members have shared values and understanding of what teammates believe in and have a clear sense of what they primarily value on certain tasks, it further enables teammates to form compatible perceptions which in turn leads to effective sharing of knowledge (Johnson, Lee, Lee, O'Connor, Khalil, and Huang, 2007; Mohammed et al., 2001). Thus,

P5: The relationship between organizational boundaries and knowledge sharing is moderated by team mental model.

Further, when members of GVTs come from diverse cultures, they face difficulties in sharing their knowledge. In contrast, having accurate perceptions of the team members can strengthen work relationships and may reduce dissonance of communication cues coming from members of diverse cultural backgrounds. Therefore,

P6: The relationship between cultural boundaries and knowledge sharing is moderated by team mental model.

Media Synchronicity

In GVTs, team members have to rely on electronic media to communicate, share information and coordinate their efforts. Many studies have found (Malhotra, Majchrzak, Carman, and Lott, 2001) that virtual teams have difficulty in communicating with one another, making it hard to exchange information among members. When functional boundaries are present, team members have different responsibilities and capabilities that have to be integrated with capabilities of other team members to accomplish tasks effectively. Thus, in functionally diverse teams, to coordinate with each other's task, use of higher synchronicity media is required. A medium allows for high synchronicity when it has a high transmission velocity, offers more natural symbol sets, (Zigurs and Buckland, 1998), while at the same time having a lower degree of parallelism, rehearsability and reprocessability. For example, when a team member sends an email to another team member, he or she does not know when other team member will respond, whereas when a team member use phone communication, there are no time lags between responses. Therefore, when team members use communication technologies with capabilities that provide higher synchronicity, team members will be able to coordinate their efforts and the extent of knowledge shared will be higher. Therefore,

P7: When functional boundaries are present in GVTs, the extent of knowledge shared among members will be higher when higher synchronicity media is used.

Further, higher synchronicity media will also benefit members from HC cultures. Unlike LC cultures, people from HC cultures rely on body language, gestures, facial expressions, and other subtle cues. Since higher synchronicity media like video-conferencing provides more symbol sets, it will help members of HC culture to effectively share their knowledge with other team members.

P8: When cultural boundaries are present in GVTs, the extent of knowledge shared among members will be higher when higher synchronicity media is used.

A study conducted by Wiesenfeld et al. (1999) found that use of lower synchronicity media was associated with increased organizational identity and higher levels of phone communication were associated with decreased organizational identification. Lower synchronicity media allows more time between messages to process information, and analyze the content of message or to develop a meaning (Dennis et al., 2008). Such type of media will be more efficient in developing team relationships. Further, the use of media lower in synchronicity like email has the ability to reach many team members at the same time, creating a sense of belongingness to the team. This also leads individuals to feel that they are participants in the organization which strengthens the organizational identification which in turn impacts the extent of knowledge sharing.

P9: When organizational boundaries are present in GVTs, the extent of knowledge shared among members will be higher when lower synchronicity media is used.

The proposed framework is presented in Fig. 1.

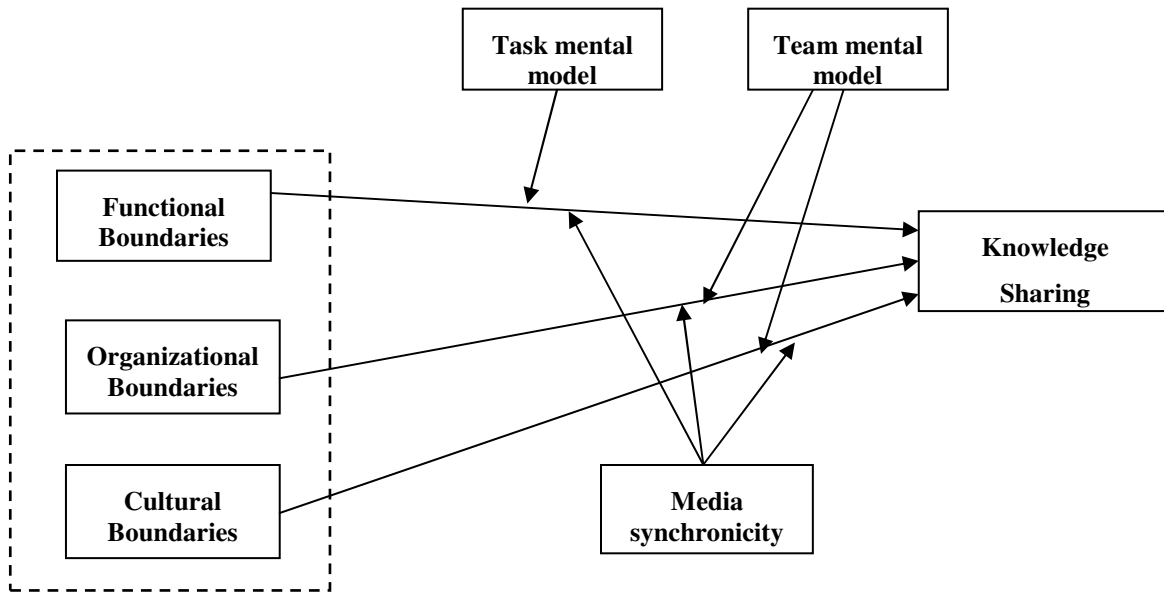


Figure 1: Research Framework

DISCUSSION AND CONCLUSIONS

This research has several implications for research and practice. It adds to the growing body of knowledge on GVTs. This study also investigates the role of boundaries on knowledge sharing practices. Further, it extends prior research on shared understanding by examining the distinctive impacts of task and team mental models. Finally, it also examines how different media capabilities mitigate the effects of boundaries on knowledge sharing.

This research has also important implications for practice. For instance, managers should be aware of the issues that can arise in sharing of knowledge due to the presence of functional, organizational, and cultural boundaries and how to mitigate these issues. While forming a virtual team, if functional diversity is required for a project, managers should ensure that team members have appropriate understanding of task before recruiting them. Online workshops can also be conducted to address and educate members about differences that can exist due to functional backgrounds. Also appropriate communication technologies should be provided and their use should be encouraged to ensure higher sharing of knowledge among team members. Similarly, when organizational boundaries are prominent in GVTs, managers should introduce mechanisms to foster team relationships between members. Further, managers should ensure that members of GVTs must possess intercultural communication competence and should know how to appropriately utilize information technologies so that the cultural barriers can be minimized. To enable shared understanding within teams, cross-cultural training should also be provided for the team members.

As a conclusion, the study suggests that the existence of multiple boundaries in virtual teams can pose several challenges to knowledge sharing culture within the teams. However, shared mental models as well as the capabilities of information technologies can mitigate the negative effects of these barriers to a great extent. Since virtual teams allows access to wider knowledge base and expertise, organizations should realize the potential of virtual teams, and should promote knowledge sharing in the teams so that better team outcomes, new and innovative idea generation, faster decision making processes, and finally competitive advantage can be gained.

REFERENCES

1. Alavi, M., and Leidner, D. (2001) Review: Knowledge Management and Knowledge Mangement Systems: Conceptual Foundations and Research Issues. *MIS Quarterly*, 25, 1, 107-136.
2. Aubert, B., Rivard, S., and Templier, M. (2011) Information Technology and Distance-Induced Effort to Manage Offshore Activities. *IEEE Transactions on Engineering Management*, 58, 4, 751-771.

3. Bunderson, J., and Sutcliffe, K. (2002) Comparing Alternative Conceptualizations of Functional Diversity in Management Teams: Process and Performance Effects. *Academy of Management Journal*, 45, 5, 875-893.
4. Byrne, D., and Wong, T. (1962) Racial Prejudice, Interpersonal Attraction, and Assumed Dissimilarity of Attitudes. *Journal of Abnormal Psychology*, 65, 4, 246-243.
5. Cannon-Bowers, J. A., Salas, E., and Converse, S. (1993) *Shared Mental Models in Expert Team Decision Making*. In N.J. Castellan, Jr. (Ed.), *Current Issues in Individual and Group Decision Making*: Hillsdale, NJ: Erlbaum.
6. Cannon-Bowers, J., and Salas, E. (1993) Shared Mental Models in Expert Team Decision Making. *Individual and Group Decision Making: Current Issues*, 221-246.
7. Carley, K. (1997) Extracting team mental models through textual analysis. *Journal of Organizational Behavior*, 18, 533-558.
8. Chase, N. (1999) Learning to Lead a Virtual Team. *Quality*, 38, 9, 76.
9. Choi, S., Lee, H., and Yoo, Y. (2010) The Impact of Information Technology and Transactive Memory Systems on Knowledge Sharing, Application, and Team Performance: A Field Study. *MIS Quarterly*, 34, 4, 855-870.
10. Cramton, C. (2001) The Mutual Knowledge Problem and its Consequences for Dispersed Collaboration. *Organization Science*, 12, 3, 346-371.
11. Cummings, J. (2004) Work Groups, Structural Diversity, and Knowledge Sharing in Global Organization. *Management Science*, 50, 3, 352-364.
12. Cummings, J., Espinosa, J., and Pickering, C. (2009) Crossing Spatial and Temporal Boundaries in Globally Distributed Projects: A Relational Model of Coordination Delay. *Information Systems Research*, 20, 3, 420-439.
13. Denison, D., Hart, S., and Kahn, J. (1996) From Chimneys to Cross-functional Teams: Developing and Validating a Diagnostic Model. *Academy of Management Journal*, 39, 4, 1005-1023.
14. Dennis, A., Fuller, R., and Valacich, J. (2008) Media, Tasks, and Communication Processes: A Theory of Media Synchronicity. *MIS Quarterly*, 32, 3, 575-600.
15. Dougherty, D. (1992) Interpretative barriers to successful product innovation in large firms. *Organization Science*, 3, 2, 179-202.
16. Dougherty, D. (1992) Interpretive Barriers to Successful Product Innovations in Large Firms. *Organization Science*, 3, 2, 179-202.
17. Espinosa, J., Cummings, J., Wilson, J., and Pearce, B. (2003). Team Boundary Issues Across Multiple Global Firms. *Journal of Management Information Systems*, 19, 4, 157-190.
18. Espinosa, J., Slaughter, S., Kraut, R., and Herbsleb, J. (2007) Team Knowledge and Coordination in Geographically Distributed Software Development. *Journal of Management Information Systems*, 24, 1, 135-169.
19. Faraj, S., and Sproull, L. (2000) Coordinating Expertise in Software Development Teams. *Management Science*, 46, 12, 1554-1568.
20. Fransen, J., Kirschner, P., and Erkens, G. (2011) *Computers in Human Behavior*, 27, 1103-1113.
21. Gibson, C., and Gibbs, J. (2006) Unpacking the Concept of Virtuality: The Effects of Geographic Dispersion, Electronic Dependence, Dynamic Structure, and National Diversity on Team Innovation. *Administrative Quarterly Science*, 51, 3, 451-495.
22. Gopal, A., Espinosa, J., Gosain, S., and Darcy, D. (2011) Coordination and Performance in Global Software Service Delivery: The Vendor's Perspective. *IEEE Transactions on Engineering Management*, 58, 4, 772-785.
23. Griffith, T., Sawyer, J., and Neale, M. (2003) Virtualness and Knowledge in Teams: Managing the Love Triangle of Organizations, Individuals, and information Technology. *MIS Quarterly*, 27, 2, 265-287.
24. Hall, E. (1976). *Beyond Culture*. Garden City, NJ: Anchor Books/Doubleday.
25. Hofstede, G. H. (1991). *Cultures and Organizations: Software of the Mind*. London: McGraw-Hill.
26. Jarvenpaa, S., and Leidner, D. (1999) Communication and Trust in Global Virtual Teams. *Organization Science*, 10, 6, 791-815.
27. Jehn, K., Northcraft, G., and Neale, M. (1999) Why Differences Make a Difference: A Field Study of Diversity, Conflict, and Performance in Workgroups. *Administrative Science Quarterly*, 44, 4, 741-763.

28. Johnson, T., Lee, Y., Lee, M., O'Connor, D., Khalil, M., and Huang, X. (2007). Measuring Sharedness of Team-Related Knowledge: Design and Validation of a Shared Mental Model Instrument. *Human Resource Development International*, 10, 4, 437-454.
29. Johnson, T., Lee, Y., Lee, M., O'Connor, D., Khalil, M., and Huang, X. (2007) Measuring Sharedness of Team-Related Knowledge: Design and Validation of Shared Mental Model Instrument. *Human Resource Development International*, 10, 4, 437-454.
30. Kale, P., Singh, H., and Perlmutter, H. (2000) Learning and protection of proprietary assets in strategic alliances: building relational capital. *Strategic Management Journal*, 21, 2, 17-37.
31. Kankanhalli, A., Tan, B., and Wei, K.-K. (2006) Conflict and Performance in Global Virtual Teams. *Journal of Management Information Systems*, 23, 3, 237-274.
32. Kauppila, O.-P., Rajala, R., and Jyrama, A. (2011) Knowledge Sharing Through Virtual Teams Across Borders and Boundaries. *Management Learning*, 42, 4, 395-418.
33. Kirchmeyer, C., and Cohen, A. (1992). Multicultural Groups: Their Performance and Reactions with Constructive Conflict. *Group and Organization Management*, 17, 2, 153-170.
34. Klimoski, R., and Mohammed, S. (1994) Team Mental Model: Construct of Methaphor? *Journal of Management*, 20, 2, 403-437.
35. Majchrzak, A., Rice, R., King, N., Malhotra, A., and Ba, S. (2000) Computer-mediated Inter-organizational Knowledge-sharing: Insights from a Virtual Team Innovating Using a Collaborative Tool. *Information Resources Management Journal*, 13, 1 44-53.
36. Malhotra, A., Majchrzak, A., Carman, R., and Lott, V. (2001) Radical Innovation Without Collocation: A Case Study at Boeing-Rocketdyne. *MIS Quarterly*, 25, 2, 229-249.
37. Malhotra, A., Majchrzak, A., and Rosen, B. (2007) Leading Virtual Teams. *Academy of Management Perspective*, 21, 1, 60-70.
38. Maruping, L., and Agarwal, R. (2004) Managing Team Interpersonal Processes Through Technology: A Task-Technology Fit Perspective. *Journal of Applied Psychology*, 89, 6, 975-990.
39. Mathieu, J., Heffner, T., Goodwin, G., Salas, E., and Cannon-Bowers, J. (2000) The influence of Shared Mental Models on Team Process and Performance. *Journal of Applied Psychology*, 85, 2, 273-283.
40. Mohammed, S., and Dumville, B. (2001) Team Mental Models in a Team Knowledge Framework: Expanding theory and Management across disciplinary boundaries. *Journal of Organizational Behavior*, 22, 2, 89-106.
41. O'Leary, M., and Cummings, J. (2007) The Spatial, Temporal, and Configurational Characteristics of Geographic Dispersion in Teams. *MIS Quarterly*, 31, 3, 433-425.
42. Piccoli, G., Powell, A., and Ives, B. (2004) Virtual Teams: Team Control Structure, Work Processes, and Team Effectiveness. *Information Technology and People*, 17, 4, 359-379.
43. Powell, A., Piccoli, G., and Ives, B. (2004) Virtual Teams: A Review of Current Literature and Directions for Future Research. *The Database for Advances in Information Systems*, 35, 1, 6-36.
44. Rafaeli, S., and Ravid, G. (2003) Information Sharing as Enabler for the Virtual Team: An experimental Approach to Assessing the Role of Electronic Mail in Disintermediation. *Information Systems Journal*, 13, 2, 191-206.
45. Ratcheva, V. (2009) Integrating diverse knowledge through boundary spanning processes – The case of multidisciplinary project teams. *International Journal of Project Management* , 27, 3, 206–215.
46. Rosen, B., Furst, S., and Blackburn, R. (2007) Overcoming Barriers to Knowledge Sharing in Virtual Teams. *Organizational Dynamics*, 36, 3, 259-273.
47. Sole, D., and Edmondson, A. (2002) Situated Knowledge and Learning in Dispersed Teams. *British Journal of Management*, 13, 17-34.
48. Staples, D., and Webster, J. (2008) Exploring the Effects of Trust, Task Interdependence and Virtualness on Knowledge Sharing in Teams. *Info Systems Journal*, 18, 6, 617-640.
49. Velmurugan, M., Kogilah, N., and Devinaga, R. (2010) Knowledge Sharing in Virtual Teams in Malaysia: Its Benefits and Barriers. *Journal of Information and Knowledge Management*, 9, 2, 145-159.

50. Vicenti, W. (1990) What engineers know and how they know it: analytical studies from aeronautical history. *Baltimore and London: John.*
51. Wiesenfeld, B., Raghuram, S., and Garud, R. (1999) Communication Patterns as Determinants of Organizational Identification in a Virtual Organization. *Organization Science, 10, 6, 777-790.*
52. Yan, A., and Louis, M. (1999) The Migration of Organizational Functions to the Work Unit Level: Buffering, Spanning, and Bringing up Boundaries. *Human Relations, 52, 1, 25-47.*
53. Zack, M., and McKenney, J. (1995) Social context and interaction in ongoing computer-supported management groups. *Organization Science, 6, 4, 394-422.*
54. Zakaria, N., Amelinckx, A., and Wilemon, D. (2004) Working Together Apart?uilding a Knowledge-Sharing Culture for Global Virtual Teams. *Creativity and Innovation Management, 13, 1, 15-29.*
55. Ziggers, I., and Buckland, B. (1998) A Theory of Task/Technology Fit and Group Support Systems Effectiveness. *MIS Quarterly, 22, 3, 313-334.*