THE EFFECTS OF TEAM DIVERSITY IN KNOWLEDGE SOURCING SCOPE AND INDIVIDUAL LEARNING MODE: A MULTI-LEVEL APPROACH

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Abstract

A team member acquires knowledge to successfully complete team tasks with other members by accessing his/her available knowledge sources. In this knowledge process, individual members can use (1) internal knowledge source from knowledgeable coworkers or formal sources within their organizational boundaries. They can also rely on (2) external knowledge source by networking with external experts or informal sources outside their organizations. To learn knowledge acquired from internal/external sources and apply it to team tasks, individual members adopt two different learning modes: (1) exploitation by repeatedly adopting and applying the existing knowledge and (2) exploration by idiosyncratically developing their own understanding. Regarding such two dimensions of knowledge processing (i.e., knowledge sourcing and individual learning), the social categorization and the information/decision-making perspectives suggest that team diversity has different effects on individual performance, which consists of task-relevant performance and creative performance. Moreover, prior studies using single-level research designs have overlooked the multi-level nature of knowledge processing in which individual members are influenced by one another. To compromise the different suggestions from these competing theories and to explain the contextual effects of team diversity in knowledge processing, this study conceptualizes a two-dimensional team diversity in terms of knowledge sourcing scope and individual learning mode. We then hypothesize its top-down effects on individual knowledge processing in work groups. The multi-level approach suggested in this study might advance our understanding of team diversity in knowledge processing and its effects on individual performance by integrating the cross-level associations into a single study.

Keywords: Team Diversity, Internal and External Knowledge Sourcing, Individual Exploitation and Exploration, Task Performance, Creative Performance, Multi-Level Analysis.
1 INTRODUCTION

Knowledge management (KM) literature has maintained the widely accepted idea that organizational knowledge is a key factor for sustainable competitive advantages, which form the fundamental tenet of knowledge-based view (KBV) of the firm (Grant 1996; Nonaka 1994; Spender 1996). Knowledge enables organizations to predict accurately the natural and commercial potential of environmental changes and the appropriateness of strategic directions (Cohen & Levinthal 1990). Without such knowledge, knowledge-intensive teams, as a key mechanism of KM in organizations, would be less capable of discovering and exploiting new opportunities in businesses because their complex tasks require a higher level of creativity for effective and efficient task performance (Bantel 1994; Bowers et al. 2000). Although necessary, knowledge by itself however is an insufficient resource for group competence. Equally important in completing given tasks are how team members seek appropriate knowledge sources (i.e., knowledge sourcing), as well as how they effectively and efficiently learn from the sources (i.e., individual learning), and their interpersonal interactions in groups. This knowledge processing in teams includes identifying the experts, collaboratively solving common problems, exchanging new knowledge and ideas, fine-tuning and reusing existing knowledge, sharing team information, coordinating project-related activities, empowering communities of experts, and helping others establish and strengthen personal relationships (Raeth et al. 2011).

Regarding such group knowledge processing, the concept of team diversity emerges in the organizational context where subunits continually become more diverse (Jackson et al. 2003; Triandis et al. 1994). This team diversity is due not only to the demographic differences among members, such as gender, age, and ethnicity, but also to the work group composition, which incorporates the task-oriented differences in the functional and educational backgrounds in cross-functional project teams (Harrison et al. 1998; van Knippenberg & Schippers 2007). In conceptualizing the team diversity in group knowledge processing, we focus on not the demographic differences (i.e., surface-level diversity) but the work group composition (i.e., deep-level diversity). The concept refers to the functional or informational/knowledge diversity (Pelled et al. 1999; Phillips et al. 2004), defined as “differences in knowledge bases and perspectives that members bring to the group” (Jehn et al. 1999, p. 743).

Specifically, a two-dimensional team diversity in knowledge sourcing and individual learning is conceptualized as the degree of task-oriented differences in knowledge processing among team members. In this sense, two different approaches toward the team diversity can be observed together in knowledge-intensive teams: i.e., the process gain and loss in knowledge groups. First, individual members might improve their performance for given knowledge-intensive tasks by being exposed to their heterogeneous groups, which acquire diverse knowledge from both internal and external sources and embrace different perspectives combined with both exploitative and explorative learning. The task-oriented diversity in knowledge sourcing and individual learning facilitates understanding of team tasks and sharing of relevant information among individual members (Pelled et al. 1999). This process gain can be explained by two potential benefits: individual members are capable of learning from one another through observational learning, incidental learning, and social facilitation; they are also cognitively stimulated by each other through their mutual encouragement in a group (Hill 1982). Second, individual members can reduce the process loss and improve their performance by engaging in their homogeneous groups, which collectively reply on either internal or external knowledge sources and concentrate on either exploitation or exploration. The knowledge process loss occurs due to strong faultlines and weak common identity in groups (Earley & Mosakowski 2000): i.e., differences among team members cause their subcategorization in a group, thus disrupting group functions and lowering their affective/evaluative responses to each other (van Knippenberg & Schippers 2007).

To understand such paradoxical effects of team diversity in knowledge processing, this study uses a multi-level perspective toward the complex KM process in groups. That is, we aim to address the following question: how the team diversity in knowledge sourcing scope (internal or external sources) and individual learning mode (exploitative or explorative learning) among team members influences their task performance and creative performance. In doing so, we apply the concept of team diversity
into knowledge processing in groups and explain its effects on individual performance for team tasks.

KBV has mainly shown the positive effects, and not the nature, of organizational knowledge at the individual level and the organizational level separately. For example, one KBV research stream has focused on individual activities and behaviors of organizational members without considering their collective KM practices because the actual agents, who create, transfer, share, and apply knowledge in organizations, are individuals themselves (e.g., Teigland & Wasko 2003). The other KBV approach has considered organizational knowledge as a collective set of individuals’ knowledge at the group or organizational level by aggregating individual knowledge-related activities and behaviors into higher-level organizational concepts at the team or firm level (e.g., Lee & Choi 2003). These two separate approaches cannot adequately explain how organizations manage workers’ expertise in their tasks and businesses and whether the collective KM practices enhance individual performance and eventually achieve group-wide competitive advantages. We believe that the multi-level insights suggested in this study might improve our understanding of the multiple KM approaches and their effects on individual performance by showing the cross-level effects beyond the traditional single-level research designs (Burton-Jones & Gallivan 2007).

2 THEORETICAL BACKGROUND

Following the review conducted by Williams and O’Reilly (1998) on the organizational diversity research (until 1998), van Knippenberg and Schippers (2007) reviewed the studies on work group diversity (1997 to 2005) and suggest the need for a more complex conceptualization of work group diversity as team characteristics, rather than the relational demography diversity. The relational demography diversity cannot correctly reflect the effects of team diversity because the demographic dissimilarities among team members do not necessarily indicate the task-oriented characteristics in groups. In this sense, we define (1) knowledge sourcing scope and (2) individual learning mode in order to conceptualize a two-dimensional team diversity among individual members in knowledge processing and then contextualize its cross-level effects on individual performance for team tasks.

2.1 Knowledge Sourcing Scope: Internal Sourcing versus External Sourcing

In organizations, team members rely on both internal and external knowledge networks to formally or informally access sources and experts who have appropriate knowledge on the specific tasks (Gray & Meister 2004). Previous studies on KM have suggested a common understanding of the different effects of internal and external knowledge sourcing. KBV explains the effect of regulating the knowledge flow among members within a firm (i.e., internal knowledge sourcing) and the effect of activating the knowledge flow of the firm’s open-network system beyond its boundaries (i.e., external knowledge sourcing) are different from each other at the organizational level (e.g., Bierly & Chakrabarti 1996; Bierly & Daly 2007; DeClercq & Dimov 2008; Kessler et al. 2000; Menon & Pfeffer 2003; Prabhu et al. 2005). In other words, internal knowledge sourcing generates firm-specific competencies by integrating the existing knowledge in organizations whereas external knowledge sourcing brings in new knowledge from outside sources either by acquisition or imitation.

At the individual level, this study takes a similar perspective on the different effects of external and internal knowledge sourcing as that of the social network perspective toward knowledge transfer. On the one hand, strong ties between coworkers generate two-way interactions between knowledge recipients and sources (Leonard-Barton & Sinha 1993) because their “strong ties have greater motivation to be of assistance and are typically more easily available” (Granovetter 1982, p. 209). Strong ties (i.e., two-way interactions) to internal knowledge sources, through which individuals can assimilate complex and non-codified knowledge from the original sources (Polanyi 1966), help team members understand the complex knowledge relevant to given team-specific tasks with opportunity to try, err, and seek advice and feedback from the strongly tied internal knowledge sources (Hansen 1999). On the basis of the social network theory, therefore, we assume that a team member who seeks knowledge by internal sourcing will achieve higher task performance than that who seeks knowledge
by external sourcing at the individual level. This assumption is supported by Staats et al. (2011) who argue that the internally specialized knowledge sourcing approach lowers team members’ search costs and improves their efficiency of knowledge transfer processing (Gray & Durcikova 2005).

Conversely, weak ties beyond the organizational boundaries are less likely to provide task-redundant knowledge (Granovetter 1973). Non-redundant knowledge from such weak ties may be advantageous to an individual’s creative performance because of two factors: (1) external knowledge sources enable an individual to learn specific, new knowledge not directly connected to his/her internal knowledge sources; and (2) the non-redundant knowledge from external sources with weak ties is a different type of knowledge that an individual member cannot acquire from his/her team and organization (Hansen 1999). Based on the idea that weak ties to external sources are more likely to provide non-redundant knowledge (Burt 1992), this study assumes that a team member who seeks knowledge by external sourcing will achieve higher creative performance than that who seeks knowledge by internal sourcing at the individual level. This assumption can also be explained by benefits of the externally broad knowledge sourcing: individual members are able to understand knowledge better by directly sourcing new ideas and problem-solving strategies from outside of their groups (Staats et al. 2011).

2.2 Individual Learning Mode: Exploitation versus Exploration

Drawing from the organizational learning theory, we identify two individual learning modes: (1) individual exploitation and (2) individual exploration. Previous studies based on the organizational learning theory have raised a conflict between exploitation and exploration in achieving the balance between the two concepts (March 1991). In terms of this problem, March (1991, p. 72) stated that “Finding an appropriate balance is made particularly difficult by the fact that the same issues occur at levels of a nested system—at the individual level, the organizational level, and the social system level.” Considering the multi-level nature of organizational learning (Huber 1991; Levitt & March 1988), we focus on exploitative and explorative learning by individuals, which are a key knowledge process in work groups where team members learn from one another to complete their given tasks successfully.

In this study, the two modes of individual learning are defined as follows: (1) individual exploitation refers to the individual learning activities, including improvement, refinement, efficiency, selection, and implementation of knowledge; and (2) individual exploration is characterized by ideas such as search, variation, experimentation, and discovery of knowledge. To improve their performance, individual members should engage in both exploitation and exploration, whose benefits are distinct from each other. That is, our central concern with regard to individual learning is connected to the exploration of new possibilities and exploitation of old certainties (March 1991) by each team member.

By learning through exploitation, individuals can attain “refinement, choice, production, efficiency, selection, implementation, execution” (March 1991, p. 71). Such individual exploitation provides incremental knowledge, which generates moderate but certain and immediate returns for task completion (Schulz 2001). The knowledge outcome of exploitation by individual members is more likely relevant to their team tasks because the members adopt and apply the knowledge already embedded in their organizations and teams: i.e., their modification of the existing knowledge (Das 2003; Mom et al. 2007). Drawing from the findings of previous studies on organizational learning, the present study assumes that a team member who learns knowledge through exploitation will achieve higher task performance than that who learns through exploration at the individual level.

Individual members can achieve “search, variation, risk taking, experimentation, play, flexibility, discovery, innovation” through exploration (March 1991, p. 71). Explorative activities provide the members with new and unsettled knowledge outcomes, which are more likely to be high but uncertain results for their performance (Schulz 2001). Thus, they can idiosyncratically develop their own knowledge on the problems and solutions for given team tasks in a creative manner (Das 2003; Mom et al. 2007). Using these common findings from previous studies, we assume that a team member who learns knowledge through exploration will achieve higher creative performance than that who learns through exploitation at the individual level.
3 HYPOTHESES DEVELOPMENT FOR A MULTI-LEVEL MODEL

Cappelli and Sherer (1991, p. 56) defined context in the organizational behavior as “the surroundings associated with phenomena which help to illuminate that [sic] phenomena, typically factors associated with units of analysis above those expressly under investigation.” In a similar manner, Mowday and Sutton (1993, p. 198) described context as “stimuli and phenomena that surround and thus exist in the environment external to the individual, most often at a different level of analysis.” Drawing from these definitions, Johns (2006) suggest that context is a set of situational variables that can operate as a cross-level influence composed of the top-down effects from a higher level to a lower level in organizations. That is, context may have not only direct effects on a lower level, but also moderating effects (i.e., top-down effects) on causal relationships among lower-level variables (Kozlowski & Klein 2000). Following this multi-level approach, we contextualize the team diversity in group knowledge processing to explicitly show how the team-level situational factor influences individual-level behavior and performance.

3.1 Effects of Team Diversity in Knowledge Sourcing among Individual Members

In this study, the team diversity in group knowledge processing is defined as an aggregate team-level construct that represents the degree of differences/similarities in knowledge sourcing scope and individual learning mode among team members (Jackson et al. 2003), the differences/similarities which are not relations-oriented but task-oriented diversity attributes (Jackson et al. 1995). In hypothesizing the cross-level effects of team diversity on individual performance from group knowledge processing, we employ two competing theories in the diversity research: (1) social categorization perspective and (2) information/decision-making perspective (Williams & O’Reilly 1998). In addition, this study considers two different individual outcomes in team tasks—i.e., task performance and creative performance—to compromise the conflict between the two competing diversity theories. The reason for the controversy in the positive and negative effects of the team diversity on individual performance could be because the competing theories consider different outcomes from each other as individual performance for team tasks.

The social categorization perspective suggests that the group differences among individual members generate social categorization processes (e.g., stereotypic perceptions of dissimilar others, subgroup formation, and intergroup biases), thereby disrupting team functions and reducing the affective/evaluative responses in groups (van Knippenberg & Schippers 2007). This perspective toward the team diversity might explain the cause of group homogeneity effects in the social psychology discipline (Tziner 1985). That is, the similarity theory argues that individuals in a homogeneous group are more likely to be productive and achieve higher performance because the members are united and collaborate with each other given their similar attributes (e.g., behavior, backgrounds, and abilities). In this sense, we propose that the team diversity in knowledge sourcing causes a knowledge process loss in individual task performance by reducing individual members’ opportunity to deeply interact with internal experts and knowledge sources that can help the members understand complex knowledge relevant to the given tasks, as suggested in H1:

**H1:** The diversity in knowledge sourcing among team members will weaken the effect of internal sourcing on individual task performance.

The similarity theory also indicates that the team diversity in individual learning approach might incur a knowledge process loss in individual task performance because individual members are unwilling to share with one another their existing knowledge that needs to be modified for their improvement of task performance. Therefore, this study suggests the negative moderating effect of team diversity in individual learning mode on the positive effect of individual exploitation on task-oriented performance, as presented in H2:

**H2:** The diversity in learning mode among team members will weaken the effect of exploitation on individual task performance.
3.2 Effects of Team Diversity in Learning Mode among Individual Members

The information/decision-making perspective maintains that the work group diversity may generate the individual differences in information, knowledge, and perspectives, thus improving individual performance for team tasks (van Knippenberg & Schippers 2007). Similarly, the equity theory suggests that collective team performance (i.e., the sum of individual performance) will increase when tension arises among dissimilar members within a group because individual members compare themselves with their coworkers in the same group (Bowers et al. 2000). In addition, a knowledge process gain can be realized by the members who have different abilities because they can cross-check one another’s tasks through efficient workload and better error capturing (Bowers et al. 2000). The positive effect of team diversity on individual performance is also supported by previous studies: the groups that experienced task conflict (i.e., caused by team diversity) can make better decisions than those without task conflict (Simion & Peterson 2000). The differences among group members can be a significant mediator that influences performance by increasing creativity (Hoffman et al. 1962). Thus, individual members with an appropriate level of task conflict can more effectively solve given problems than those in teams without conflict (Damon 1991).

On the basis of the aforementioned ideas, we suggest that the team diversity in knowledge sourcing scope encourages individual members to share with one another non-redundant knowledge from external sources. Such knowledge is acquired through the individuals’ weak ties to diverse external sources. Consequently, each member obtains a larger pool of new information and non-redundant knowledge from not only his/her own external sources but also from those of the other members. Such knowledge enables individual members to be more creative. Thus, H3 is proposed as follows:

**H3:** The diversity in knowledge sourcing among team members will strengthen the effect of external sourcing on individual creative performance.

The equity theory also suggests the positive effect of team diversity in individual learning mode among members on their individual creativity. An individual’s explorative activities can further generate new and innovative knowledge through interactions among team members, who also generate their own unique understanding. As a result, each individual member can develop more idiosyncratic knowledge about problems and solutions by stimulation from the other members’ unique understanding in their own creative ways. Thus, we propose the positive contextual effect of team diversity in individual learning mode on creative performance at the individual level, stated as H4:

**H4:** The diversity in learning mode among team members will strengthen the effect of exploration on individual creative performance.

In summary, Figure 1 shows the multi-level research model and its hypotheses. All hypotheses are shown across different levels. This research model is represented using a multi-level analysis approach (Appendix A describes the detailed modeling, which is available upon request from the authors).

![Figure 1. Multi-level research model of the team diversity in knowledge processing](image-url)
4 RESEARCH DESIGN AND CURRENT STATUS

We conclude with the development of a questionnaire based on previous literature and the comments gathered from interviews. The survey instrument was developed either by adapting existing measures to the research context or by converting the definitions of the constructs into a questionnaire format. When we developed the survey instrument, the multiple-item method was used, and each item will be measured on a seven-point Likert scale. Specifically, internal knowledge sourcing will be assessed by measuring the extent to which an individual relies on the scope of internal knowledge sourcing whereas external knowledge sourcing will be measured in terms of the extent to which a member relies on the scope of external knowledge sourcing (Cassiman & Veugelers 2006; Teigland & Wasko 2003). The multiple items of two different individual learning modes—i.e., exploitation and exploration—were developed on the basis of Durcikova et al.’s (2011) indicators. Task performance and creative performance will be measured in terms of an individual’s job performance on his/her assigned duties and responsibilities (Williams & Anderson 1991) and innovativeness for his/her team contribution (Scott & Bruce 1994) respectively. In addition, each team diversity in knowledge sourcing scope and individual learning mode could be observed as a meta-variable at the team level, that is, the proxy variable is a team-level construct in the dispersion or variance among individuals (Chan 1998). Thus, we will measure the two-dimensional team diversity using within-group variance, its derivative (i.e., the value of within-group agreement index, such as $r_{wg}$), as the operationalization of the team-level constructs among the individual members’ responses to their knowledge sourcing scope and individual learning mode within each team. The structure of all the measures developed in this study is presented in Appendix B (i.e., the questionnaire for individual members) and Appendix C (i.e., the questionnaire for team managers/supervisors), which are available upon request from the authors.

To empirically test the multi-level hypotheses, we will collect survey data from knowledge-intensive firms where various cross-functional IT projects (management/engineering consultancy services for client organizations) are formulated and executed by team units consisting of knowledgeable workers as business consultants and engineering technicians with diverse expertise. The main tasks of these units are knowledge-intensive because of the common understanding and interactions among individual professionals from both business and IT domains where knowledge enhances intellectual capital for individual performance. In particular, we will conduct a field study using survey questionnaires that target not only the consulting team members, who seek knowledge to complete their tasks, but also their managers/supervisors, who can objectively evaluate individual performance in teams. In this way, quantitative data will be collected from multiple sources across independent variables (from individual team members) and dependent variables (from team managers/supervisors) in accordance with a recommended technique to reduce common method bias (King et al. 2007). The future plan for the empirical analysis might provide strong evidence for our multi-level theory and generate practical implications to align adequately the team diversity in cross-functional IT projects, knowledge-intensive teams which are exposed to complex interdependencies and required to achieve innovation and creativity (Ancona & Bresman 2007).

5 POTENTIAL CONTRIBUTIONS

5.1 Expected Theoretical Contributions

Motivated by inadequacies in the extant studies, this study is expected to contribute to the KM literature in three ways. First, we contextualized the task-oriented team diversity based on two dimensions: (1) knowledge sourcing scope and (2) how individuals learn the knowledge acquired from internal and external sources. This approach might provide a better understanding of knowledge processing in groups and suggest the moderating effects of team diversity as a team-level context.

Second, this study comprises the two competing theories—i.e., the social categorization perspective and the information/decision-making perspective—which present conflicting suggestions on whether
the team diversity positively or negatively influences individual performance for team tasks. In other words, this study attempts to disentangle the paradoxical effects of team diversity in knowledge processing by considering both task-relevant performance and creative performance at the individual level, as well as by contextualizing the team diversity as contingency factors of the knowledge process across levels in organizations (i.e., the cross-level effects from the team level to the individual level).

Finally, we suggest that knowledge processing in teams is a multi-level phenomenon. Previous studies have predominantly examined KM as either an individual perceptual phenomenon or as a collective practice. This has led to ambiguity in determining the appropriate unit of analysis to understand the knowledge process in organizations. We instead propose that the group knowledge process and its consequences are tied to both the individual and team levels of an organization because KM can be both a set of institutional climates (i.e., top-down effects) and an emerging collective consequence from individual behaviors (i.e., bottom-up effects). Analyzing the top-down effects (the contextual effects of team diversity as a moderator) of the bottom-up concept, the team diversity which emerges from individual members, explains the paradox: i.e., conflicting implications of the previous single-level studies. That is, the present study suggests the contextual effects of work group diversity on the knowledge process approaches of individual members by proposing an important contingency factor that explains when the team diversity is beneficial for individual performance in groups.

5.2 Expected Practical Implications

The findings from this study can also result in several practical implications. First, our multi-level approach might provide practical guidance in the selection of group members and the congruent composition of business- and IT-domain competence for the improvement of individual performance and the success of group work in organizations. This target can be achieved because our multi-level model of team diversity in knowledge processing can be specifically applied to cross-functional IT projects, of which success cannot be achieved by either the business competence or the IT profession alone (Bashein & Markus 1997; Ross et al. 1996). Based on the finding from prior studies, such work groups are fundamental social units in organizations whose individual members share valuable knowledge and learn from each other to perform successfully not only the assigned individual tasks but also the team-wide tasks (Bereby-Meyer et al. 2004; Senge 1990). The union of distinct professionals (i.e., business professionals and IT experts) and their competence in different domains has been a key issue in the IS literature (e.g., Bassellier & Benbasat 2004; Bassellier et al. 2003; Joshi et al. 2007). With the proper multi-level theorizing and the right multi-level analysis (Chan 1998; Klein et al. 1994; Klein & Kozlowski 2000), testing our hypotheses might suggest specific guidelines for group managers and KM practitioners to fit their organizational climate of the team diversity in the group knowledge processes: i.e., knowledge sourcing scope (internal/external sourcing) and twin learning modes (individual exploration/exploration), which can be employed by individual members.

Second, we expect practical implications on IT design by better understanding the cross-level effects of IT usage practices on both the knowledge managing activities at the individual level and the dynamic KM process at the group/organizational level. The concept of team diversity is an important issue in IT design because individual members’ patterns of technology usage are strongly influenced by their coworkers in groups (Sykes et al. 2009). Knowledge combination and socialization through IT-mediated interactions among individual members at the team level demand social capital to create valuable knowledge (Nahapiet & Ghoshal 1998; Nonaka 1994). The social capital can be effectively achieved by individual members through task-oriented interactions (e.g., communities of practice) when the interactions are activated by the individual and the collective IT usage. For example, our multi-level model might specify the social media usage at multi-level units in organizations because individuals not only use social media with their own usage patterns of external/internal exploitation and exploration but also rely on social features that support their collective usage for knowledge collaboration. Such implications can help IT designers develop social features that can encourage social media users to exploit and explore external/internal knowledge sources through individual usage, supported by group-wide practices, thus improving performance for team tasks.
References


