

Literature Review: The Paradox of Social Network Ties in Creating Knowledge

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Abstract — Knowledge creation, as a salient concept in recent literature on business and strategic management, has been examined as one of the most valuable capabilities of firms. As the increasing impact of globalization and high competition challenge the firms to manage knowledge efficiently, social network ties among firms come to agenda. Network ties are beneficial in knowledge creation process since knowledge creation is a social process, in need of coordination and cooperation with partners who possess the knowledge the firm requires. Combination and exchange of knowledge is realized in social networks. The central argument in that context is which ties are more beneficial: Should firms forge strong or weak ties in their inter-organizational relations to strengthen their knowledge creation capability is the question that tried to be examined in this paper. According to weak-tie theory, distant and infrequent ties are proper since they provide novel and diverse information from disconnected actors. However, strong-tie theory provides that frequent and long-lasting relationships are more conducive to support knowledge creation since they include trust, reciprocity and willingness to share the resources. The aim of this conceptual paper is to examine the extant literature concerning social networks and knowledge creation to develop a tentative model which presents the conditions affect the decision of utilizing strong or weak ties. Different benefits are embedded in these ties, but the point is to get understand under which conditions a strong or a weak tie generate a better return in knowledge creation process.

Keywords — knowledge creation, social capital, weak ties, strong ties

INTRODUCTION

In view of increasing globalization and intense competition, knowledge is becoming more and more important for firms competing in a rapidly changing environment [1]-[2]-[3]. Firm competitiveness is mostly achieved by having the continuous ability of forming, disseminating and applying new knowledge [4]-[5]. Kogut and Zander (1996:503) define firms as social communities specialized in knowledge transfer and creation. What makes a firm predominant in markets is not the capacity for reducing costs, but the capacity for managing knowledge [6].

Researchers recently have pointed out that social network ties are a key factor in understanding and managing knowledge creation process. Forming network ties is a prevalent form of cooperation for gathering resources and gaining competitive advantage in international arena [7]-[8]-[9]. Knowledge creation conditions which are labeled as combination and exchange are directly affected by social network ties since these ties facilitate the flow of knowledge and other resources [10].

By accessing knowledge through networks, a firm can utilize its network partners' assets to create new knowledge and enhance its competitiveness.

The purpose of this study is to analyze the extant literature conducted on the relationship between social ties and knowledge creation process. The primary cause for this study is a theoretical controversy where the key concepts of networks, social capital and knowledge creation intersect. To fulfill the intentions of this paper, research databases including ABI Inform and EBSCOhost were used and also working papers and books were reviewed.

KNOWLEDGE CREATION

Knowledge creation results from new combinations of knowledge and other resources [4]-[11]

Shawney and Prandelli (2000:27-28) have studied the concept of knowledge: Knowledge is;

- socially spread and influenced by social settings,
- a social construction, embedding in lasting relationships,
- developed through participation in "communities of practice",
- catalyzed by the development of network organizational structures,
- continuously changing from individual to social, from tacit to explicit.

In this sociological approach, knowledge creation is "an emerging, dynamic and diffuse process" and "new knowledge is the output of a synergistic interplay between individual contributions and social interaction" [12]. Nonaka and his friends (2006: 1179) conceptualize organizational knowledge creation as "the process of making available and amplifying knowledge created by individuals as well as crystallizing and connecting it with an organization's knowledge systems" [13].

Knowledge creation, a path-dependent evolutionary process, is the result of changes and development of existing knowledge, know-how and experience [11]-[14]. Creating new knowledge requires combining elements previously unconnected or developing novel ways of combining elements previously related [15].

According to the knowledge-based view of the firm, firm acts as an institution for accumulating and integrating knowledge [1]. To gain organizational advantage on the market, it is critical to have a superior capability in creating and transferring knowledge. Although some firms have limited firm resources, they have the opportunity to survive and grow through forming and developing social ties.

Because of the fact that creating and transferring knowledge is a social process, social capital has a vital role in this process. Access to new sources of knowledge is one of the most important direct benefits of social capital [15]-[16]. It governs the flow of information and resources [17]-[18]-[19]-[20]-[21] and reduces the probability of opportunism [22]-[23]-[24]. Many of the researchers accept that intensive social interactions facilitate the process of knowledge creation [25]-[26]. When the transmission of knowledge from individual base to collective base is realized, then knowledge creation can be occurred [27]. It is a social process and resides in a network of individuals [28]-[5]. As Powell (1990: 304) states:

“Networks are particularly apt for circumstances in which there is a need for efficient, reliable information. The most useful information is rarely that which flows down the formal chain of command in an organization, or that which can be inferred from price signals. Rather, it is that which is obtained from someone you have dealt with in the past and found to be reliable. You trust information that comes from someone you know well” [29].

Networks can be developed between individuals, groups, organizations, as well as between collectives of organizations. The term network indicates the relationships between these actors. This paper focuses on the inter-firm networks as a core element of social capital in knowledge creation process.

SOCIAL CAPITAL

The emphasis on the significance of social relationships is summarized in the concept of social capital. Social capital is gaining prominence as a concept that describes and characterizes the set of relationships of actors. In view of the fact that various disciplines like economy, sociology, political science have examined and accept the concept of social capital, there remains widespread uncertainty about its meaning, sources and effects. While the concept's application in different areas brings the richness of the idea of social capital, but at the same time limits the development of the theory of social capital [30].

Social capital concept firstly placed in written literature in 1916, by Hanifan, in context of the importance of common participation in successful schools. Moreover the first systematic sociological analysis of social capital was accomplished by Bourdieu. Bourdieu (1986:248) defined the concept as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition” [31]. But also, adaptation and utilization of social capital in different areas were realized by Coleman, Putnam, Fukuyama and Burt. The common point of these various scholars is that social capital presents the ability of actors to secure benefits by virtue of membership in social networks [22].

Comprehensive review of social capital definitions enables to seize the various approaches used in studying social capital [32]-[33]. Fundamentally, two perspectives emerge from those definitions. Firstly, the analysis level of concept is changed due to which discipline examines the idea of social capital. Whereas some scholars examine the social capital of communities or nations, the others analyze individuals', teams' or firms' social capital level. How the direct benefits of social capital are managed form the second perspective. Some scholars like Coleman (1988), Putnam (1995) conceptualize social capital as a public good which means that it is owned by communities and they are the actors who firstly benefit from that [34]-[35]. The other scholars suggest that social capital is a private good. It is not a public good distributed in a social unit. Individuals access and gather that capital according to their positions or strategies that form the positions [10]-[36].

In this paper, a definition of social capital offered by Nahapiet and Ghoshal (1998:243) is accepted: “Social capital is the sum of the actual and potential resources embedded within, available through and derived from the network of relationships possessed by an individual or social unit.” [15]. This definition includes both the private and public good perspectives of social capital. This view of social capital possesses the proposition that social networks play a vital role in the actions of actors.

Nahapiet and Ghoshal (1998) have suggested three dimensions of social capital:

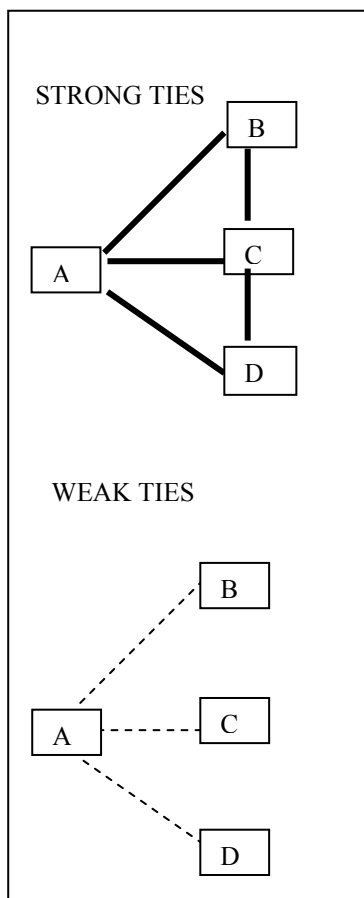
- Structural Dimension: The structural dimension of social capital involves the pattern of relationships between the network actors and can be analyzed from the perspective of network ties, network configuration and network stability.
- Relational Dimension: This dimension involves the relationship types which are developed through interactions among parties.
- Cognitive Dimension: Cognitive dimension refers to the resources which present shared representations, interpretations and systems of meaning among parties.

Due to the fact that this paper basically examines social network ties in context of knowledge creation, only structural dimension is taken into account. A key feature of networks is repeated and enduring exchange relationships between network actors [37]. Ties are a fundamental aspect of social capital, because they provide access to resources [15]-[33]-[38]. The social network ties facilitate intermember social interactions and provide channels for knowledge exchange.

The concept of tie strength has been considered as a basic feature of social relationships. Granovetter (1973) is accepted as one the scholars who have examined the strength of weak ties first. According to Granovetter, weak ties among interpersonal relations facilitate to reach particular aims by accessing more social capital. He identified the strength of ties as “the combination of mutual

obligations, intimacy, emotional intensity and the amount of time. Strong ties are the ties involve frequent interaction and intense emotional relationships; whereas weak ties are conceptualized as the ties involve less interaction and less emotional relationships. The basic argument of Granovetter was that to access more relevant new information a weak tie is more proper than a strong tie, because a weak tie is more likely to form a bridge between different social circles [39]. This bridge acts as a unique direct tie between two networks, which does not possess a tie between each other [40]. According to weak-tie theory, strong ties are less likely to act as a bridge, because strong ties make the actors familiar with particular qualifications, especially with the knowledge being transferred [39]. Figure 1 shows the differences between weak and strong ties; in extant literature strong ties are presented with solid lines and weak ties are with dashed lines [41].

Figure 1: The Images of Weak and Strong Ties



Source: Adopted from Boorman (1975: 218)

THE PARADOX OF TIE STRENGTH IN KNOWLEDGE CREATION PROCESS

Today a firm's alliance partners are the most important source of new ideas and information that result in innovations [42]-[43]-[44]-[45]. Aytay and Jyrama (2005) and Nielson (2005) indicate that collaboration and alliances between researchers generate a synergy of knowledge that is greater than the knowledge that can be created by each researcher independently [46]-[47]. An individual creates new knowledge by forming social interactions. Social relationships include the ability to share and integrate different mental models and theories which form different areas of expertise; besides they also provide a mechanism for rapid feedback and capitalize on existing knowledge of other researchers [48]. External collaboration is used in every step of production process from discovery to distribution. When industry is characterized with complex knowledge, it is positively correlated with the intensity and the number of alliances in that industry [49]-[44]. Forming strategic alliances need to utilize network ties. Social networks create opportunity for collaboration; large and diverse networks provide firms with access to knowledge, enhance their innovation capability and learning speed. [49]-[50]-[38].

The optimal strategy for firms to use in building relationships with other firms involves the use of both weak and strong ties. The optimal network structure involves a mix of weak ties for flexible adaptation for market demands and embedded ties for enriching networks [51]-[40]-[52]-[53]. To follow a contingency approach is more conducive to utilize social ties in knowledge creation process. Some important factors have to be examined in building the optimal network structure:

A- The Process of Knowledge Creation

Knowledge creation process has to be analyzed in deciding whether weak or strong ties are used, because each process of knowledge creation has different requirement.

- a) Search of Knowledge: In that process, the focus is on searching, identifying and noticing the useful knowledge exists in other firms [54]. Weak ties are important for searching novel, additional information; strong ties are not proper in searching for new knowledge since strong ties develop among the actors who have the same qualifications; then the flow of knowledge is redundant [55] and involves a high cost [54].
- b) Transfer of Knowledge: The movement of knowledge from one unit to another is the result of being affected by the experience of that unit [56]. For knowledge transfer to occur in alliances, strong ties between the partners are necessary [57]-[27]-[58]. On the absence of strong ties, especially in alliances between the necessary relationships that allow managers to share knowledge willingly. Hansen and his friends (2005) analyze the knowledge sharing in three phases according to social network subsets. They find that weak ties are

required on the searching process; whereas strong ties are required on the transferring process [54].

- c) **Creation of Knowledge:** In this process, the focus is on jointly engage in knowledge development process. Discussing, sharing, brainstorming and engaging into joint discovery and experiences needs strong ties [59]. Strong ties are needed for reformulation and validation of new knowledge that requires trust and willingness [60]. For implement new ideas we need coordination and this requirement is fulfilled by dense, strong ties [61]-[62]-[63]. The important point in that sense is too high communication and interaction may hinder the creativity potential. Flexible thinking and diverse perspectives are essential parts of innovation [64]. This means that moderate level of strong ties are much more proper than so close, embedded ties which have a potential to hinder to form external relationships [54]-[65]-[66].

B- Type of Knowledge

The type of knowledge is considered as information and know-how. As information refers to knowing what something means, know-how refers to knowing how to do something efficiently. Complexity and codifiability are two dimensions determine the type of knowledge. Coded knowledge is structured into a set of identifiable rules and be easily accessed, stored and shared [11]. Knowledge complexity, which is the degree of codifiability, and the stage of knowledge creation have a major effect on determining the type of tie. The two basic stage of creation are searching (access to new knowledge) and transferring (to move and incorporate of knowledge). Hansen (1999, 2002) has analyzed the role of weak ties on knowledge sharing in a new product development projects in a multinational organization. Strong interunit ties provide the highest relative net effect when knowledge is highly complex, whereas weak ties have the strongest effect when knowledge is not complex [67]-[68]. Given that strong ties require a greater investment of time, Reagans and McEvily demonstrate it is inefficient to use strong ties to transfer codified knowledge [64], but conversely Kauffeld-Monz designates the opposite finding that strong ties are useful in transferring codified knowledge [69]. Weak ties are not proper for transferring tacit knowledge, since interaction is infrequent to interpret and modify the knowledge; moreover tacitness and complexity create ambiguity which has a negative effect on knowledge transfer [70]. Transfer of tacit knowledge may require the development of a shared code in a long-term, strong relationship and working closely [71]. Uzzi and Lancaster (2003) found that weak ties proper when the knowledge is public, such as company reports. Strong ties strongly promote the transfer of private knowledge which is called unpublished aspects of the firm's strategy, success plans; thereby since private knowledge needs trust and to be protected from misuse it is sensible to use strong ties in transferring private knowledge [19].

Table 1: The Relationship between Type of Knowledge and Weak/Strong Ties

	Codified	NonCodified
Search	Weak Ties	Weak Ties
Transfer	Weak/Strong Ties	Strong Ties

Source: Adopted from Hansen (1999: 89).

C- Knowledge Creation Strategy and Type of the Environment

Firms' behaviors are affected by the external environment. Firms in volatile or turbulent environments are conducive to alter their strategic orientations than firms in static environments [72]. Market turbulence, technological turbulence and the degree of competition signs the density of volatile environment [73]. The relationship between the firm and its environment points out how the firm develops its network [74]-[75]. According to March (1991) strategies linked to knowledge creation aim to explore new opportunities or exploit existing capacities. Complex search, innovation, variation, risk-taking, relaxed control, loose discipline are the concepts characterized exploration [76]. In exploratory strategy, the focus is gathering new information on many different alternatives. The emphasis is on identifying viable alternatives rather than fully understanding how to develop any one innovation. Thus, explorers concentrate on broad searches through weak ties. The returns of exploration are distant in time and highly variable [77]. Refinement, choice, production, efficiency, implementation are the concepts characterized exploitation [76]. In exploitative strategy, the emphasis is on refining an existing innovation by gathering specific information that will provide deeper knowledge in that particular area. In a local area, a deep search is needed through strong ties. Şimşek and his friends (2003) analyze the same knowledge creation strategy under the name of incremental and radical entrepreneurial behavior. Their findings indicate that weak ties promote the radical innovations due to diverse information obtainment; strong ties promote the incremental innovations due to tacit information [78].

Table 2: The Relationship between Knowledge Creation Strategy and Weak/Strong Ties

Knowledge Creation Strategy	Tie Strength
Exploration	Weak Ties
Exploitation	Strong Ties

This exploration-exploitation dilemma assumes a strategic choice according to environment turbulence. Firms require these two types of knowledge; exploitation brings the use of current knowledge, whereas exploration brings the use of historical knowledge that is unforgotten or uncovered. The sine qua non point is to balance these two

strategies in knowledge creation process [76]-[79]-[77]. Excessively conducted exploitation strategy could bring similar recombinations and it is more likely to be discovered and used by competitors. It means that the advantages of exploitation could be short-lived. Meanwhile, excessively used exploration strategy may cause to reach no longer relevant knowledge that do not offer the best solutions and may suffer from high costs resulted from so many experiments [76]-[14].

However, since resources are scarce, they have to invest them in respect of the environmental uncertainty. However, the extant literature involves controversial perspectives concerning which type of knowledge creation strategy is congruent with environmental uncertainty, some authors point out that environmental uncertainty is likely to be decreased by making coordination with repeated, old ties [80]-[74]-[81]-[7]-[8]-[52]. When environmental uncertainty is high, the partners are looking for trust and stability. Instead of forming new relationships with new partners, reinforcing existing relationships with older partners is less risky. Forming additional relationships with existing partners is a form of exploitation and creates strong ties [80]-[82] and develops trust between partners [7]. Kraatz cites that strong ties diminish uncertainty through providing in depth exchanges of knowledge [55].

Besides the above arguments, some authors indicate that when the environment is unstable and the rapid of change and innovation is swift, exploration, the environment for emerging innovations is required. Actors have to explore emerging know-how and innovations; new ideas gathered from diverse and broad scope are required to survive in high competition and diminish uncertainty [53]-[83]. Contrast, when the environment is stable, then exploitation, the degree to which firms' strategies are designed exploit existing technologies, information, is important for firms. So we can say that firms' decision to invest the type of knowledge is partly determined by the environmental context surrounding the firm. As the uncertainty increase, firms to be survived have to realize more innovations. Thus, gathering new information from many alternatives is required in exploration. Whereas, in exploitation, the emphasis is on refining on existing innovation by gathering specific information that will be provide deeper understanding. Different ties are required in different context. The strong tie argument is sensible when dealing with lower environment uncertainty which demands more exploitation. Although strong ties require more frequent interactions and commitment of resources, strong ties provide rich exchanges of customized information. The weak tie argument is sensible when dealing with higher environment uncertainty which demands more exploration. This is why exploration does not require a deeper knowledge of a specific innovation that is obtained through strong ties. Moreover, the time and resource obligations of strong ties diminish the number of a contact a firm can maintain and therefore restrict its reach into divergent sectors of the environment. This means that whether firms should form their networks through strong or weak ties depends on partly the environmental context. [84].

Koka, Madhavan and Prescott (2006) cite that not only environmental uncertainty but also the amount of resources (which is labeled as "munificence") are critical for forming new ties, which indirectly affects the strength of ties used in knowledge creation strategy. When munificence is decreased, the ability of firms to create new ties will be limited [85]. Under the conditions of high uncertainty, the other factor which has to be taken under consideration is the availability of resources in the environment. If resources are scarce, then using strong ties can be more suitable.

Larson (1992) has shown that strong ties promote and enhance trust, reciprocity, mutual interdependence and long term perspectives [82]. Kale, Singh and Perlmutter (2000) found a positive relationship between the strength of ties and the degree of learning in alliances. Relational capital based on mutual trust and interactions at the individual level between alliance partners create a basis for learning and know-how transfer [86]. A strong tie brings mutual trust through shared language and shared vision [87]-[88]-[44]. Dense, strong ties between partners are likely to help in curbing opportunism. In this type of network, opportunistic acts diffuse rapidly to other actors [89] and the result of these acts are being excluded from information networks [90]. As the strength of a relationship increases, the possibility of moral exclusion decreases [91]. Strong ties are needed to continue important cooperative relationships.

Hagedoorn, Cloudt, Kranenburg are analyzed the effect of inter-firm R&D network ties on the technological performance of companies in high-tech industries. They find that strong ties in terms of dimension time and depth, measured by length and multitude of partnerships, degree of cooperation and similarity of ties improve technological performance. However, the cultural closeness dimension, the degree which a company has established partnerships with companies from countries that are culturally similar, support a weak tie perspective [92]. International diversity is important in acquiring new and diverse ideas come from multiple markets and different cultural perspectives [93]. Their research suggests that a combination of stronger and weaker R&D ties, with elements of both social embeddedness and international diversity is most beneficial for the technological performance of companies. A similar result has been reached by Jack; strong ties link into wider social structure and draw benefits into the business [94]. Strong ties act as a mechanism for generating knowledge and resources and provide a mechanism to invoke weak ties.

Yli-Renko, Autio and Sapienza (2001) have analyzed the effects of social capital in key (single largest) customer relationships on knowledge acquisition and knowledge exploitation in 180 young technology-based firms in United Kingdom. By examining social capital in three distant dimensions, they found that social interaction and network ties are positively related to knowledge acquisition in young technology firms; whereas relationship quality which includes trust is negatively related to knowledge acquisition. Intense, repeated interaction facilitates not only knowledge acquisition, but also enhances the ability of a

firm to recognize and evaluate the relevant knowledge. Consistent with the result of social interaction, network ties which link the firm to broader set of ties enable to transmission of novel information from a variety of external relationships. Although the higher level of social interaction and network ties have a positive impact on acquiring knowledge, the higher level of trust has a negative effect. [95]. One possible explanation of this result can be made according to Uzzi's article. Uzzi (1997) posited that intense, close relationships restrict small firms to form external ties which are the sources of diverse information. [51]. To acquire novel and new ideas, weak ties are more appropriate since they enhance the ability of connect different and unique ideas. Molina-Morales and Martinez-Fernandez have also found social interaction and trust have a non-linear (inverted U-shaped) relationship with innovation [96]. A high degree of social interaction and trust can curtail to follow new opportunities due to strict obligations and lack of autonomy they embrace.

D- The Life-Cycle of the Firm

To analyze the relationship between strong and weak ties, it is vital to put emphasis into the stage of the life cycle of organizations. Emerging firms have less reputation and the other organizations don't perceive them as a potential tie; since they are small and new, they don't know where the knowledge resources are and how to access them. In that stage, strong ties will play an important role to overcome various challenges in terms of limited resource access and to welcome the need of frequent communication for flowing valuable information [97]. When emerging firms began to grow and come to an early grow stage, and then weak ties become important according to access a wide range of resources [98]. Each organizational life cycle stages has unique context that influences the extent and nature of resources; so this strategic context affects the benefits of network composition [99].

To analyze the relationship between strong and weak ties, the other factor may be the aims of network members. Competitors, in the same industry, look forward to share their knowledge and develop technological linkages. In this linkage, a collaborative milieu and overcoming opportunism are essential to success then closed networks are likely to be more beneficial [9]. The type of industry is also important since the aims of network members are shaped in parallel with industry characteristics. Walker and his friends analyze the relationship between network formation and social capital in biotechnology startups. Their findings assert that strong, embedded ties of startups are likely to have more relationships with new partners in the following time period. This industry has last long relationships, firms have mutual dependent, so far these inputs are covered strong relationships between partners. May be sparse, weak ties are more apt in industries which have short relationships and more market transactions [89]. Some industries are the base of competition; high competition requires to think and act speedy and efficiently. It is obvious that these characteristics may change the type of network ties [11].

E- The Optimal Network Structure

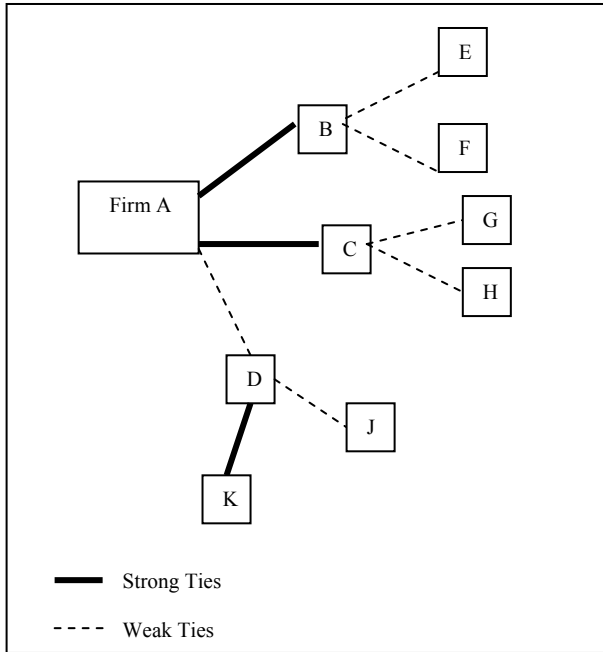
To sum up, according to the review of literature, neither weak nor strong ties are superior to one another in creating knowledge. Different benefits are embedded in different types of ties. (See Table 3)

Table 3: The Benefits and Costs of Weak/Strong Ties

		KNOWLEDGE CREATION	
		Benefits	Costs
Weak Ties		<ul style="list-style-type: none"> - Accessing novel/diverse information - Searching for new opportunities - Providing autonomy - Flexibility to shift exchange sources - Less Costly - Transferring of codified knowledge 	<ul style="list-style-type: none"> - Lack of mutual obligation - Lack of trust - Inhibiting the transfer of tacit knowledge - Restricting to build long-term relationships
		<ul style="list-style-type: none"> - Promote cooperation in an exchange - Include trust, reciprocity - Enhance knowledge sharing, joint-learning between firms - Transferring of tacit knowledge - Implement strategic initiatives 	<ul style="list-style-type: none"> - Inefficient for transferring codified knowledge - More costly - Brings redundant information - Constrain new knowledge flowing - Lack of opportunity to shift knowledge sources
Strong Ties			

According to Uzzi (1997), a firm should sustain mostly strong ties with its direct ties and both weak and strong ties with its indirect ties which are formed through direct ties (Figure 2). A mix exploitation of indirect ties with diverse tie strengths may enhance the opportunity of resource acquisition [51]. Especially, when the resource owner does not have a adequate prior knowledge about the firm, strong tie between resource owner and the common third party provides a knowledge-based trust [100].

Figure 2: The Optimal Network Structure



Source: Adopted from Uzzi (1997:60)

E- Development of a Tentative Model of Tie Strength and Knowledge Creation

Based upon the review of literature on strength of ties and knowledge creation, the integration of salient key

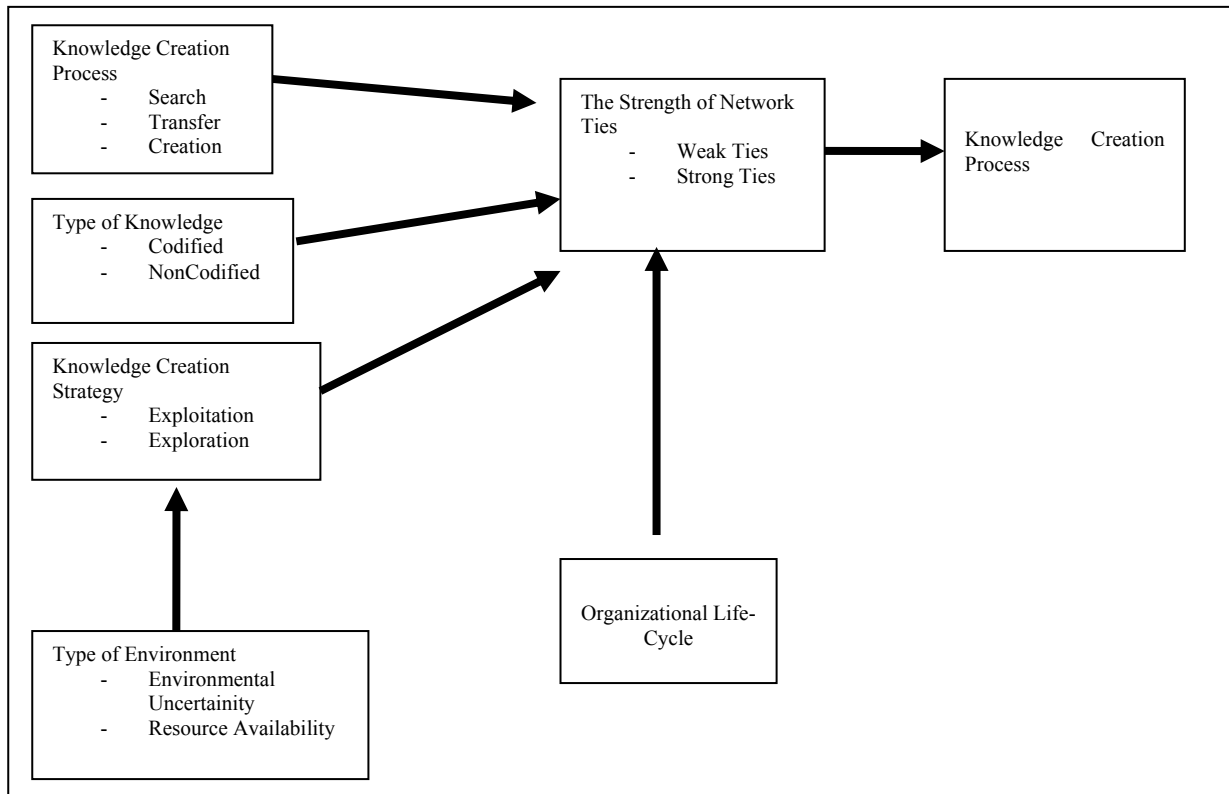
findings has enabled this study to develop a tentative model that further requires a more comprehensive, additional brainstorming and elaboration. (See Table 4)

IMPLICATIONS FOR PRACTICE AND RESEARCH

According to the literature of social networks and knowledge creation, network ties provide benefits associated with knowledge acquisition and creation. However, the relationship between strength of tie and knowledge creation has been exposed to contradictory findings. As some scholars suggest, weak ties are more beneficial in providing novel and diverse information; whereas strong ties are more beneficial in transferring tacit and specialized knowledge due to trust and reciprocity they consist of. Since different benefits are embedded in each type, to develop a model that shows the conditions to adjust the mix use of weak and strong ties can enhance the ability of performance of knowledge creation.

To sum up, the development of this tentative conceptual model provides gaining a perspective that affects a proper choice about the type of ties under certain conditions. These conditions are examined as type of knowledge creation process, type of knowledge and knowledge creation strategy.

Table 4: A Tentative Model of the Factors Affecting the Relationship between Tie Strength and Knowledge Creation Process



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