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# **Social Network and Knowledge Accessibility of Project Teams: A Multi-level Approach**

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## ***Abstract***

*This study deals with the relationship between the project team's social network and knowledge accessibility from an empirical aspect. What kind of network structure is desirable to improve project team members' knowledge accessibility? Does a strong connection among group members improve their knowledge accessibility? Otherwise, does the expansion of the external network of a group improve its members' knowledge accessibility more efficiently? This study aims to contribute to developing existing network theories and knowledge management theories by answering these questions. To solve the raised research questions, a multi-level research model was developed on the basis of social network theory. From a social network analysis which was conducted on 172 consultants and 42 project teams in 5 global consulting companies in Korea, it was found that the research results backed the existing two different social network mechanisms: closure mechanism and brokerage mechanism. However, the effect of social network on knowledge accessibility of project team members varied along the type of network involved. This study is meaningful in that it overcame the limits of the unit of analysis shown in existing studies by distinguishing group-level network density from individual-level network properties, and by analyzing the moderating effect between them.*

*Keywords: Social Network, Knowledge Accessibility, Social Network analysis, Multi-level Modeling, Project Team*

# 1. Introduction

According to social network theory, the structure of a social network has a strong influence on an individual's capability to access knowledge (Burt 1992; Thia and Ghoshal 1998). Researchers suggest two different mechanisms to explain the relationship between social network structure and knowledge accessibility: the closure mechanism and brokerage mechanism. According to closure mechanism, individuals who are strongly connected to other group members are more likely to share their knowledge based on an assumption that closed and dense network facilitates the stronger psychological ties to the group identity (Coleman 1988). In contrast, brokerage mechanism emphasizes the importance of bridging ties that connect different people (Burt 1992). To expand, brokerage mechanism, which is represented by weak tie theory (Granovetter 1973) and structural hole theory (Burt 1992), argues that a large and diverse network, where useful information is aired, is the best guarantee of accessing needed knowledge.

Current research trend shows increasing interest in the effect of social network on knowledge accessibility (Nahapiet & Ghoshal 1998; Oh et al., 2006). Applying social network analysis, scholars have tried to explain the interplay between development of social network and knowledge management. However, most previous research limited their view of social network properties to discrete units of analyses; otherwise, they addressed one or few specific social network type. The problem of 'how to manage social network at the different level of network properties and with different type of social relations' is still not fully addressed.

In particular, the relationship between knowledge-intensive project teams and social network still remained unclear. Compared with conventional teams, the project team has unique characteristics in that it is organized temporarily and disappears after the completion of a project. Although previous literature provides researchers with a rigorous theoretical framework in social network and knowledge management, there is little evidence to affirm that this traditional view can still be applied to project teams that have distinctly different characteristics from traditional teams. As the flexibility of organizations is increasingly important, exploring how social-network mechanisms interplay with knowledge accessibility of project teams provides a more comprehensive understanding of effective knowledge management in organizations.

The questions to be addressed here is the role of social network in shaping individuals' knowledge accessibility in the context of project teams. More specifically, we ask: (1) does intra-group network closure increase the degree of individuals' accessing knowledge needed to accomplish their project? Otherwise, (2) does the extra-group bridging ties improve its members' knowledge accessibility more efficiently? (3) How does the effect of social network vary along with the different network type at the different level of network properties? To address these research questions, we examine the ways in which a social network contributes to an individual's ability to access knowledge using a multi-level approach. There is increasing demand for a multi-level approach in organizational science, since it enables a more integrated understanding of phenomena that unfold across levels in an organization (Kozlowski and Klein 2000).

Our study has two main objectives. First, we conceptually clarify and empirically examine the influence of two distinct mechanisms of social network that individuals maintain within and outside of their work groups. Integrating two social network mechanisms, we develop a unified research model. In doing so, we can reveal the complex interplay between social network and knowledge accessibility in more detail. Second, we explore how social network properties influence the individual knowledge accessibility of project teams. Specifically, conducting a multi-level analysis that includes cross-level interaction effect, this study aims to contribute to the continued development and success of knowledge management.

## **2. Theoretical Foundation**

### **2.1 Social Network**

Traditionally, social network theorists have stressed the role of strong social ties or cohesive ties in fostering a normative environment that facilitates cooperation, trust, and cohesion (Coleman 1988). Such strong and dense relations among community or group members have been considered to engender network closure. This closure perspective focuses on the presence or absence of relations in local interaction, and emphasizes on the strength of ties inside a group.

In contrast, weak ties theory (Granovetter 1983; 1993) and structural hole theory (Burt 1992) highlight the brokerage opportunities created by dispersed ties. This brokerage mechanism focuses on the bridging capability at the macro level of social network rather than a locally limited strong social interaction. This perspective argues that if an individual has a broad and non-redundant social network, he or she may have more competitive advantages available to them through access to information, as well as a better control over the flow of projects that bring together people from opposite sides of the hole (Burt 2000).

Some researchers identify these two mechanisms as conflicting each other (e.g., Gargiulo and Benassi 2000). However, we identify that these two mechanisms on social network do not conflict, but they complement each other. Our view is consistent with the arguments of Adler and Kwon (2002), who conceptualize social network as being external and internal ties. Integrating the two mechanisms, we developed one single unified research model. Within the proposed model, we argue the different role of social network on knowledge management. Based on closure mechanism, we explain the role of social network on knowledge accessibility in the sense of cohesiveness that benefits within a group or community. Based on brokerage mechanism we explain the role of social network in the sense of a focal actor's external linkages providing cost-effective resources.

### **2.2 Knowledge Accessibility**

An individual's knowledge accessibility refers to the extent to which an individual has access to timely and relevant knowledge that is required to complete a task. People acquire needed knowledge mainly from two avenues. First, people exchange knowledge with other members within their work group; people retrieve knowledge from their group members and in return they go on to help others in need (Yuan et al. 2007). Such direct knowledge exchanges are an important avenue for people to gain access to knowledge stored within other group members. Particularly, intra-group tie strength is considered important when the information and knowledge has tacit elements that cannot be easily codified for sharing through written archives (Hansen 1999; Reagans & Zuckerman 2001).

Second, people can obtain external knowledge from outside the work group. In some cases, group members do not necessarily need to be dependent on other members to secure access to needed knowledge. It is sometimes more efficient for individuals to access external knowledge through their social networking outside their work group. In general, people attach greater importance to the use of external contacts while attempting to complete a given task or project successfully, when its characteristics are more complex and knowledge intensive.

### **2.3 Multi-level Approach**

The general concept of multi-level modelling is that individuals interact with the social contexts to which they belong, and that the properties of those groups are in turn influenced by the individuals who make up that group (Hox, 2002). Generally, the individuals and the social groups are conceptualized as a hierarchical system, and defined at separate levels of this hierarchical system. Naturally, such systems can be observed at different hierarchical levels, and variables may be defined

at each level. However, a single-level perspective can not adequately account for organizational behaviour. This leads to research into the interaction between variables characterizing individuals and variables characterizing groups.

### 3. Research Model and Hypotheses

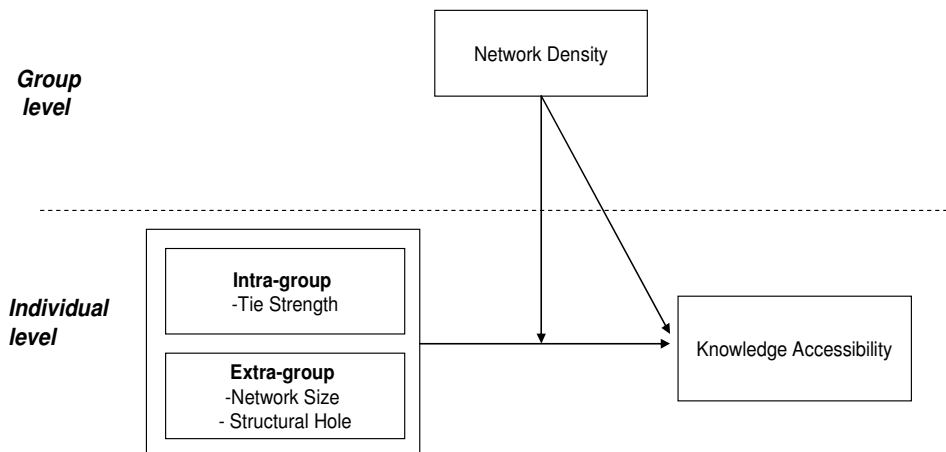


Figure 1. Research Model

#### 3.1 Individual-level Social Network

The closure mechanism of social network explains that an individual's close and strong relationships provide more accessibility and response to relevant knowledge than those with weaker relations (Coleman 1988). According to this perspective, strong social ties within a work group facilitate development of trust and support from others and lead to a more efficient accessibility to certain crucial resources (Podolny & Baron, 1997). This is because, as people get closer to each other, they become more willing to exchange their resources. In other words, strong social ties facilitate an exchange of resources and encourage transmission of knowledge (Uzzi 1996; Gulati 1995). More specifically, if an individual member wants to acquire implicit and tacit knowledge required to his or her task, then the strong social ties within group members are more helpful to access timely and relevant knowledge. Thus:

**[Hypothesis 1]: An individual's intra-group tie strength is positively associated to the individual's knowledge accessibility.**

Brokerage mechanism explains why and how organizational members seek outside information or knowledge to aid their projects through social-networking outside their work group (Ancona 1990; Ancona & Caldwell 1992). The theory of weak ties posits that rich networking leads to more non-redundant sources of information, since non-redundant contacts offer information that is additional rather than just overlapping (Burt 1992). In the same context, the structural hole theory argues that individuals, who occupy brokerage positions between those clusters, have better access to information and knowledge (Gargiulo & Benassi, 2000).

In summary, proponents of weak ties and the structural hole theory regard a dense network as a virtually worthless monitoring device. Each member knows what the other members of the group know, and all of them discover the same opportunities at the same time (Burt 1992). This implies that people connected closely to one another tend to know about the same things at about the same time. Extending this argument further, a large and diverse network gets more information benefits than a small, homogeneous network by bridging relationships that connect structural holes; and provide an individual with more timely and relevant knowledge (Burt 1992; Gubbins & Garavan, 2005). To assess the extent to which an individual has external contact, extra-group network size and structural hole are considered important network properties. Extra-group network size refers to the number of each individual's direct social ties with other actors outside the group. Structural hole means the gap between disconnected people. Thus, we can infer that if an individual has larger network or more structural hole in his or her network, then he or she is more likely to have more opportunity to access diverse and fresh knowledge.

**[Hypothesis 2]: An individual's extra-group network size is positively associated to the individual's knowledge accessibility.**

**[Hypothesis 3]: An individual's extra-group structural hole is positively associated to the individual's knowledge accessibility.**

### **3.2 Group-level Social Network**

Network density represents group-level cohesion. When members of a group are connected by strong, positive, multiple, and reciprocated relationship ties, the group's overall network is generally dense (Oh et al. 2006). Multiple scholars argue that the network density enhances conformity and solidarity within a work group (Krackhardt & Hanson 1993). This group-level network density is distinguished from individual-level tie strength (Podolny & Baron 1997). Group-level of closure increases the degree of trust, cooperation, and commitment, thereby leading to greater knowledge sharing (Sparrowe et al. 2001). By adopting this theoretical foundation to the context of project team, we can infer following hypothesis.

**[Hypothesis 4] Network density is positively associated to the individual's knowledge accessibility.**

From another perspective, excessive high-level group cohesion may hinder knowledge accessibility. This is because the group's closure may reduce the opportunities to find more non-redundant, fresh, and diverse information from outside the group (Burt 1992; 1997). Oh et al.'s (2004; 2006) research demonstrates that group-level network density at a very high level may decrease the group's knowledge accessibility. When we apply this notion to our research, the accessibility of individual-level knowledge from outside the group may be decreased, when the internal group network density is too high. The point of contention is that individual access to knowledge is contingent to the degree of group-level network density. In summation, the degree of knowledge that network density may facilitate can help individuals encourage social networking, resulting in more efficient and effective knowledge accessibility. Thus, we can infer that network density does indeed have a moderating effect on the degree of individual knowledge accessibility.

**[Hypothesis 5] A group's network density will moderate the relationship between an individual-level social network properties and knowledge accessibility.**

## **4. Sampling and Data Collection**

We employed social network analysis (SNA) to test our research model. SNA provides a more potent prediction of organizational behavior (Krackhardt & Hanson, 1993). Furthermore, SNA is very useful

in analyzing the structural tendencies of informal network forms (Contractor et al. 2006). For the social network analysis, at least 80% of team members should be administered the questionnaires. Teams with a response rate that is below 80% should not be considered for any further analysis.

We collected data from 42 project teams of 5, large Korean consulting firms. A total of 211 surveys were collected from 270 questionnaires. We discarded 39 questionnaires because the response rate within the concerned groups was below 80 %. About 172 individuals and 42 project teams were usable for final analysis. The average response rate of teams was 81.5%. The age of the respondents ranged from 25 to 47 years ( $M= 34.32$  years,  $SD = 4.08$ ). There were 33 women and 139 men. Job tenures ranged from 1 year to 23 years ( $M=7.10$ ,  $SD = 4.493$ ).

## 5 Measures

The questionnaires were designed to collect both network variables (e.g., group density, intra-group tie strength, extra-group network size, and structural hole) and non-network variables (e.g., individual access to knowledge). We obtain network data by using socio-metric techniques. We provide a list of all workgroup members and ask the respondents to indicate the nature their relations with each member along a set of dimensions identified in our questions. Non-network variables (e.g., individual access to knowledge and group performance) were gathered through questions using 5-point Likert-type scale (1= strongly disagree, 5=strongly agree).

### 5.1 Independent Variables

We collected data on task-advice relations using the roaster method. The roasters of team members had been established in communication with team members; and where applicable, team managements. As a result, all team roasters were reported to be ‘complete’ by all respondents. Following Burt (1992), we asked respondents to assess network properties of friendship network as well as task-advice network, “To what extent did you go out with this person for social activities outside work such as going out informal lunch, dinner, or drinks”, “To what extent did you meet this person to seek work-related advice” (Burt 1992, p. 123). These network data were valued on a five-point scale ranging from “not at all” (1) to “very much” (5). We constructed matrices that represented all of the informal socializing relationships among members of each group. Next, group-level network density, intra-group tie strength, extra-group network size, and structural hole were calculated. Group-level network density was calculated by the number of lines in a graph, expressed as a proportion of the maximum possible number of lines (Scott 1991). Intra-group tie strength was calculated by the average value of frequency of interaction with other group members.

To drive the numerical indices for network size and structural holes in each ego’s network, we adopted the procedure of the Burt’s work (1992). Network size refers to the number of contacts in an ego’s network. As a measure of structural hole, we use a network constraint index, which describes the extent to which a person’s network is concentrated in redundant contacts (Burt 1992). Constraint is high if contacts are directly connected to one another or indirectly connected through a central contact (Burt, 1992).

We used UCINet to compute social network variables for network density, and structural hole obtained from the social network data. Specifically, in order to drive network density, we first dichotomized the value in the socio-metric, then symmetries with the maximum value. To drive the numerical indices for the structural hole, we used the network constraint index. Network constraint refers to the extent to which a network is directly or indirectly concentrated in a single contract (Burt 1992). As a result, the lower the network constraint, the higher will be the number of structural holes that exist within the network. Table 1 shows the operational definition and formula of independent variables.

Level		Network Properties	Operational Definition
Group-Level		Density	<p>The number of linked lines expressed as a proportion of the maximum possible number of lines. The formula for density is</p> $\frac{1}{n(n-1)/2}$ <p>where            1: the number of lines present, n: the number of group member</p>
Individual-Level	Intra-Group	Tie Strength	The frequency of interaction with other group members.
	Extra-Group	Network Size	The total number of each individual's direct links with other actors outside the group
		Structural Hole	<p>The extent to which each individual occupied a structurally advantageous position, connecting otherwise unconnected others in the networks</p> <p>Structural hole = 1-network constraints</p> <p>The formula for network constraint is</p> $C_{ij} = (P_{ij} + \sum_q P_{iq}P_{qi})^2, q \neq i, j$ <p>where,  <math>P_{ij}</math> = the proportion of <math>i</math>'s relations invested in contact <math>j</math>  <math>\sum_q P_{iq}P_{qi}</math> = the proportion of <math>i</math>'s relation invested in contact <math>q</math>, who are in turn invested in contact <math>j</math></p>

Table 1. Operational Definition of independent Variables

## 5.2 Dependent Variables

We measured perceived knowledge accessibility on a five item scale adapted from Lurey and Raisinghani (2001). In order to assess the individual access to knowledge, we prefaced each of the items with a stem, "during the project." Specifically, we asked: (1) I could have generally access to adequate knowledge to complete my task. (2) I could have timely access to the required knowledge to complete my task. (3) I could easily acquire diverse knowledge in terms of quantity. (4) I could easily acquire adequate knowledge in terms of quality. (5) I could have access to the persons who possessed the knowledge that I needed to acquire

## 5.3 Control Variables

Gender and job tenure were used as control variables at the individual level. These variables were suggested to affect individual access to knowledge, since they might influence an individual's social network building.

## 5.4 Validity of Instruments

All of the independent variables were measured by the socio-metric technique, and were driven by numerical indices that ranged from 0 to 1. A factor analysis was conducted for the dependent variable-individual access to knowledge. To test for the construct validity of the individual access to knowledge, a principle axis factoring analysis was conducted with direct oblmin. The result of factor analysis showed that individual access to knowledge converged to one factor. The factor loadings for all five items were 0.828, 0.882, 0.849, 0.842, and 0.734, respectively. Eigen value of the one factor



was 3.738. The one factor explained 68.652 percent of the total variance. The scale also showed high reliability (Cronbach's alpha = .915).

Our analysis was conducted in Hierarchical Linear Modelling (HLM) version 6.02 to deal with a multi-level approach. Hierarchical Linear Modelling (HLM), a statistical technique, is gaining increased acceptance in the management literature (Hox, 2002). A main advantage of HLM is that it allows the examination of relationships at different levels while maintaining the appropriate level of analysis (Hoffman, 1996). We reported robust standard errors for fixed effects estimates. We estimated variance components using restricted maximum likelihood. We used procedures outlined by Hox (1995) in order to first determine whether there was a significant between-team variation in an individual's extra-group network building. This was a necessary condition that needed to be satisfied before we could test the specific hypotheses. We began using a "baseline model" to examine whether the lower-level variables exhibited sufficient variability for modelling cross-level influences (Hoffman and Gavin 1998). The percentage of total variance that resided between groups was significant for individual access to knowledge (ICC= .388,  $\chi^2 = 68.576$ ,  $P < .005$ ). Thus, it could be conducted that there was a potential for cross-level influence on all four individual level variables.

## 6. Results and Findings

The hypotheses of the present study required testing the cross level effects to address group-level variables (e.g., group's network density) and individual-level variables (i.e., individual's intra-group tie strength, extra-group network size, and structural hole). Table 2 and Table 3 report the HLM coefficients of all predictors of knowledge accessibility in friendship relations and task-advice relations respectively. Model 1 includes individual-level control variables (i.e., gender and job tenure). Model 2, 3, 4 examine the relationship between individual-level variables and knowledge accessibility. As predictors, we used intra-group tie strength, extra-group network size, and extra-group structural hole. Model 5 examines the influence of group-level variable on individual-level access to knowledge. Model 6 examines the interaction effect between group-level variable and individual-level variables.

In hypothesis 1, we expected the positive relationship between intra-group tie strength and knowledge accessibility at the individual level. Contrary to our hypothesis, intra-group tie strength in friendship network did not influence knowledge accessibility (see Model 2 in Table 2). However, intra-group tie strength in task-advice network did significantly influence knowledge accessibility,  $\gamma_{30} = .13$ ,  $SE = .07$ ,  $p < .1$  (see Model 2 in Table 3).

In hypothesis 2 and 3, we examined the effect of extra-group network size and structural hole on knowledge accessibility, respectively. As we expected, extra-group network size  $\gamma_{40} = .04$ ,  $SE = .02$ ,  $p < .1$  (see Model 3 in Table 2) and structural hole,  $\gamma_{50} = .28$ ,  $SE = .15$ ,  $p < .1$  (see Model 3 in Table 3) significantly increased knowledge accessibility in friendship network. The effect of extra-group network size in task-advice network on knowledge accessibility was also significant,  $\gamma_{40} = .07$ ,  $SE = .02$ ,  $p < .01$  (see Model 3 in Table 3). However, the effect of extra-group structural hole on knowledge accessibility was not significant in task-advice network (see Model 4 in Table 3).

In hypotheses 4, we examined the effect of group-level network density on individual-level knowledge accessibility. The HLM results showed that group-level network density significantly increased knowledge accessibility in friendship network,  $\gamma_{01} = .59$ ,  $SE = .32$ ,  $p < .1$  (see Model 5 in Table 2), while it was not significant in task-advice network (see Model 5 in Table 4).

In hypothesis 5, we examined the cross-level interaction effect. The results presented that group-level network density moderated the effect of extra-group network size on knowledge accessibility in task-advice network,  $\gamma_{41} = -.40$ ,  $SE = .22$ ,  $p < .1$  (see Model 6 in Table 3).

Figure 2 shows that every group has different slope, which represents the relationship between extra-group network size and knowledge accessibility. Figure 3 demonstrates that the effect of extra-group

network size on knowledge accessibility is different at the degree of group-level network density. HLM provides the graphic function substantiating the moderating effect by categorizing high-level network density groups and low-level network density groups. The result shows that the effect of extra-group network size in task-advice network has positive influence on knowledge accessibility, when the degree of group-level network density was low. On the contrary, the effect of extra-group network size on individual access to knowledge decreased when the degree of group-level network density was high in task-advice network.

		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		
Fixed Effect		Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	
<b>Individual Level</b>	INTRCPT	$\gamma_{00}$	<b>3.18***</b>	0.07	<b>3.18***</b>	0.07	<b>3.18***</b>	0.07	<b>3.19***</b>	0.07	<b>3.18***</b>	0.06	<b>3.19***</b>	0.06
	Gender	$\gamma_{10}$	0.05	0.12	0.03	0.14	0.07	0.12	0.03	0.12				
	Tenure	$\gamma_{20}$	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.02				
	Intra-group Tie Strength	$\gamma_{30}$			0.10	0.08								
	Extra-group Network Size	$\gamma_{40}$					<b>0.04*</b>	0.02						
	Extra-group Structural Hoel	$\gamma_{50}$							<b>0.28*</b>	0.15				
<b>Group Level</b>	Density	$\gamma_{01}$								<b>0.59*</b>	0.32			
	Tie Strength x Density	$\gamma_{31}$										-0.53	0.48	
<b>Cross Level</b>	Size x Density	$\gamma_{41}$										-0.11	0.18	
	Structural Hoel x Density	$\gamma_{51}$										-0.15	1.54	

Table 2. Results of Hierarchical Linear Modelling Analysis on Individual's Knowledge Accessibility (in friendship relations)

\* p<.1; \*\* p<.05; \*\*\* p<.01

		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		
Fixed Effect		Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	
<b>Individual Level</b>	INTRCPT	$\gamma_{00}$	<b>3.18***</b>	0.07	<b>3.18***</b>	0.07	<b>3.18***</b>	0.07	<b>3.22***</b>	0.07	<b>3.20***</b>	0.07	<b>3.21***</b>	0.08
	Gender	$\gamma_{10}$	0.05	0.14	0.07	0.12	0.00	0.12	0.00	0.12				
	Tenure	$\gamma_{20}$	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01				
	Intra-group Tie Strength	$\gamma_{30}$			<b>0.13*</b>	0.07								
	Extra-group Network Size	$\gamma_{40}$					<b>0.07***</b>	0.02						
	Extra-group Structural Hoel	$\gamma_{50}$							0.20	0.24				
<b>Group Level</b>	Density	$\gamma_{01}$								0.17	0.37			
	Tie Strength x Density	$\gamma_{31}$										-0.05	0.45	
<b>Cross Level</b>	Size x Density	$\gamma_{41}$										<b>-0.40*</b>	0.22	
	Structural Hoel x Density	$\gamma_{51}$										1.87	1.87	

Table 3. Results of Hierarchical Linear Modelling Analysis on Individual's Knowledge Accessibility (in task-advice relations)

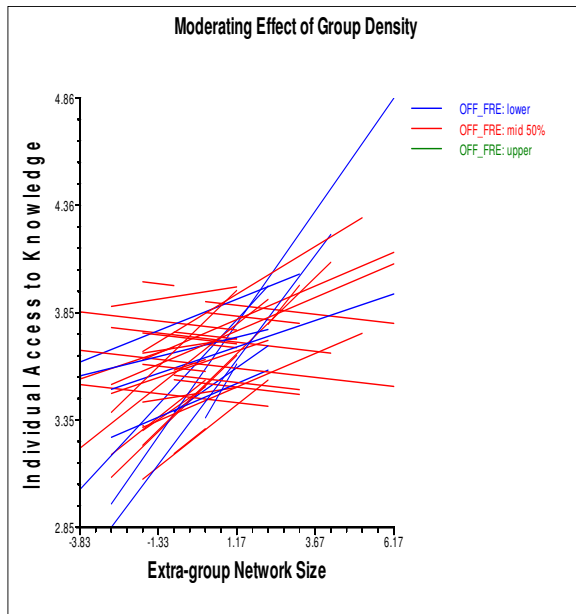


Figure 2. The moderating effect of network density (All groups)

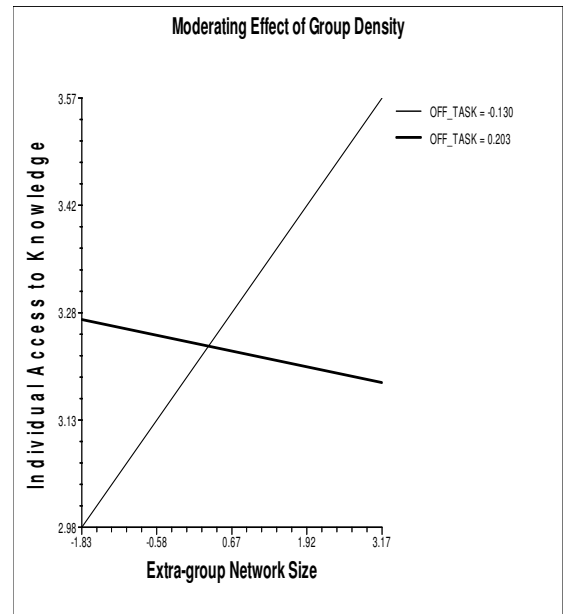


Figure 3. The moderating effect of network density (High/Low)

## 6. Discussion and Implications

Before discussing the implications of our findings, we note that our findings must be interpreted in light of the studies' limitations. First, we measured intra-group tie strength by frequency of contact. The present study did not include emotional closeness as a measure of tie strength. Although it has been reported that frequency and closeness are highly correlated (Hansen, 1999), including emotional closeness among group members would provide a more comprehensive understanding of the relationship between virtuality and social networks.

Project teams are distinct in that they are created for only a limited period of time; and cease to exist, once the project is completed (Hargadon & Sutton, 1997). As business paradigm is moving toward emphasizing flexibility by organizing project teams, the role of social network shaping individual's capability to access to knowledge is getting more attentions. Despite a rapid increase in the number of organizational units such as project teams, little is known about their structure or performance (Ahuja & Carley 1999). In this point, this study aims to address the knowledge accessibility of the project teams through the lens of social network.

As we hypothesized, it was found that the research results backed the existing two different social network mechanisms in terms of internal cohesion and external bridging. However, the effect social network on knowledge accessibility varied along the type of network involved. For example, group-level network density significantly influences knowledge accessibility in friendship network, while task-advice network did not directly influence knowledge accessibility. Supporting the closure mechanism, the results showed that the strength of intra-group ties positively influenced individual access to knowledge, regardless of network types. Supporting brokerage mechanism, extra-group network size and structural hole positively influenced individual access to knowledge in task-advice network and friendship network respectively.

The most important standpoint is that the effect of social network structure varies along the type of social network involved. In our study, task-advice network density did not directly influence individual access to knowledge. Instead, task-advice network density moderated the effect of the relationship between extra-group network size and individual access to knowledge. This result indicates that a far too high level of task-advice network density reduced the opportunities available to access more diverse and fresh information and knowledge outside the team. Therefore, we argue that the role of social network should be considered at different network levels and different network properties.

## 7. Conclusion

In conclusion, this study suggests that project managers should more pay attention to the developing appropriate social network structure considering the network type they involved in as well as the level of network properties to maximize capability to access knowledge both within and outside a work group. Project team managers also should fine-tune or reconfigure their network to be efficient with equilibrium between internal cohesion and external bridging ties.

As organizational flexibility is emphasized, the interest in human behaviour in their social networks has increased rapidly among both academics and the public. However, there has been little empirical research that compares the influence of the two social network mechanisms with a single model. In this regards, we believe that this study is an important step toward achieving a refined understanding on how to integrate the internal network cohesion and external bridging ties.

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