A STUDY OF TEAM LEARNING ACTIVITIES IN NPD PROJECT TEAMS – THE MEDIATING MECHANISM OF TEAM MEMBERS’ PERCEIVED TRANSACTIVE MEMORY SYSTEMS

Lung-Far Hsieh, Dept. of Business Administration, Chung Yuan Christian University, Taiwan, R.O.C.,
Tel: 886-3-265-5113, E-mail: lungfar@cycu.edu.tw

ABSTRACT

This study applies transactive memory systems (TMS) as the mechanism connecting division of labor with team learning activities. A field study was conducted to verify and refine this framework and to provide potential theoretical explanations for the influences of division of labor at organizational level on its NPD teams’ learning activities. Several propositions derived from this field study are: 1) Higher levels of division of labor at organizational level associate with higher levels of TMS perceived by the team members, 2) Higher levels of responsibility assignment also associate with higher levels of TMS perceived by the team members, and 3) An earlier and clearer TMS associates more team learning activities.

Keywords: Team learning activities, Division of labor, Transactive memory systems

INTRODUCTION

Recently, more and more companies have employed cross-functional teams as the primary integrating mechanism in their new product development (NPD) activities (Leenders and Wierenga, 2002). An implicit assumption for the productivity of a cross-functional team is that, when team members with disparate specialties are brought together, there comes a synergistic integration of their different knowledge that will boost the team’s performance. This assumption parallels to Brown and Duguid’s (2001) contention that a firm’s advantage over the marketplace is found in “the greatest benefits to knowledge accrue from coordinating its development across the division of labor”. However, empirical findings from NPD literature don’t seem to consistently support this synergistic integration assumption (Barczak and Wilemon, 2003; Sarin and Mahajan, 2001). Research in small groups’ information processing dynamics (e.g., Stasser, Taylor and Hanna, 1989; Stasser and Stewart, 1992; Stasser et al. 1995; Larson et al., 1994; Stewart et al. 1998) also reveals that the synergistic effects may not come automatically by simply pooling team members with various knowledge.

On the other hand, research in knowledge management and organizational learning has constantly demonstrated a strong association between effective team learning activities and higher team performance (Dougherty, 1992; Moorman and Miner, 1997; Sarin and McDermott, 2003; Katzenbach and Smith, 2003). In this vein, Hage (1999) emphasized the importance of the complexity of the division of labor because it taps the organizational learning, problem-solving, and creativity capacities of the organization. Therefore, it is arguable that the effective team learning activities is highly relevant to the synergistic effect of a cross-functional team. This linkage between division of labor and team learning activities is central to the justification of adopting cross-functional teams in new product development.

Because that most research concerning the influences of division of labor on team activities is largely found in small group dynamics research and in laboratory settings (e.g., Stasser, 1989; Stasser, and
Stewart, 1992; Larson et al., 1994; Stewart and Stasser, 1995; Stasser et al. 2000; Lewis et al., 2005), there is little empirical evidence supporting the linkage between the division of labor in an organization and its cross-functional teams’ learning activities. Neither is there a clear theory to explain the underlying mechanism of this linkage. This is lamentable because there is a tradition in the research of the influences of division of labor in product innovation (Damanpour, 1991) and, from the viewpoint of practitioners, the division of labor is one of the initial conditions of cross-functional teams that are mostly amenable to the discretion of managers in an organization.

Research in transactive memory systems (TMS) (Wegner, 1987) demonstrates a promising theory to explain the linkage between division of labor and team learning activities. Studies of team behavior have revealed that effective teams use a well functioning TMS to store and recall more knowledge than any individual (Hollingshead and Brandon, 2003), to use the knowledge of others better (Moreland, Argote and Krishnan, 1998), to match problems with the person most likely to resolve them (Moreland and Levine, 1992), and to reduce cognitive load when others act as external memory stores and allow greater specialization (Hollingshead and Brandon, 2003). Therefore, this study will use transactive memory systems (Wegner, 1987) to explain the linkage between division of labor and team learning activities and provide evidence to support it.

THE FIELD STUDY

The study conducted a field study on team members’ perceived TMS by in-depth interviewing members of two NPD project teams from two computer & communication components manufacturing companies in Taiwan. These interviews were conducted at early, middle, and last time periods of NPD stages of each team, respectively. First, the researcher implemented a questionnaire survey on NPD managers of 10 computer & communication components manufacturing companies to investigating levels of division of labor of these companies. The questionnaire consists of three components of division of labor, including specialization, functional differentiation, and professionalism. The two teams were selected purposefully that one team (Team A) came from the company with the highest level of division of labor, and the other (Team B) came from the company with the lowest level of division of labor. Team A consisted of 11 members including seven engineers (three product developing engineers (components engineers), one design engineer, one product structure (layout) engineer, one client service engineer, one senior product developing engineers serving as the leader of the team) and four part-time participants (one purchaser, one manufacture engineer (cost analyzer), one marketing analyzer, and one bookkeeper). Team B consisted of 10 members including eight engineers (four product design engineers, three senior product design engineers, one product design manager serving as the leader of the team) and two part-time participants (one purchaser and one adviser from marketing department). The study will focus on investigating the formation of the team members’ perceived TMS and its effectiveness for acting an underlying mechanism linking division of labor at organizational level and team learning activities of NPD project teams.

The formation of Transactive memory system

Lewis (2003) demonstrated that the TMS construct have three major components: specialization, credibility, and coordination. Thus, this field study will investigate these TMS components to estimate the level of TMS on the observed teams. On the in-depth interviews at the early NPD stage (conducting right after each team had started for one week), most of team members of both teams reported high awareness of their roles in the NPD teams. But when asked to depict other members’ roles, members of
Team A reported teammates’ specialized domains more consistent with their self-reported ones than did members of Team B. Two junior engineers of Team B (with less than 2 years in the company) even confused the specialties of their three senior product design engineers. When asked if they had confidence on the specialties of their teammates, members of Team A also reported higher trust on their teammates’ specialties than did members of Team B. This difference mainly comes from two senior engineers of Team B who expressed reservations on competence of some of their junior engineers. During some informal conversations when I observed Team B’s designing works as a bystander, some junior engineers complained to me about being devaluated by their senior teammates.

On the in-depth interviews at the middle NPD stage conducting right after each team had reached the middle point of its outline schedule (the outline schedule of Team A and Team B is eight months and six months, respectively), all members of both teams reported high awareness of their roles in the teams. But some members of Team B still revealed certain confusions and some still expressed reservations of their teammates’ specialized domains, although much less than they did at the early stage of the NPD program.

By reaching its middle of the fourth month from the starting of NPD program, Team B’s manager redesign the NPD program and prolonged its schedule to ten months because of the depressed progression of the NPD tasks. Beside, he also explicitly defined the four junior engineers’ responsible specialties that set the responsibilities for knowledge of certain domains to each junior engineer. Adapting to this change in Team B, this study conducted an additional in-depth interviews with members of Team B right after five months from its beginning. This time, all members of Team B reported high awareness of their roles in the team and predicted teammates’ specialized domains that consisted with their self-reported. Moreover, they also expressed high level of confidence on teammates specialties, although a little less than that of Team A.

On the in-depth interviews at the last NPD stage (conducting right after each team had reached the beginning of the last month of its schedule), all members of both teams reported high awareness of their roles in the teams, depicted consistent specialized domains of teammates, and expressed high level of confidence on teammates specialties. Thus, in this stage, the teams’ TMSs had a stable condition.

The linkage between division of labor and TMS

In this field study, Team A came from the company with the highest level of division of labor among ten investigated companies. It also exhibited much higher levels of TMS than did Team B, especially in early stage of the NPD program. Just after one week from beginning, members of Team A already worked smoothly with one another. This provides some temporal evidence for the positive association between division of labor in an organization and the level of its team’s TMS. This also confirms Lewis’s (2004) argument that teams with initially distributed expertise and familiar members are more likely to develop a TMS and “TMS emerge during a project-planning phase as a function of a team's initial conditions”. Hence, the study puts the proposition as following:

**P1: a NPD team with higher level of division of labor is more likely to form its TMS.**

There is some unanticipated finding that, after Team B’s manager explicitly assigned responsibilities on team members for certain knowledge domains, Team B seemed able to develop its TMS effectively. This resonates to a recent study that emphasizes the importance of allocating responsibilities for knowing within a team (Jackson and Klobas, 2008). But, this administrative coordination on members’
expertise seems to conflict with Faraj and Xiao’s (2006) observation that expertise coordination practices are highly emergent and cannot necessarily be pre-specified. And this study also found that although Team B’s level of informal discussion (one of learning activities) significantly increased, its level of reflection (another one of learning activities) was hardly heightened. Nevertheless, this study indeed observed an association between responsibility assignment among team members and the team’s TMS. Thus, I propose the following.

**P2: a NPD team with higher level of responsibility assignment is more likely to form its TMS.**

**Team learning activities**

In organizational learning literature, two major processes of learning are learning-by-absorption and learning-by-reflection (Scarbrough et al. 2004). Accordingly, team learning should not be confined to knowledge transfer among team members, it also assumes combining all members’ knowledge and experiences to cope with new situations. For cross-functional teams, combining (or, integrating) team members’ separate knowledge entails negotiating and reflecting along their underlying backgrounds such as assumptions, routines, mental models, etc. In this vein, Edmondson (2002) identified team learning as the iterative process of reflective discussion and action. Only through an iterative cycle of reflective discussion and action, can a team truly integrate specialist capabilities of all team members.

This study defines team learning as an iterative process in which a team’s members collectively gather knowledge from themselves, their internal colleagues (intra-organizational) and external sources (inter-organizational); engage the process of discussion and reflection to make decisions to cope with the assigned common tasks; and gain feedbacks and additional knowledge to embark on next round of knowledge gathering, discussion and reflection. Following this definition, team learning activities are those activities (taken by members of a team) that conducive to team learning, including knowledge gathering, discussion, and reflection. Thus the field study focuses on these activities of team members.

From beginning, members of Team A demonstrated much higher level of knowledge gathering than did members of Team B. Usually, some members of Team A would provided their newly gained information in the routine meetings. Sometimes, they even brought in certain colleagues in other departments to provide first hand knowledge, especially on some bottlenecks they confronted in later stages of the NPD program.

There also were many informal discussions engaged among variant compositions of team members. The conversations often started by two team members discussing their design problems, then someone was asked to join the discussion, still then may be joined by more teammates. These phenomena continued to occur from the early stage to last stage of the NPD program in Team A. But, in Team B, the informal discussions of designing works are much less in the early and middle stages of the NPD program. Only during the later stage did members of Team B frequently engaged this kind of discussion, although still less frequent than those occurred in Team A. In contrast, the formal discussions (estimated as time spent on routine meetings) in Team B were much longer than those in Team A. Interestingly, in Team B, the time of routine meetings seemed to decrease during the later stage of NPD program as its informal discussions increased.

In interviews, members of Team A expressed more eagerness for negotiating potential conflicts relating to their responsible design areas with other teammates. Basically, they thought that both informal discussions and routine meetings were used to negotiate these interdependences and search for some
alternatives. While in Team B, the routine meetings were deemed to allocate design responsibilities and inspect if tasks were done in schedule. But when asked if they thought that reflection is the important mean for integrating team members’ different perspectives, members of both teams all highly confirmed with it. When asked if their meetings’ conclusions were decisive, members of team B expressed negative answers (by average) in interviews at early stage and first middle stage (three months after beginning) and expressed positive answers (by average) at second middle stage (five months after beginning) and last stage of the NPD program. While members of Team A expressed positive answers at all stages of NPD program.

For more fine-grained analyses, it is worth to mention that there is a subtle difference between reflection and discussion. According to social loafing research (Karau and Williams, 1993) there is a tendency for people to expend less effort when working collectively than when working individually. In most of cross-functional teams, there is also a tacit behavioral norm that demands team members to engage in team discussions. As a result, team members may participate discussions but never touch critical issues. In this field study, members of Team B spent much time in routine meetings, but these meetings often resulted in less decisive conclusions. In other words, they may engage the form of discussions but provide little reflection.

The linkage between TMS and team learning activities

In this field study, members of Team A exhibited much higher level of knowledge gathering than did members of Team B. This is consistent with Ren et al.’s (2006) finding that TM decreases group response time by facilitating knowledge retrieval processes and improves decision quality by informing task coordination and evaluation. Also, the many informal discussions within parts of members further speeded the efficiency of knowledge transfer among members with different specialties. There are many studies (Stasser et al., 1995; Littlepage et al., 1997; Moreland and Myaskovsky, 2000) that provide consistent evidence for the effectiveness of TMS on enhancing team leaning activities.

Members of Team A also expressed an eagerness for negotiating potential conflicts relating to their responsible design areas with other teammates. Brown and Duguid (1998) argued that tacit knowledge could be communicated or demonstrated only in direct interaction, and corrected in mutual adjustment between deliverer and recipient, therefore to combine different experts’ experiences needs the process of iterative reflection and action. These activities will make team members to suspend assumptions and enter into a genuine “thinking together” (Senge, 1990), which is critical to a team’s creative capabilities. Thus, this study proposed that:

P3: an earlier and clearer TMS will result in more team learning activities.

![Figure 1. A Summary of Research Propositions](image-url)
CONCLUSIONS

In a multi-functional team consisting of experts with different specialties, team members often bring with significant differences in perspectives and interests (Carlile, 2002). It is necessary to provide some mechanisms for facilitating the transformation and combination of different knowledge domains within these teams. As Faraj and Sproull (2000) put it that to manage members’ skill and knowledge interdependencies effectively entails knowing where expertise is located, knowing where expertise is needed, and bringing needed expertise to bear. The theory of transactive memory system (TMS) seems to provide a plausible explanation to fulfill this requirement. This study provides some field materials to temporarily support and refine the theorizing that TMS acts as a mediating mechanism to link division of labor at organizational level with team learning activities of the NPD team. Further empirical studies incorporating more samples and applying more refined measures should provide more decisive findings on the research of TMSs.

REFERENCES


A complete form of references is available on request.