Managing and Developing Absorptive Capacity:

A Multilevel Network Approach

ABSTRACT

Not only internal organizational factors, but also external network factors can influence absorptive capacity. We develop a multilevel conceptual model relating key network properties to absorptive capacity. We argue that the important properties of network structure for a firm’s absorptive capacity are network positions (i.e. centrality and structural autonomy), properties of connected relations (i.e. strength-of-ties), and the overall network properties (density network) will influence the scope, flexibility and efficiency of knowledge absorption. By occupying a central position in the network or balancing different ties, a firm can develop the overall absorptive capacity. Lastly, this study concludes implications and the future direction of research.

Keywords: Absorptive Capacity, Network Approach
INTRODUCTION

Knowledge can be treated as the most important strategic asset for firms (Grant, 1996a). Hence, one of the most important management logic for modern enterprises is how to acquire the knowledge for maintaining the competitive advantages. However, a firm has two critical factors in acquiring knowledge: willingness and capability. The former involves organizational culture and learning intention, the latter relates to absorptive capacity. A firm’s absorptive capacity is primary discussed in this article. Lane and Lubatkin (1998) and Tasi (2001) suggest that absorptive capacity is an important factor that affects the assimilation of new knowledge. Furthermore, developing and maintaining absorptive capacity is critical to a firm’s long term survival and success because absorptive capacity can reinforce s firm’s complement and refocus the firm’s knowledge base (Lane & Koka, 2006) and subsequently lead to innovation(Tsai, 2001).

Recently many researchers brought absorptive capacity into their analyses for explaining complex organizational phenomena. The importance of absorptive capacity has been noticed across the fields of strategic management (Nahapiet & Ghoshal, 1998), technology management (Schilling, 1998) and international business (Kedia & Bhagat, 1988), but few have captured and discussed the richness and multidimensionality of absorptive capacity (Jansen, Van den Bosch, & Volberda, 2005; Lane, Koka, & Pathak, 2006). Moreover, most studies have focused on the competitive benefits of absorptive capacity, such as well absorptive capacity contributes to organizational learning (Levinson & Asahi, 1995; Van Den Bosch, Volberda, & De Boer, 1999), make firms understand specific new knowledge and correctly evaluate new technology they want to carry out (Cohen & Levinthal, 1990), facilitate interorganizational knowledge transfer (Szulanski, 1996) and innovation (Cohen & Levinthal, 1990; Zahra & George, 2002). However, antecedents of absorptive capacity have
been largely ignored (Jansen et al., 2005; Lane et al., 2006), that is, most researchers treat absorptive capacity as a taken-for-granted construct, few of them have developed strategies and processes for absorptive capacity except for Van den Bosch et al. (1999) and Jansen et al. (2005). Van den Bosch et al. (1999) and Jansen et al. (2005) have discussed internal antecedents of organization, namely organizational forms and combinative capabilities and test their relationships with different dimensions of absorptive capacity. However, external antecedents have not been tested and discussed clear and definitely how they influence on absorptive capacity.

Cohen and Levinthal (1990) suggest that the firm develops broad and active relationships in internal and external network will reinforced its knowledge and understand other’s capabilities well. As a result, employees’ absorptive capacities are leveraged all the more, and the organization’s absorptive capacity is enhanced. For that matter, absorptive capacity is not only influenced by internal factors, but also by antecedents of network of external relationships. Powell, Koput and Smith-Doerr (1996) analyzed learning-network of biotechnology industry, and pointed out a firm can obtain effectiveness for developing absorptive capacity through participating in external industrial network. Jansen et al. (2005) suggest the researches towards absorptive capacity should incorporate external linkages and interactions of organizational units in analyzing absorptive capacity. The assertions above apparently imply that the relationships in external network are also the antecedent of absorptive capability. To our knowledge, despite the previous researches have referred to the relationship between external network relationships and absorptive capacity, this particular issue has not been discussed thoroughly. Furthermore, network approach is a multi-level concept (Klein, Tosi, & Cannella, 1999), including actor-level, pair-level and network-level (Gnyawali & Madhavan, 2001). Each of the levels concerns a different degree and type of interorganizational interactions, so the influence of three levels on absorptive capacity is
different. Therefore, we attempt to explore the impacts of different levels of network on absorptive capacity.

As discussed above, due to the facts that researchers have seldom studied the external antecedents influencing absorptive capability and network relationships being an important topic of organizational management, this article attempts to introduce external network in which firms are embedded to examine the influence of three-levels of network on absorptive capability. By our discussion, we hope this article could contribute to existing theory of absorptive capacity.

THEORETICAL OVERVIEW

The Absorptive Capacity Literature: A Brief Review

Cohen and Levinthal (1989) introduced the absorptive capacity constructs as follow: the firm’s ability to identity, assimilate, and exploit knowledge from environment. Follow-up researchers (e.g. Szulanski, 1996; Lane & Lubatkin, 1998; Tasi, 2001; Phene, Fladmoe-Lindquist, & Marsh, 2006) have gradually developed related researches on the basis of this groundwork. For example, Szulanski (1996) indicates that if knowledge accepters lack absorptive capacity and they are unable to transfer related knowledge smoothly. Tasi (2001) argues that organizational units in a firm can produce more innovations and enjoy better performance if they occupy central network positions that provide access to new knowledge developed by other units, but this effect depends on units’ absorptive capacity. Phene et al. (2006) indicate that absorptive capacity will limit the effective use of knowledge. However, most researches treated absorptive capacity as a moderating variable and antecedents, and just thought absorptive capacity as taken-for-granted manner in a firm. Lane et al. (2006) point
out that a firm should develop and build processes and policies to manage and expand absorptive capacity.

Although some researches have mentioned and tested the factors influencing absorptive capacity, the majority only emphasize the internal factors of organization. For instance, Van Den Bosch et al. (1999) suggest that firms’ internal organizational forms (i.e. functional form, divisional forms and matrix form) and combinative capabilities (systems capabilities, coordination capabilities, and socialization capabilities) can influence their absorptive capacity. Functional form has a high potential for efficiency of knowledge absorption, division form has a high potential for both scope and efficiency of knowledge absorption, and matrix form has a high potential for both scope and flexibility of knowledge absorption. Furthermore, system capabilities can increase efficiency of knowledge absorption, coordination capabilities have a high potential for both scope and flexibility of knowledge absorption, and socialization capabilities have a high potential for efficiency of knowledge absorption.

After reviewing the literatures about absorptive capacity, Zahra and George (2002) pointed out the affect of several factors on absorptive capability, but the main focus has been on internal factors of firm, such as past experiences, activation triggers and social integration mechanisms. The accumulation of organizational experiences in the past will influence the ability obtained and direction of future knowledge developed, because it has an important relation between organizational experiences and memory. These factors influence firms to interpret incoming information, guide actions and affect organizational cognizance. Triggers are events that encourage and force a firm to respond to internal and external stimuli like all kinds of organizational crises, but crises threaten can intensify a firm’s efforts to learn new skills, internalize and eternal knowledge. Social integrate mechanisms can facilitate free flow of information and allow firm to transform and exploit those information.
Lane, Salk, and Lyles (2001), in their research of the learn of international joint venture, found prior related knowledge and business relatedness of the joint venture encourage a firm to understand new knowledge from their partners and offering of trains promote to internalize knowledge. As for other internal factors which influence on absorptive capacity, brought up by previous researches, also include educational degree and the academic level (Rothwell & Dodgson, 1991; Vinding, 2000), organizational culture (Lloyd, 1998), firm size (Welsch, Liao, & Stoica, 2001), organizational rigidity (Davenport & Prousk, 1998; Welsch et al., 2001).

In contrast with the studies on internal factors which influence on absorptive capacity, few researches probed into the external factors which influence and develop absorptive capacity and they did not analyzed profoundly. For example, Bowman and Hurry (1993) point out interorganizational relationships are able to enhance a firm’s absorptive capacity. Powell et al. (1996) suggest that a firm participating external industrial network can obtain effectiveness of developing absorptive capacity. However, it is necessary to use external network approach to examine a firm’s absorptive capacity, because for the most part, a lot of new knowledge come from the external network where firms exist, and interaction with external members of network is one of the source of acquiring knowledge (Zahra & George, 2002), that is, network is an important depository of resources for firms.

Gulati, Nohria and Zaheer (2000) point out firms are embedded in networks of social, professional, and exchange relationships with other individual and organizational actors, that is, networks encompass a set of firm’s relationships, hence conduct and performance of firms can be more fully understood by examining the network of relationships in which firms are embedded. Knoke (1990) thought each actor participates in the social environment constructed by many actors, and all the behavior, attitude and belief of other actors will affect the actor’s behavior. Probing into the behavior of actors with network approach can be analyzed from variety of structural levels in the social system, and these structural levels are
constructed by the relative mode among individuals. Granovtter (1985) point out the network structures can restrain the autonomy of the individual actor and shape his behavior. Meanwhile, the status of a member in the network would affect his actions.

As discussed above, firms are embedded in the external network, and the network will influence firms’ actions and performance. For this reason, examining a firm’s absorptive capacity can not just focus on the internal perspective of a firm, because performance and actions of a firm are influenced by external network where the firm located, hence it is necessary to go through the structures of external network to examine a firm’s absorptive capacity.

**Dimensions of Absorptive Capacity.** Based on Grant’s (1996a) three characteristics of knowledge integration, Van Den Bosch et al. (1999) assume the content and process of a firm’s knowledge absorption can be analyzed by using three dimensions of knowledge absorptive, that is, efficiency, scope, and flexibility. More specifically, in terms of standpoints of absorptive capacity, they especially emphasize a firm’s efficiency, scope, and flexibility of knowledge absorption. Efficiency of knowledge absorption means how firms identify, assimilate, and exploit knowledge from a cost and economies of scale perspective. Scope of knowledge absorption refers to the breadth of component knowledge a firm draws upon. Flexibility of knowledge absorption can be treated as the extent to which a firm can access additional, and reconfigure existing, component knowledge.

How the external network in which firms participate influence and enhance their efficiency, scope, and flexibility knowledge absorption, ceteris paribus the level of prior related knowledge is the main purpose of this article.

**Network Perceptive**

Building on the above, we try to develop a multilevel model of network to specify how
structural properties of network influence a firm’s absorptive capacity. Interorganizational networks are linked by both structural and relational embeddedness (Gulati, 1998; Uzzi, 1999). Structural embeddedness consists of various patterns of direct and indirect links among network members. Relational embeddedness is defined as the degree of reciprocity and closeness among network participants (Rindfleisch & Moorman, 2001). German sociologist Simmel, founder of social network theory, developed network theory based on Structuralism. The essential thought of Simmel is the duality within an actor and a group. It is exactly when joining a group, an actor will get restrained from it and build the essential relationship between an actor and a group, that is, so-called social network relationship.

Wilkinson and Young (2002) indicate that examining a firm and relationship behavior and performance must consider five groups of factors: (a) characteristics of the relationships and interactions in which a firm is involved; (b) characteristics of a firm’s relationship partners; (c) characteristics of connected relations and their interactions; (d) characteristics of a firm’s network position; and (e) characteristics of the network as a whole. Furthermore, Gnyawali and Madhavan (2001) point out that the key advantage of network approach is its potential for multilevel analysis, that is, actor-level, pair-level and network-level analyses (Wasserman & Faust, 1994), as well as competitive behavior of firms can be more fully understood and specific analyzed by examining these three levels. For this reason, while researching a firm’s actions, it should not be observed only in the angles of a firm but in the network in which the firm is embedded. From social network theory, the tasks of network researches try to employ specific structures of social network to examine an actor’s actions and then fully understand a firm’s performances. These structures include the properties of network position which the focal firm occupies, the properties of interconnection among the focal firm and other network members in the network, and the properties of the network as a whole.
There are two key reasons why a multilevel model of network is suitable for this research. First, network is a multilevel phenomenon (Gnyawali & Madhavan, 2001), with causal processes that cross a number of levels of analysis (Pettigrew, 1992), so introducing network approach to examine an actor’s action has its own advantage, that is, it can expose a variety of structural levels in social system (Knoke, 1990). Second, multilevel model of network provide the richer and deeper portrayal of organizational phenomena, and allow a more integrated exploration of social phenomena (Kostova, 1999). These two reasons are both very important considerations in the firms’ absorptive capacity. For this reason, we attempt to examine a firm’s absorptive capacity by the advantage of network approach in multilevel analysis, that is, actor-level (i.e. properties of network position which the focal firm occupies), pair-level (i.e. the properties of connected relations (strength-of-ties)) and network-level (i.e. the properties of the network as a whole) analyses.

**Dimensions of Network Structure.** We adopt three criteria for selecting the independent variables. First, the variables should be consonant with a firm’s efficiency, scope, and flexibility of knowledge absorption. The network structures literatures have largely focused on firm and network levels—both very useful considerations in knowledge acquirement. However, the pair-level interactions are very important too, because the strength of ties among the focal actor and other network actors could be used gainfully to understand information flows among them (Granovetter, 1986). We propose the ties among them could influence on a firm’s absorptive capacity. Second, the variables should have direct implications for knowledge and information flows, so that we can deduce the influence of the variables on a firm’s absorptive capacity. Finally, the variables should have sufficient theoretical support.

There are four variables are compatible with above criterions, because they are closely related in examining a firm’s efficiency, scope, and flexibility of knowledge absorption, these are (a) centrality (the property of firm-level) (b) structural autonomy (the property of
firm-level), (c) strength of ties (the property of pair-level), and (d) density (the property of network-level). Centrality means the extent to which a firm occupies a central position in the network. Structural autonomy refers to the extent to which a firm can free move in the network. Strength of ties can be distinguished into strong ties and weak ties, the former are viewed as having higher levels of closeness, reciprocity, and indebtedness than the latter. Density refers to the extent of interconnection among the actors in the network. Density and centrality, for instance, can measure amount of accessing knowledge. Strong and weak ties represent different opportunities for a firm to access diverse knowledge and information. A firm with structural autonomy can have different opportunities in accessing diverse and no-redundancy knowledge.

**CONCEPTUAL FRAMEWORK AND PROPOSITIONS**

As mentioned above, we build a multilevel framework of network in Figure 1. The conceptual framework includes three dependent variables of absorptive capacity (i.e. efficiency, scope and flexibility of knowledge absorption) are influenced by four structural properties (i.e. centrality, structural autonomy, strength of ties and network density). Different structural properties represent different opportunities for a firm to absorb new knowledge. Therefore, the basic logic in this article is as following: how and why the actor-level, pair-level and network-level properties in the network influence absorptive capacity, ceteris paribus the level of prior related knowledge. Especially, we treat network density as both independent and contextual variables. As we indicated in the above definitions, network density refers to the extent of interconnection among the actors in the network. In general, the extent of interconnection among actors could not be controlled and shaped by any single firm in the network, unless all of the network actors depend on a certain firm that make the firm
has the greatest power to control and shape network density. More specifically, for most actors, the network density could not have been controlled by any one of them. For this reason, other than besides independent variable, we treat network density as the contextual variable as well. We assume network density has moderating influence on the part of relationships suggested in proposition 1 and proposition 2 that we will discuss below carefully.

Network Centrality

Network centrality refers to the extent which the focal actor occupies a strategic position in the network by virtue of being involved in many significant ties (Wasserman & Faust, 1994; Gnyawali & Madhavan, 2001), and the degree of accessing and controlling valuable resources (Burt, 1992). By occupying centrality in the network the firm can obtain higher volume and novel knowledge (Rogers, 1995; Gnyawali & Madhavan, 2001) because network ties are conduits for resources (include information and knowledge) (Galaskiewicz, 1979; Gulati et al., 2000). Tasi (2001) point out by occupying a central position in the network a unit is more likely to access desirable strategy resources and necessary knowledge that can be applied to the unit’s innovative application. Therefore, we suggest that:

**Proposition 1: All else being equal, as the centrality of a focal firm relative to others in the network can increase the firm’s efficiency, scope and flexibility of knowledge absorption.**

Structural Autonomy

Structural autonomy is a key actor-level property. Gnyawali and Madhavan (2001) indicate that structurally autonomous actor has structural holes between the actors it is
connected to but is free of structural holes at its own end. They further point out that if firm A
has ties to both firm B and firm C, but B and C are not directly tie between them, B and C can
associate each other only though the firm A, for this reason, the firm A can exploit the
structural hold between B and C. By holding structural holds a firm can enhance benefit of
information and knowledge, because by structural holds the actor can access many actors who
dose not directly ties among them (Burt, 1998), that means the firm can acquire
no-redundancy and high quality information and knowledge, and can access novel
information in time and knowledge emerge in interaction. Structurally autonomous actor can
hold richer and more varied knowledge due to acquirement of no-redundancy knowledge. In
general, in the network, the more automatic position a firm owns the more no-redundancy
knowledge the firm will acquire, and the more resources (include knowledge and information)
the firm can redeploy.

However, in order to keep autonomy and independence the structurally autonomous
actor could not build the strong ties at its own ends, because strong ties will increase its
switching cost and make it lack in these relationships to such an extent that it can not
maintain autonomy and independence. However, in general, strong ties are characterized by a
high degree of relational embeddedness and a high degree of knowledge redundancy, hence
they can provide sharing belief and common language to encourage knowledge application
and understanding (Hansen, 1999). While structurally autonomous actor can acquire new and
breadth of knowledge by its autonomy and independence, lack of strong ties would not let it
effective understand and apply knowledge. Therefore, we suggest the following:

**Proposition 2:** All else being equal, as the structural autonomy of a focal firm relative to
others in the network can increase the firm’s scope and flexibility of knowledge
absorption, but decrease the firm’s efficiency of knowledge absorption.
Strength-of-Tie

The strength-of-ties literature is concerned with the nature of the relational bond between two or more social actors, and the effect of this bound on their information sharing activities (Rindfleisch & Moorman, 2001), a tie’s strength is viewed as a combination of duration, emotional intensity, intimacy, and reciprocal services (Chae, Koch, Parawdice, & Huy, 2005), as well as social ties can facilitate or inhibit access to resources and action for mutual benefit (Coleman, 1990). According the strength of the connection, ties can be distinguished into strong ties and weak ties (Granovetter, 1973).

Derived from Granovetter’s (1973) weak-tie theory, distant and infrequent relationship, (i.e. weak tie), are efficient for knowledge sharing on account of they provide the opportunities for accessing novel information by bridging otherwise disconnected groups and individuals in organization. The actor with weak ties (i.e. infrequency and distant relationships), for instance, could have a more advantageous search position in the network than the actor with strong ties because their contacts are not likely to provide redundancy knowledge. Hansen (1999) point out that non-redundant knowledge can be distinguished into two kinds. The first kind is new information about opportunities for knowledge use. For example, other network actors can point to specific knowledge that be owned by actors to which the focal actor has no direct ties. The second kind is about acquiring non-redundant knowledge by direct contact, that is, direct inter-unit contacts are less redundant to the extent that they provide different types of knowledge that can be used by a focal unit. Thus, weak ties characterized by non-redundancy and novel knowledge.

Strong ties, in contrast, are viewed as having higher levels of closeness, reciprocity, indebtedness and emotional intensity than weak ties (Granovetter, 1973; Chae et al., 2005). However, strong ties are likely to lead to redundant knowledge because they tend to occur
among a small group of actors in which everyone knows what the others know (Hansen, 1999). Involving closed reciprocity relationship lead the actors frequently acquire the same knowledge. Strong ties may lead to redundant knowledge and few opportunity for acquire new knowledge; however, Rindflesich and Moorman (2001) point out that redundant knowledge can improve information utilization and enhance innovation by providing a shared base of tacit understand, similar organizational routines, and common beliefs that are critical to understanding and applying knowledge more efficient. However, it is impossible for a firm with weak ties to apply knowledge more efficient because a lower of closeness and reciprocity and lack of dense interaction lead to the fewer opportunities for building shared base of tacit understanding, similar organizational routines, and common beliefs.

Moreover, we consider that it has a trade-off relationship between weak ties and strong ties because it is costly to maintain and cultivate strong and closed relations. Because of these cost, an actor could rarely afford to maintain relations with many other actors, let alone maintain strong ties that require a lot of resource and times. Therefore, there are opportunity costs between maintaining strong relations and develop new but weak relations, that is, instead of maintaining and cultivating a strong tie, an actor can develop a lot of weak ties that provide new and broader knowledge. As discussed above, we consider that:

**Proposition 3:** All else being equal, the firm with a lot of strong ties can increase its efficiency of knowledge absorption it can enhance, but decrease the firm’s scope and flexibility of knowledge absorption.

**Proposition 4:** All else being equal, the firm with a lot of weak ties can increase its scope and flexibility of knowledge absorption, but decrease the firm’s efficiency of knowledge absorption.
Directly Effect of Network Density

Gnyawali and Madhavan (2001) point out the network density is a key network-level property that means the extent of interconnection among the network actors, and the greater the interconnectedness the higher density. They consider that density networks not only can function as closed systems, trust, shared norms and common behavioral patterns develop more easily (Burt, 1998; Coleman, 1990), but also encourage faster and more efficient flows of information and other resources (include knowledge) because of the many interconnections and shared routines for information collection and distribution (Coleman, 1990; Valente, 1995). The highly interconnected network provides actors with opportunity to get to know one another and interactions that is critical to facilitate a high degree of socialization among actors. Camerer and Vepsalainen (1988) argue that socialization can encourage the efficiency of knowledge integration and knowledge utilization.

However, the higher the degree of connection among actors in the network, the more similar information the actors will get and may result in the few opportunities for accessing special knowledge and stimulus. Moreover, Dyer and Nobeoka (2000) point out that highly interconnected network (such as Toyota’s network) has potential risks. First, the diversity of knowledge that resides in the network will diminish over time. With firms in the network become increasingly alike through imitation, the network may be less effective at generating new knowledge. Second, the network may become so inwardly focused that it will be unable to respond to and adopt major technological innovations that occur in firms outside of the network.

Building on above, in the highly interconnected network, due to the actors’ acquaintance with each other, the knowledge has a highly redundancy. Though it can reduce the cost in searching for knowledge, and the information may float speedily and efficiently, and then
result in the efficiency of knowledge absorption for the actors. Nevertheless, absorbing broader and latest knowledge is limited. Therefore, we suggest the following:

**Proposition 5:** All else being equal, as network density increases any firm’s efficiency of knowledge absorption will increase, but any firm’s scope and flexibility of knowledge absorption will decrease.

**Moderating Effect of Network Density**

As we pointed out above, network density not only has a directly influence on proposition 1 and proposition 2, but also has a moderating influence on the part of relationships interpreted in both them. Specifically, as an increase in network density will change the part of main effects of centrality and structural autonomy.

**Moderating Effect of Network Density on Centrality Effects.** Centrality has special characteristics, that is, superior knowledge advantage about absorbing new and broader knowledge stemming from centrality. Because of the rapid knowledge and information flows in a dense network, not only the central firm but other actors in network can acquire new knowledge and accumulate knowledge. Consequently, as an increase in network density, the benefits of knowledge flow enjoyed by the central firm are likely to be decreased. Therefore, we suggest the following:

**Proposition 6:** All else being equal, an increase in network density will weaken the positive relationship between centrality and scope and flexibility of knowledge absorption.

**Moderating Effect of Network Density on Structural Autonomy Effects.** According to Gnyawali and Madhavan (2001), it is may be more difficult to attain structural autonomy in a dense network; however, if it can be, the benefits will enhance because the other firms could
be lacked in a dense network of redundant relationships or be precluded partnering with other viable firms. They assume a situation for us to further understand network density moderating influence on structural autonomy is described as follow. The structurally autonomous firm A, with ties to B and C, but B and C are not directly tie between them, and no ties to D, which is isolated. Given that B and C establish a direct tie with each other now, effectively extinguishing A’s structural hold advantage. A can then retain its structural autonomy by terminating one of its existing ties, that is, A can retains the tie with B but terminates the tie with C, it still get information about C and knowledge owned by C from B, because B and C are connected, then A can invest the resources in a new tie with D. For this reason, the structurally autonomous firm can maintain the benefits of knowledge, that is, scope and flexibility of knowledge absorption, as before even though in the highly interconnected network.

Furthermore, the structural autonomy main characteristics are a low degree of knowledge redundancy and a breadth of knowledge, while increasing density increases the redundancies in the network, the firm’s advantage will be strengthened, because if it maintain its autonomy and freely move in the network without be locking into unproductive relationships. It is critical to increasing the scope of knowledge and access new knowledge, and then it can cause the more and more the benefits of knowledge.

As we discussed above, in the density network, the structurally autonomies firm can enjoy the benefits of a speedy flow of knowledge on account of increasing density among the firms it is tied to, and of a low degree of knowledge redundancy on account of linking with structural holds. Moreover, in the highly interconnected network, the structurally autonomies firm can apply its advantage to change a pattern of the ties it is tied to, so that it can decrease the level of redundant acquaintances and access a lot knowledge. Thus, even though in the density network, the structurally autonomies firm still can maintain the advantage in scope
and flexibility of knowledge absorptive.

**Proposition 7:** All else being equal, an increase in network density will strengthen the positive relationship between structural autonomy and scope and flexibility of knowledge absorption.

**DISCUSSION AND CONCLUSION**

Not only internal organizational factors, but also external network factors can influence firm’s absorptive capacity. This article has argued that the firm’s network position and the overall network properties will influence the firm’s scope, flexibility and efficiency of knowledge absorption. Our framework shows how network positions and network properties effect on the level of a firm’s absorptive capacity. From this framework, we derived various ways in which firms, as a result of managerial intentionality, can build and change their network position and develop weak and strong ties with other firms in network in order to increase their absorptive capacity.

Knowledge is usually distributed unevenly within an external network. Network position, an actor location in an external network, describes its access to knowledge. A firm can occupy a central position in the network by connecting with many significant ties to enhance and develop its absorptive capacity, because ties provide channels for acquiring knowledge. Weak ties can enhance a firm’s scope and flexibility of knowledge absorption; contrary to weak ties, strong ties can increase a firm’s efficiency of knowledge absorption. For this reason, a firm can build and develop overall absorptive capacity by developing and investing in network ties. Developing ties have to spend a lot of cost and time; however, not all of network actors have abilities and resources to developing and occupying a central position in the external network.
Nevertheless, a firm still develops and enhances absorptive capacity by their structural properties in the network.

A firm can develop and enhance its scope and flexibility of knowledge absorption by increasing its autonomy, because the structurally autonomies firm’s autonomy and independent that is critical to acquiring new and broad knowledge. Furthermore, a firm also can enhance and develop its efficiency of knowledge absorption by means of investing in strong ties development, and enhance its scope and flexibility of knowledge through weak ties it is tied. There are always pros and cons between maintaining strong relations and develop new but weak relations; therefore, a firm has to be aware of the balance between those two relations for 360 degree development of absorptive capacity.

In terms of network density, it refers to the extent of interconnection among the network actors, the greater the interconnectedness, the higher density and the more the actors’ acquaintance with each other. It is easy to develop trust and shared norms and common language that are critical to increase efficiency of knowledge application and understanding in the highly density network. However, it is very difficult for the network actors to acquire new and broad knowledge that are attributable to the higher degree of knowledge redundancy in the highly interconnected network. At this time, a firm can maintain its autonomy among networks, that is, enhancing its efficiency of knowledge absorption in the high dense network and developing it scope and flexibility of knowledge absorption by participating in new network.
FUTURE RESEARCH ISSUE

This article introduces external factors, especially on externally network approach, to reinterpret the development of a firm’s knowledge absorption. However, in terms of the influences of external factors on a firm’s absorptive capacity, in addition to network approach, other important factors may be resided in organizational and strategy theories (such as institutional theory and resource dependence theory). For this reason, further research could combine other theoretical conceptions to achieve complementary effects. By doing this, researchers could contribute to the overall understanding about managerial practices. Moreover, further research could do an empirical validation of the propositions formulated in this article. In terms of future directions for empirical work, this article points out three suggestions in the following:

**Network and Absorptive Capacity.** Further research could examine how network structure and absorptive capacity coevolve over time, that is, the firm with overall absorptive capacity (i.e. efficiency, scope, and flexibility of knowledge absorption) whether changing its position and structural properties in the network. Moreover, it could be interesting for further research to examine whether inter-network relationships influence on an individual firm’s absorptive capacity, and the differences of absorptive capacity development for different firms between some participate in the single network and others participate in a lot of networks are valuable for future work.

**Targeting the Specific Network.** For carrying network analysis out, it is very important to set the boundary of network. In this case, further researchers must focus on the specific network; however, it is the best to count all the actors of the specific network in for conducting network analysis, as well as for getting complete network date. More specifically, further researchers should select the specific network which is highly closed and easier to get data for proceeding
empirical study.

Moreover, before carrying out network analysis, researchers must carry out exploratory research to know which network actors are involved in the network. What is the nature of relationships among them - is it the horizontal or vertical relationships? What kind of relationships belongs to strong and weak ties? Furthermore, further research should develop the operational definitions for strong and weak ties. In terms of this issue, further researcher could consult the exploratory research about network by Human (1997).

**The Measure Method of Network Structures.** In terms of the measurement of network structures, researcher must get the data about the ties among network actors. We consider that researchers can use questionnaire to collect firsthand data. After getting the date, researchers could manipulate the social network analysis software, such as KrackPlot, to analyze the variables of network structure (e.g. network density and network centrality. The measurement of the centrality could be referred to Tasi’s (2001) research.
REFERENCE


FIGURE 1 Conceptual Framework