Improving Absorptive Capacity

the power of a supply chain
Inhoud

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ABSTRACT

Over the last decade, the lifetime of products has decreased dramatically (Cavusgil, Calantone and Zhao, 2003). Innovation has become of utter importance for firms to survive in the current antagonistic environment (e.g. Floyd and Lane, 2000; Prahalad and Hamel, 1990; Cohen and Levinthal, 1990; Van den Bosch, Volberda and De Boer, 1999). An active search for available knowledge outside the firm has become obligatory, since innovation often springs from recombining existing knowledge (March and Simon, 1958), for example by learning from other companies (e.g. Chen et al., 2009; Lane and Lubatkin, 1998). How well a company can absorb en use newly gathered knowledge is called the absorptive capacity of a firm (Cohen and Levinthal, 1990). Absorptive capacity can be seen as a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability (Zahra and George, 2002).

A way to gather new external knowledge is to learn from other companies (Chen et al., 2009). A network may provide access to new information, new markets and technologies (Gulati, Nohria and Zaheer, 2000). This network is also called social capital (Coleman, 1988). Social capital comprises three elements; a structural, a relational and a cognitive element (Nahapiet and Ghoshal, 1998). This paper focuses on the influence of these three main elements of social capital on the ability of a firm to acquire, assimilate, transform and exploit knowledge, or put differently, the potential and realized absorptive capacity.

However, the assumption that there is a relationship between social capital and absorptive capacity implies an underlying assumption. To make the gathering of new information possible firms need to share information (Darr and Kurtzberg, 2000). Firms may have a network, however, when none of the network participants is willing to share information, there will be no transfer of knowledge. Could it then be suggested that firms with high levels of absorptive capacity have better understanding of the importance of sharing information than firms with low levels of absorptive capacity? Hence, there might also be a relationship between the ability of a firm to acquire, assimilate, transform and exploit knowledge and how much knowledge is available through the network. Moreover, since it is suggested that innovations rely more heavily on recombining existing knowledge rather than new inventions (March and Simon, 1958), it is reasonably to assume that the transfer of knowledge has a significant relation to the innovative capabilities of a firm.

In order to empirically test these hypotheses e-mail as well as a regular mail survey was undertaken under Dutch firms. Only firms that operate in six specific branches that are most likely to be part of a supply chain were administered. In addition the firm’s were selected to have a minimum workforce of 100 employees. Only existing scales were used. These scales were translated from English to Dutch. A correlation analysis and several linear regressions were carried out.

The results of these analyses demonstrate the influence of the three elements of social capital on absorptive capacity. The results show that the alleged influence of some elements of social capital is less strong than currently expected. Relational Embeddedness is for example known to be positively related to the transfer of knowledge (e.g. Dhanaraj et al., 2004; Uzzi, 1997; Granovetter, 1979; Frenzen and Nakamoto, 1993; McEvily and Zaheer, 1999). It was therefore suggested that relational embeddedness would also have a positive relationship with absorptive capacity (Upadhyayula and Kumar, 2004). However, only competence-based trust was positively related to assimilation as an element of potential absorptive capacity. No further significant relationships were found. This might be explained by results of Minbaeve et al. (2003). They found that subsidiary absorptive capacity did facilitate the transfer of knowledge. It could therefore be researched if absorptive capacity is a moderator in the relationship between relational embeddedness and absorptive capacity. A second explanation of why relational embeddedness did not turn out to be significantly related to absorptive capacity might be found in the operationalisation of relational embeddedness. Relational embeddedness was measured following partially the study of Dhanaraj et al. (2004) and partially the study of Levin and Cross (2004). The reason was that a supply chain was taken as a hybrid organization, thereby giving
way for incorporating the relational embeddedness measures of Dhanaraj et al. However, this might have been the root cause of the insignificant results. Further study could also focus on retesting the hypotheses done in this study using a different measure for relational embeddedness.

The results of this study considering the relationship between structural embeddedness and absorptive capacity are more positive. Literature identified having external knowledge sources as an important antecedent for the transfer of knowledge (e.g. Burt, 1992, 2000; Fosfuri and Tribo, 2008). And literature therefore also suggested that structural embeddedness would be positively related to absorptive capacity (Upadhyayula and Kumar, 2004). This study emphasizes on the importance of structural embeddedness for increasing the absorptive capabilities of a firm. Although no significant relationship was found between the number of direct, indirect ties and absorptive capacity, this study did show that the number of indirect ties was positively related to assimilation as an element of potential absorptive capacity. And, the results on the relationship between structural embeddedness and absorptive capacity are even more appealing, since the results of this study also show the sheer significance of the third element of structural embeddedness, namely closeness. The great role of closeness, as found in this study, is in accordance with previous literature. Closeness is advocated by various scholars to have a substantial impact on absorptive capacity because it stimulates cooperation and generates trust (Moran, 2005; Jansen, van den Bosch and Volberda, 2005; Cohen and Levinthal, 1990). This study thus under scribes these preceding findings. However, supporters of sparse networks can also be understood by previous studies. The supporters advocate that sparse networks contribute to a broader variety of new information (e.g. Burt, 1992) what would increase the possibilities for new information. This could be true in personal relationships. However, in alliances, ties with higher levels of trust, strong ties, are suggested to provide more access to non-redundant information than weak ties (McEvily and Zaheer, 1999; Achrol and Kotler, 1999; Reingen, 1994). And Hansen (1999) also mentioned that a sparse network within a unit might create more and non-redundant information sources, however a sparse network might not be sufficient to support the regular flow of knowledge. The findings of this study suggest that the same reasoning might be true for inter firm networks. This study thus advocates the absolute importance of close, dense networks in alliances such as supply chains for its positive relationship with absorptive capacity.

Additionally, the results on the relationship between cognitive embeddedness and potential and realized absorptive capacity are very positive. These findings are in line with literature stating that a small cognitive distance increases a common basic perception (Nootbeoom, 2006; 2000) and understanding each other has a great influence on the ability of a firm to share, gather and use information. However, some scholars believe that cognitive embeddedness would be negatively related to absorptive capacity, since it could create mental prisons prohibiting firm’s to think out-of-the-box (de Leeuw and Volberda, 1996; Ouchi, 1981; Jansen, Volberda and de Boer, 1999). An explanation why this study did not observe the downside of cognitive embeddedness could be that this study merely focused on cognitive embeddedness as the striving to a collective goal and vision within the supply chain. Jansen, van den Bosch and Volberda (2005) researched the importance the umbrella variable ‘socialization tactics’ that comprised more elements of cognitive embeddedness and they did not found any significant influence of these socialization tactics on potential absorptive capacity. Jansen, van den Bosch and Volberda (2005) therefore also identified the need for further research to find what certain socialization tactics might contribute to an open orientation and thus support potential absorptive capacity. This study adds to the current knowledge on cognitive embeddedness and the results thus suggest the key importance of a collective goal and vision for both potential as well as realized absorptive capacity. The relevance of these findings in the practical workplace is clear. For alliances to understand the vital importance of the information they share with each other, collaborating organizations must be aware of each other’s goals and visions. Thus, in an alliance, such as a supply chain, it is very desirable and wise to diminish the cognitive distance. Hence, this study demonstrates the major importance of cognitive embeddedness.

As mentioned before, this study also suggests that absorptive capacity might influence the transfer of knowledge. The reasoning that firms with high levels of absorptive capacity might have a better understanding
of the importance of sharing information and as a consequence share more information than firms with lower levels of absorptive capacity was based on previous studies. Because literature had proven that higher levels of absorptive capacity improved the exploitation of technical data and both Ngoc (2006) and Chou (2005) found strong support that the levels of absorptive capacity influenced inter-firm knowledge transfer. This posed the question if a different influence could be found analyzing the relationship of potential and realized absorptive capacity on explicit and tacit knowledge transfer. However, the underlying study did not find any significant relationship between absorptive capacity and the transfer of knowledge. A reason why the results are not in line with previous literature could lay in the different measures of knowledge transfer. Both Ngoc (2006) and Chou (2005) do not use the difference in tacit and explicit knowledge, but studied knowledge as a whole or as a distinction between low and high specific knowledge. Furthermore, Ngoc (2006) explicitly mentions that both potential and realized absorptive capacity are necessary to ensure the sharing of explicit and tacit knowledge and transforming explicit knowledge in tacit knowledge and vice versa. Separating between potential and realized absorptive capacity might have caused the insignificant results. Further research could focus on getting more insight on whether absorptive capacity is positively related to knowledge transfer.

Finally, the findings on the relationship between the transfer of tacit, explicit knowledge and exploratory, exploitative innovations are a very important result of this study. Cavusgil et al. (2003) demonstrated that the transfer of tacit knowledge is positively related to the innovation capability of a firm. However, this study did not distinguish between the influence on radical and incremental innovations. My findings on the relationship between the two types of knowledge transfer and two types of innovations are pioneering and the results are very satisfactory. They show that explicit and tacit knowledge transfer impacts radical and incremental innovations differently. Explicit knowledge is negatively related to exploratory innovations and tacit knowledge is positively related to both types of innovation. This gives both scholars as well as supply chain managers handles how to contribute to innovative ideas by the sharing of explicit or tacit knowledge. The relevance in the practical work sphere is obvious.

In conclusion, the overall findings of this study are very relevant for both the practical workplace as well as scholars. This study emphasizes on how a firm can use its elements of social capital in order to increase its ability to gain and use new knowledge and how knowledge transfer increases a firms’ innovative capabilities. This study contributes to previous findings on the relationship between the elements of social capital and absorptive capacity, specifically, the key importance of closeness and cognitive embeddedness for a firm to stand out. Furthermore, this study has pioneered, researching the different impacts of the transfer of both tacit and explicit knowledge on the two different types of innovation.

Besides, this study also generates several recommendations for further research that is necessary to gain further insight in the absorptive capacity theme, and taking into consideration the other fields of investigation including the transfer of knowledge, social capital and innovation. For example, further research could investigate when does knowledge becomes more explicit than tacit and thus negative for advancing innovation. Since tacit knowledge is positively related to innovation, explicit knowledge has the opposite effect. This could be of great practical use, since companies like Buckman Laboratories use databases to make tacit knowledge more explicit in order to transfer it more easily. Furthermore, in the analysis of absorptive capacity on the transfer of knowledge no significant results were found. However, the control variable relationship learning did show a significant result. To my knowledge no studies have yet been done investigating this relationship between relationship learning and the transfer of explicit and tacit knowledge.
CHAPTER ONE - INTRODUCTION

As competition strengthens and changes follow more rapidly, firms need to modernize themselves by exploiting existing competencies and exploring new ones (Floyd and Lane, 2000). The turbulence of the business environment focused attention on knowledge as a necessary foundation for competitive advantage. “To survive selection pressures, firms need to recognize new external knowledge, assimilate it, and apply it to commercial ends” (Jansen, Van den Bosch and Volberda, 2003, p. 999). The ability to exploit knowledge is a critical component of innovative capabilities (Cohen and Levinthal, 1990), especially because it is suggested that most innovations result from borrowing, rather than invention (March and Simon, 1958). Besides, organizations that can make full use of their collective expertise and knowledge are likely to be more innovative, efficient and effective in the marketplace (Argote, 1999; Grant, 1996; Wernerfelt, 1984).

The ability of a firm to recognize the value of new, external information, assimilate it and apply it to commercial ends is labeled as absorptive capacity (Cohen and Levinthal, 1990). Literature mentions that absorptive capacity tends to be one of the most important determinants of the innovative performance of a firm (Chen, Lin and Chang, 2009). Zahra and George (2002:186) further specify absorptive capacity as “a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability.” They suggest two dimensions of absorptive capacity; potential absorptive capacity which comprises acquisition and assimilation capabilities, and realized absorptive capacity, this includes transformation and exploitation capabilities (Zahra and George, 2002).

Cohen and Levinthal (1990) already mentioned in their paper about absorptive capacity that there are two ways to gather new knowledge. First, firms can create new knowledge through R&D processes. Secondly, firms can also recombine existing knowledge that they must acquire from outside the firm. For companies, a way to acquire new external knowledge is to learn from other companies and as a consequence thereby increasing their knowledge stock (Chen et al., 2009). Lane and Lubatkin (1998) described this learning from other firms as relative absorptive capacity. Amongst others Gulati, Nohria and Zaheer (2000) stressed the idea that networks potentially provide a firm access to new knowledge, such as new information, markets, and technologies. This idea that the social context of a firm may be a valuable resource for a company is not a new idea. In 1980 Ben-Porath developed the “F-connection.” Ben-Porath showed that friends, families and firms influenced the economics of a company (Ben-Porath, 1980). Coleman (1988) called this social capital; to use the aspects of the social structure as resources to achieve interest. This paper is merely concerned with the second way of retrieving new external knowledge, mentioned by Cohen and Levinthal, by using the potency of social capital.

The potency of social capital has been researched quite thoroughly before. Few studies have been devoted to the relationship between social capital and transfer of knowledge (e.g. Dhanaraj, Lyles, Steensma and Tihanyi, 2004; Uzzi, 1999). More studies contributed to the understanding of the relationship between social capital and innovation (e.g. Fosfuri and Tribó, 2008; Landry, Amara and Lamari, 2002), some studied the correlation between relationship learning and innovation (e.g. Chen et al., 2009). What haven’t been given much attention are the relationship between social capital and its impact on the absorptive capacity. Some papers have given strong suggestions though about the possible relationship between these two elements. Fosfuri and Tribo (2008) identified external knowledge sources as major antecedents of potential absorptive capacity. (Yli-Renko, Autio and Sapienza, 2001) advocated that firms that have recurring interaction with other firms enhance their ability to evaluate and acquire significant knowledge from other firms. Zahra and George (2002) commented that social integration, by using informal or formal networks, contributes to knowledge assimilation. And firms that facilitate networks make their employees aware of data that might further establish their potential absorptive capacity. Even more specific, Upadhyayula and Kumar (2004) based a model on literature stating that social capital influences the potential and realized absorptive capacity of a firm. However, the relationship between social capital and absorptive capacity has never been tested empirically. This paper aims to fill this gap.
Why Upadhyayula and Kumar (2004) did not test the relationship between social capital and absorptive capacity was also mentioned in their study. They identified social capital in three dimensions; the structural dimension, the relational dimension and the cognitive dimension (Upadhyayula and Kumar, 2004) thereby following Nahapiet and Ghoshal (1998). Upadhyayula and Kumar (2004) stated however that measuring these three dimensions of social capital would be very difficult, as well as measuring absorptive capacity. However, recent literature has opened possibilities for measuring absorptive capacity as well as social capital. This makes it possible to empirically test the relationship between structural, relational and cognitive embeddedness, as elements of social capital, and their influence on potential and realized absorptive capacity. Therefore this paper aims to answer the following research questions:

1. How does structural embeddedness influence potential and realized absorptive capacity?
2. How does relational embeddedness influence potential and realized absorptive capacity?
3. How does cognitive embeddedness influence potential and realized absorptive capacity?

However, as mentioned before, the purpose of sharing knowledge is because new information may result in innovations that give firms advantages over competitors in the fast changing markets. But sharing information implies that there is be a sending and receiving firm (Darr and Kurtzberg, 2000). If absorptive capacity makes a firm receptive to new knowledge and makes a firm able to transform and exploit it, it might be suggested that absorptive capacity also has an influence on the transfer of knowledge. It is a possibility that firms with high levels of absorptive capacity have better understanding of the importance of sharing information than firms with low levels of absorptive capacity? Are firms with higher levels of absorptive capacity thus more eager to share information? In other words, how does absorptive capacity influence the transfer of knowledge? And how strong is this influence on different types of knowledge? Some studies found empirical proof that absorptive capacity has a significant influence on the transfer of knowledge (Szulanski, 1996; Ko et al, 2005; Tsai, 2001). However, the different influence of potential and realized absorptive capacity on the transfer of knowledge has never been tested. Neither has the influence of absorptive capacity been tested on the different types of knowledge. Therefore this paper also aims to answer the following research question:

4. How does potential and realized absorptive capacity influence the transfer of knowledge?

But again, the purpose of sharing information is to be more innovative as a competitive firm. If absorptive capacity has a suggested influence on the transfer of knowledge, could it then be that the transfer of knowledge has an influence on innovation? This assumption has been made before. Cavusgil et al. (2003) empirically tested that the transfer of highly codified knowledge has a positive influence on the innovation capability of a firm. Literature, however, distinguishes between two different types of innovation, radical and incremental innovations. The question now rises, how does the transfer of knowledge influence the two types of innovations. Is there a significant difference? Bearing this in mind, this paper also aims to answer the question:

5. How does the transfer of knowledge influence innovation?

In summary, drawing from various theories on absorptive capacity, this study emphasizes on how a firm can use its elements of social capital in order to increase its ability to gain and use new knowledge and how knowledge transfer increases a firms’ innovative capabilities. By this study, I contribute to the greater understanding of the influence of social capital on the ability of a firm to mold and sculpt its current and newly acquired knowledge. Moreover, it clarifies how in practice, a firm’s management can use the transfer of knowledge within their network to improve their innovative performance.

To live up to these expectations and to answer the five research questions, I shortly elaborate on absorptive capacity as explained by Zahra and George (2002). I then go into detail about the suggested relationships between the three main elements of social capital and potential and realized absorptive capacity. I will then
say more about the two types of knowledge transfer that are distinguished in this study and the relation between potential and realized absorptive capacity on the transfer of knowledge. Finally, I will elucidate the two different types of innovations. Additionally, I will go into the suggested influence of transfer of knowledge on innovation.

Concurrent with the elucidation of theory I will introduce the different hypotheses. After describing the research method, I present the empirical findings using data on 85 Dutch firms. I conclude with a discussion of the results, implications and issues for further research.
CHAPTER TWO – THEORETICAL OVERVIEW AND HYPOTHESES

Competition is increasingly knowledge-based as firms strive to learn and develop capabilities faster than their rivals (Prahalad and Hamel, 1990) and outside sources of knowledge are often critical to the innovation process (Cohen and Levinthal, 1990). The absorptive capability of a firm is therefore of crucial strategic importance (Van den Bosch, Volberda and De Boer, 1999). Zahra and George (2002) discussed that several external sources have an impact on absorptive capacity, one of these external sources being inter-organizational relationships. Through these social relationships a firm can attain a very valuable asset, called social capital. Coleman stated (1988:S98): “like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible.” According to Nahapiet and Goshal (1998) this capital is, to a large extent, embedded in networks. This suggests that a firms’ network might have an influence on the absorptive capacity of the firm.

Zahra and George (2002) however believed that absorptive capacity was not just one organizational capability. They noticed that companies differed in the ability to improve productivity. They began with turning the spotlight on the four basic dimensions of absorptive capacity; respectively the acquisition, assimilation, transformation and the exploitation of knowledge. Potential absorptive capacity (acquisition and assimilation capabilities) makes a firm receptive to external knowledge, however it does not guarantee that the firm utilizes this knowledge and turns it into new products or services. Realized absorptive capacity (transformation and exploitation capabilities) determines how well a company can combine existing and newly mastered knowledge and exploit this (Zahra and George, 2002). Only having both potential and realized capabilities yields innovation. This brings up the question if a firms’ social capital might have a different influence on the potential and realized capabilities, which in the end leads to a different innovation performance.

Following Nahapiet and Goshal (1998), social capital comprises three elements; 1) the structure of the relationships, 2) the quality of the relationship and 3) to what extent the relationship has led to the usage of common properties like a shared language, code or for example common symbols. To structure the analysis we subsequently discuss these three elements of social capital and their influence on potential and realized absorptive capacity.

Structural Embeddedness influences Potential Absorptive Capacity

Structural Embeddedness is, in essence, the composition of the relationships of a firm (Moran, 2005). It refers to the impersonal properties of relationships (Upadhyayula and Kumar, 2004). Many authors have used many ways to describe and measure structural embeddedness. I will follow Moran (2005) who described and measured structural embeddedness using three elements; direct ties, indirect ties and closeness.

Within a network, a firm has direct and indirect ties (Podolny and Baron, 1997; Moran, 2005). Direct ties refer to the relationships between the firm and its acquainted companies. Indirect ties refer to the relationships among these acquainted companies. In general can be stated that network ties influence the ability of firm to obtain new information (Tsai and Ghoshal, 1998). A firm that has direct and indirect ties has the possibility to collect diverse information and knowledge through these ties. Having more contacts can contribute to getting in touch with more and as well as a broader variety of new ideas (Emerson, 1962). In potential absorptive capacity, acquisition refers to how well a firm can spot and obtain external knowledge that is of vital importance for its operations. Assimilation is the second element of potential absorptive capacity and refers to the ability of a firm to analyze and understand the new information (Zahra and George, 2002). This suggests that having a bigger network, with lots of direct and indirect ties, could positively influence the acquisition capabilities of a firm.

However, having many contacts might contribute to getting in touch with a bigger diverse network, but when a firm’s contacts are interconnected, the information and knowledge is not merely available to one firm, but
possibly to all firms in the network. Information or knowledge that is only available to only one firm is scarcer and more valuable, than knowledge and information that is available to all firms in the network (Moran, 2005). When knowledge is considered a public good it is easily transferred and this non-excludability of knowledge causes knowledge spillovers (Howells, 2002). Literature therefore stresses the importance of sparse networks and the non-redundancy of information (e.g. Moran, 2005, p. 1132); “those who have sparse networks who are not connected to one another benefit most.”

This brings us to Burt’s structural hole strategy, that advises firm’s to embed themselves in sparse networks as a linchpin between sub-networks of firms. Burt (2000, 1992) and Moran (2005) argue that firms that are a linchpin in a sparse network of contacts prosper from the disclosed network, because these firm’s are able to solemnly harvest the network’s information. Besides, the linchpin firm, the glue in the sparse network, holds greater control over this network than its unconnected acquaintances. This privileged information access and control benefits add up for firms that have many unconnected contacts, in other words for firms that have many direct ties, but that lack indirect ties. These two advantages should contribute to the acquisition of fresh knowledge for this interconnected firm while inhibiting the new information from the unconnected others. I therefore suggest that firms with more direct ties and less indirect ties benefit most in favor of their acquisition and assimilation capabilities, which is potential absorptive capacity.

HYPOTHESES 1a) The number of direct ties is positively related to acquisitions and assimilation of new external knowledge (that is, to potential absorptive capacity).

HYPOTHESES 1b) The number of indirect ties is negatively related to acquisition and assimilation of new external knowledge (that is, to potential absorptive capacity).

The number of direct and indirect ties together shapes the closeness of a firm’s network. In a sparse network (Figure 1 – A), only one company connects to all companies in the network. A sparse network therefore consists mainly of unconnected contacts. In opposition, a closed network (Figure 1 – C) is a network that consists fully of interconnected contacts.

![Networks](image)

**Figure 1: visualization of closeness (Moran 2005:1143)**

Burt’s strategic hole theory advocates the theory that sparse networks are advantageous for retrieving new external information. In contrast, some advocate the benefits of closed networks (networks with fully intertwined contacts) (Coleman, 1988, 1990: 275-278, 318-320). The latter support the argument that closed networks are beneficial for developing trust and cooperation (e.g. Nahapiet and Ghoshal, 1998b). A dense c.q. closed network would therefore ease the transfer knowledge (Jaworski and Kohli, 1993), especially rich, non-codified (tacit) information (Hansen, 1999).

Studies that investigate the impact of closeness on absorptive capacity show mixed results. Jansen, van den Bosch and Volberda (2005) posited that close networks would negatively influence potential absorptive capacity because the relational intertwined networks would create collective blindness for new, alternative information, but their results proved otherwise. Closeness did not affect acquisition and it positively influenced assimilation. Moran (2005) partially supports this suggestion; he suggests that a closed network might boost trust and cooperation. However, he also mentions that a sparse network without many redundant contacts enhances the acquisition and assimilation capabilities of a firm due to the privileged information access and control benefits. This evokes the suggestion that closeness improves the potential absorptive capacity of a firm. I follow the suggestion that closeness has a positive influence on potential absorptive capacity due to the boosting of trust and cooperation, thereby keeping in mind the results of Jansen, van den Bosch and Volberda (2005).
HYPOTHESES 1c) Closeness will be positively related to the acquisition and assimilation of new external knowledge (that is, to potential absorptive capacity).

Structural Embeddedness influences Realized Absorptive Capacity

Realized absorptive capacity consists of the transformation and exploitation capabilities of a firm. How well a company can combine existing en newly mastered knowledge is identified as the transformation capability of a firm. How well a firm can leverage existing skills or generate new skills by using this sum of existing and newly mastered knowledge is called the exploitation capability of a firm (Zahra and George, 2002). In effect, realized absorptive capacity concerns how the mixture of newly acquired and existing knowledge is utilized. The question now is: how do direct and in-direct ties influence the ability of a firm to transform and exploit new external knowledge? It is mentioned that having direct and indirect links can greatly aid the actions of groups (Adler and Kwon, 2002). Indirect and direct contact could thus have a positive influence on the actions following the gathering of new information, thus the utilization of new knowledge.

According to (Kohli and Jaworski, 1990) two components of information utilization in organizations can be distinguished. First, one component is the way in way firms combine new and existing product (or process) information to harvest new creations that are new to the industry and challenge existing standards (Rindfleisch and Moorman, 2001). Second, it matters how fast and efficient firms are able to execute these new creations. Thus, both the creativity and speed of information utilization indicate how well a company is able to employ acquired knowledge.

Direct personal contacts between R&D, design, manufacturing and marketing departments positively affect a firms’ absorptive capacity and innovation performance (Cohen and Levinthal, 1990). Japanese companies, for example, have been credited for rapidly introducing new products due to the close link between design and manufacturing departments (Cohen and Levinthal, 1990). However, progressively more producers of complex systems hand over design and manufacturing activities to suppliers (Baldwin and Clark, 1997). “Due to the rising costs of R&D, increased global competition, and need for standardization, growing numbers of firms are conducting new product activities through new product alliances” (Rindfleish and Moorman, 2001:1). New product alliances are joint arrangements in which firm’s mutually acquire and utilize information to establish new product of process innovations (Rindfleisch and Moorman, 2001). Put differently, the transformation and exploitation of new knowledge is not only done in-house, but together with other firms. Joint developing and manufacturing is advantageous when partners together add value in comparison to competitors (Hamel, Doz and Prahalad, 1989). Companies constantly evaluate what activities to perform in-house and they outsource activities that other firms perform better (Narasimhan and Jayaram, 1998). A result of the outsourcing is that personal contact and information sharing is not only necessary in-house between different departments, but also between different firms that play a part in different phases of the production process. This is the case in a supply chain were knowledge is utilized in a selected network of firm’s that operate together in a supply chain. Thus knowledge must be transferred across firms to jointly transform and exploit new knowledge.

Hence, possible innovative knowledge should be shared with other firms that are capable of helping transforming the newly acquired information into new innovative ideas, or with other firms that are capable of manufacturing new products. The question remains how direct and in-direct ties influence this ability to transform and exploit new external knowledge? In order to exploit the innovative ideas a firm must know “who can do what”. Knowing who can help with understanding new information and who can help exploiting the new assembled knowledge is according to Cohen and Levinthal (1990) one element of prior related knowledge necessary to ensure both potential and realized absorptive capacity. When lacking the necessary prior knowledge, in this case for example about possible co-producers, new knowledge might often be acquired but not properly put into use (Lindsay and Norman, 1977). In other words, firms should have enough contacts, directs or indirect, to know who they can turn to in case of joint development or manufacturing.
Joint developing and manufacturing may be advantageous, but participants in the relationship must be aware of the skills and information they share (Hamel, Doz and Prahalad, 1989). Giving new information might cause a strategic risk due to spillover problems especially when the new information is close to the core competencies or competitive advantages of a firm (Bogenrieder and Nooteboom, 2001). Timing is also of utter importance (Burt, 1992). Timing refers to the ability of a network to bring new information faster to the one firm than its competitors. This timing of information is especially of importance in “commercially oriented markets and development, where speed to market may be a crucial factor in determining success” (Nahapiet and Ghoshal, 1998:252). Again, the possibility of spillover problem exists. If competitors are capable of exploiting innovative ideas as rapidly or even more rapid than the firm with the innovative ideas, spillover risk is high (Nooteboom, 2001).

In this case the structural hole strategy of Burt (1992) could again be of use. A firm that has many direct contacts and less indirect contacts holds greater control over the network than a firm with both many indirect and direct ties (Burt, 1992; Moran, 2005). I suggest that this reduces the chance that innovative ideas spill over to possible competitors. In other words, I suggest that having more direct contacts and less indirect contacts gives enough possibilities for firms to know who to turn to, to jointly develop and manufacture new innovative products and processes, with minimizing the spillover risk due to informal sharing to many indirect contacts. I therefore posit that direct contacts have a positive influence on realized absorptive capacity and that indirect contacts have a negative influence on realized absorptive capacity.

**HYPOTHESES 2a** *(The number of direct ties is positively related to transformation and exploitation of new external knowledge (that is, to realized absorptive capacity)).

**HYPOTHESES 2b** *(The number of indirect ties is negatively related to transformation and exploitation of new external knowledge (that is, to realized absorptive capacity)).

The number of direct and indirect ties together shapes the closeness of a firm’s network as been mentioned before. Jansen, van den Bosch and Volberda (2005) assumed, thereby following (Rowley, Behrens and Krackhardt, 2000) that dense, thus fully intertwined network, increase the trust, cooperation and a mutual language (Rowley, Behrens and Krackhardt, 2000). Nahapiet and Ghoshal (1998) also support this assumption and mention that the structural embeddedness of a relationship influences the cognitive embeddedness of a relationship (to be discussed later on). It means as much that a common language is created through the density of the network. Jansen, van den Bosch and Volberda (2005) believed that this shared language would improve mutual understanding, makes communication more efficient, reducing the possibility for conflicts and thus would structural embeddedness have a positive influence on the (joint) development and exploitation of newly acquired knowledge. They found empirical proof that a dense network has a positive influence on the realized absorptive capacity of a firm.

**Relational Embeddedness influences Potential Absorptive Capacity**

In contrast with structural embeddedness, which refers to the quantity of actors within a firms’ network, relational embeddedness refers to the quality of the network. Relational embeddedness determines to what extent potential resources, made available by the structural embeddedness, can be accessed in real. The structural embeddedness may give access to certain resources, however “the personal experience and the quality of past interactions will often influence whom he or she is likely to approach and engage” (Moran, 2005:1135).

Dhanaraj et al. (2004) defined relational embeddedness for International Joint-Ventures (IJV’s) as the degree to which commercial ties are embedded in social attachments. This definition is only applicable for hybrid relationships (Foss, 2003) such as IJV’s. These IJV’s are hybrid relationships and depend on the strong relationships that are needed in arms’ length markets and besides, use the shared values and systems as needed in hierarchical relationships. Supply chains, can also be considered as hybrid organizations. Due to
continuous value innovation, supply chains need to evolve from a pure transactional focus to leveraging inter-organizational partnerships (Malhotra, Gosain and El Sawy, 2005). “A supply chain configuration refers to the specific patterns of IT-usage, information processing, and process structuring characteristics of a local enterprise related to its boundary activities interfacing with another enterprise in the supply chain (Malhotra et al., 2005).” Supply chain partnerships, just like IJV’s, have elements of both market and hierarchy exchange. Therefore, the definition of relational embeddedness proposed by Dhanaraj et al., is assumed to be applicable to supply chains as well.

A hybrid relationship between actors can be characterized in terms of 1) the strength of their social ties, 2) their level of trust and 3) the extent to which they share common processes and values (Kale, Singh and Perlmutter, 2000); (D. Cohen and Prusak, 2001).

Dhanaraj et al. (2004), found that relational embeddedness is important for the clarification, control and motivation in the process of knowledge transfer (Uzzi, 1997). Dhanaraj et al. (2004) point out that highly embedded relationships allow for feedback mechanisms that ensure that procedures are properly interpreted, and that knowledge is accurately transferred. This might suggests that tie strength, but also trust and common processes and values are positively related to potential absorptive capacity. According to (Granovetter, 1979) information sharing is even facilitated by high degrees of relational embeddedness. But, how do the three elements of relational embeddedness, tie strength, trust and common processes influence the potential absorptive capacity of a firm?

First of all, there is a discussion about how to capture tie strength. Tie strength was operationalized by (Granovetter, 1973) as the closeness and the interaction frequency of the relationship. This focuses mainly on the structural elements of the relationship. (Kale et al., 2000) therefore operationalized tie strength as the provisioning of emotional support, managerial expertise and time within the relationship. In this study I will be using the latter.

The question if a strong or weak tie leads to more (useful) knowledge has been the focus of previous research. The answer seems to be twofold. Using the above definition, the more emotional support, managerial expertise and time a firm receives from its contact, the stronger their tie. Some believe that especially strong ties are more accessible and more willing to be helpful due to the presence of an at ease feeling, a mutual comfort, between parties (Krackhardt, 1992). Others believe that weak ties could lead to a larger quantity of new information than strong ties (e.g. Granovetter, 1982; Frenzen and Nakamoto, 1993; Hansen, 1999). Levin and Cross (2004) therefore studied if strong or weak ties lead to greater useful knowledge. Strong ties approved to have a positive result on useful knowledge. Yet, Levin and Cross found that weak ties provided even more useful knowledge than strong ties, as long as the weak tie was a trustworthy tie. This leads to the suggestion that both weak and strong ties have a positive influence on potential and realized absorptive capacity. However, with respect to potential absorptive capacity, I posit that there exists only a positive relationship with strong ties as opposed to weak ones.

This suggestion is based on four arguments. First of all, literature concerning information flow among individuals, states that strong ties enhance the sharing of sensitive information whereas weak ties provide greater access to a diverse bundle of information (Frenzen and Nakamoto, 1993; Hansen, 1999). The assorted knowledge is suggested positively related to the flow of knowledge among social actors (Uzzi, 1999; Burt, 1992; Granovetter; 1973). Thus, weak ties are supposedly more desired than strong ties for the transfer of new knowledge. However, more recent research suggests that this relationship is inverted within alliances. Within alliances strong ties are suggested to provide more access to non-redundant information (McEvily and Zaheer, 1999; Achrol and Kotler, 1999; Reingen, 1994) and therefore should lead to more novel knowledge than weak ties. A supply chain is considered a vertical alliance in which firms operate at neighboring stages of the value chain (Rindfleisch and Moorman, 2001) a supply chain can be considered as a vertical alliances, I suggest that only strong ties should have a positively influence on potential absorptive capacity.
Secondly, Levin and Cross (2004) found that weak ties are leading to greater useful knowledge than strong ties when trust acts as a moderator. However, both benevolence-based trust and competence-based trust is more likely to occur between strong ties when weak ties, due to presumable greater emotional bonds, better awareness of someone’s competencies and due to common ways of thinking (Levin and Cross, 2004). These emotional bonds enhance the amount of complex knowledge that is being transferred (Hansen, 1999; Krackhardt, 1992). Nakamoto (1999) illustrated this with his findings that consumers are more likely to transmit information to a close friend than a casual acquaintance. It is therefore less likely that a weak tie is as trustworthy as a strong tie. This suggests that strong ties have a greater positive influence on the transfer of new knowledge than weak ties.

Thirdly, it seems to matter if communication is predominantly formal or informal. Weak ties are in general more associated with formal contracts and depersonalized exchanges than strong ties (Ferguson, Paulin and Bergeron, 2005). In turn, strong ties are more likely to be associated with informal, ad hoc, communication. Ad hoc communication supports knowledge transfer more effective than mere formal communication as referred to in contracts (Dhanaraj et al., 2004). Thus, informal communication is preferred over formal communication when transferring knowledge. Since strong ties are more associated with informal communication, this essentially suggests that strong ties support knowledge transfer more effectively than weak ties.

Fourthly, strong ties are thought to be closer than weak ties in terms of interaction frequency. Although the frequency of communication is as mentioned not merely of influence on tie strength, high levels of communication could indicate a vast amount of time being reserved for a relationship between contacts. Hansen (1999) found that frequent contact enhances the transfer of complex knowledge. Dhanaraj (2004) found that high levels of communication could generate an at ease feeling between parties. This at ease feeling could lead to more accessible knowledge (Krackhardt, 1992), what would in turn positively influence the potential absorptive capacity of a firm.

Because these four arguments I posit that strong ties are positively related to potential absorptive capacity.

HYPOTHESES 3a) Tie strength is positively related to acquisition and assimilation of new external knowledge (that is, to potential absorptive capacity).

Dhanaraj et al. (2004), defined trust following Uzzi (1997:43) “as the belief that an exchange partner would not act in self-interest at another’s expense.” Trust is important in IJV’s as well as supply chains because it isn’t possible to cover all possible variations in contracts or conditions (Dhanaraj et al., 2004) and because both parties must be willing to solve problems (Uzzi, 1997). Trust influences the amount of knowledge that will be transferred as well as how efficient this is done (Lane et al., 2001). However, Levin and Cross (2004:1478) further broke down the concept of perceived trust “being that quality of the trusted party that makes the trustor willing to be vulnerable” in benevolence based trust and competence based trust. Benevolence-based trust is based on the knowledge seeker admitting his lack of knowledge and is therefore the basis for learning. Put in other words; protective behavior blocks learning (Argyris, 1982). Thus, benevolence-based trust will supposedly positively influence potential absorptive capacity. Competence-based trust explains that a knowledge seeker believes the aptitude of his knowledge source. People that trust the competence of their knowledge source will better listen and absorb information than people that distrust their knowledge source. Competence-based trust will therefore most likely be positively related to potential absorptive capacity.

For those reasons, I posit that both benevolence- and competence-based trust, are positively related to potential absorptive capacity.

HYPOTHESES 3b) Benevolence-based trust and Competence-based trust are both positively related to acquisition and assimilation of new external knowledge (that is, to potential absorptive capacity).
Dyer and Nobeoka (2000) mention that shared systems and values are created through socialization, thereby creating a common identity and view of reality. According to Boisot (1995) trust can reside in a relationship and lead to shared values, norms and expectations. Whenever individuals or firms see themselves as part of a group and identify with this group they may act upon the standards and thus values of this group. Kramer et al. (1996) found that this identification has a positive influence on the collective outcome and the concern for collective processes. According to Malhotra (2005), supply chain partners are already interlinked through processes that allow the sharing of information and the building of information technology infrastructures. These interlinked processes allow supply chain partners to obtain new information to create new knowledge. Using matching systems and procedures makes it possible for partners within the relationship to control each other and it makes certain that both companies work by the same business philosophy (Dhanaraj et al., 2004).

Put differently, when groups have opposite identities, knowledge sharing and collective learning are constraint by the lack of shared values or identity (Napahiet and Ghoshal, 1998). Thus, shared values, common processes and a shared identity have a suggested positive influence on the acquisition and assimilation of new external knowledge. Even stronger, “the ability to assimilate information is proportional to the degree of shared codes” (Upadhyaayula and Kumar 2004). However, more procedures and instructions could prevent individuals to stray from conformist behavior and thwart people to search out for new knowledge. (Jansen, van den Bosch and Volberda (2005) based on Weick (1979)). Yet, empirical studies (Jansen, van den Bosch and Volberda, 2005) showed no such results.

Additionally, whenever the collective has the right to prohibit an individual to carry out a certain action it is called a norm (Coleman, 1990). An effective norm may form a powerful form of social capital since it prescribes an individual to not act in self-interest but in the interest of the community. A norm demonstrates a harmony between actors in the relationship (Nahapiet and Ghoshal, 1998). Norms may open possibilities for parties to exchange knowledge (Putnam, 1993). Norms may also drive parties to value diverse ideas, be open for criticism and tolerate failure and accordingly support the creation of knowledge (Leonard-Barton, 1995). However, just like too many procedures and instructions, effective norms may also constraint and yield innovativeness, since norms may be an constraint not only to deviant actions, but also to beneficial ones (Coleman, 1988). Obligations or expectations have suggested the same influence on knowledge creation as norms (Nahapiet and Ghoshal, 1998). Obligations or expectations are activities that will be redeemed in the future to pay usages in the past. According to Fairlough (1994) formal, professional and personal obligations have a positive influence on the dedication to the collective goal and as a consequence these obligations have a positive influence on the cooperative research and development. In other words, both norms and obligations have both a suggested positive and negative influence on potential absorptive capacity.

Since there is no empirical evidence that too many instructions and procedures have a negative influence on the acquisition and assimilation of new external knowledge and more arguments support the fact that common processes, values and norms may have a positive influence on potential absorptive capacity. I posit the following:

HYPOTHESES 3c) Common processes and values, or having shared systems positively related to acquisition and assimilation of new external knowledge (that is, to potential absorptive capacity).

Relational Embeddedness influences Realized Absorptive Capacity

As mentioned before, companies increasingly collaborate to develop new products and penetrate new markets (Hamel, Boz and Prahalad 1989). “For collaboration to succeed each partner must contribute something distinctive; basic research, product development skills, manufacturing capacity, access to distribution. But this holds a possibility for the spillover of knowledge. The challenge is to share enough vis-à-vis with companies outside the alliance while preventing a wholesale transfer of core skills of the partner” (Hamel, Boz and Prahalad (1989:192-193). Sharing too much information could give away innovative ideas. Assessing the
capabilities as well as the trustworthiness of the potential partner is thus of strategic importance. Hansen (1999) found that strong relational embeddedness diminishes the concern about loss of proprietary skills and knowledge and thus minimize the likelihood for conflicts over goals and implementation (Hansen, 1999). He also found that strong ties are more likely to share sensitive information with each other. Strong ties could thus have a positive influence on the sharing of information for joint manufacturing or developing. As a consequence, strong ties may have a positive influence on the realized absorptive capacity of a firm.

However, the type of knowledge transferred has some bearing on how easy knowledge can be stolen by partners. Knowledge that is easily internalized, transported or interpreted is easily transmitted (Hamel, Boz and Prahalad, 1989) since it is highly codified (Dhanaraj et al., 2004). Tacit knowledge, however, is developed specifically for a company, circumstance or customized processes. Therefore, it is harder to transfer (Dhanaraj et al., 2004). Dhanaraj et al. (2004) found that strong ties, especially in mature hybrid relationships, positively influenced the transfer of highly-codified, harder to transfer, tacit knowledge, as perceived fair play by partners deepens trust and risk-sharing (Uzzi, 1997). This relationship was not found for explicit knowledge. Thus tacit knowledge is easier transferred within strong ties than weak ties. However, product development, production and technology have been proven less tacit than for example marketing expertise (Lane et al., 2001). The transfer of tacit knowledge is thus less important for processes like product development, production and technology than for example the transfer of managerial expertise. This suggests that strong ties are of less importance for product and process development, than for example the transfer of managerial expertise and as a result, strong ties would not be as mandatory for utilizing new acquired knowledge and transforming it into new products or processes.

Furthermore, Kumar and van Dissel (1996) suggested that that the work in inter-organizational relationships is divided between partners by assigning each other specific roles and using well-specified protocols and procedures for coordination. Since explicit knowledge is easier to acquire, learn and exploit than tacit knowledge (Polanyi, 1966) it doesn’t require the same collective learning than tacit knowledge (Dhanaraj et al., 2004).

There are thus several arguments in favor of strong ties as well as there are arguments opposing them. But, because weak ties may lengthen project completion in product development and impede the transfer of complex knowledge among team members (Hansen, 1999) and because strong ties should have a positive influence on the sharing of sensitive information because I suppose firm’s feel less need to defend for opportunistic usage of newly given knowledge I posit that strong ties have a positive influence on the realized absorptive capacity of a firm.

I therefore assume that strong ties positively influence realized absorptive capacity. In other words, I pose that tie strength will have a positive influence on realized absorptive capacity

**HYPOTHESES 4a)** Tie strength is positively related to transformation and exploitation of new external knowledge (that is, to realized absorptive capacity).

Companies collaborate more and more in their search for innovation. “Collaborating will reveal the dedication and capabilities of each partner to absorb the skills of the other” (Hamel, Boz and Prahalad (1989:191). Working in partnerships will show each other’s true skills and expertise what will consequently lead to asking each other for advice in the domain of the firms’ expertise (Rulke and Rau, 2000). Witnessing the skills and expertise of a partner has an influence on the amount of trust. Whenever a knowledge seeker trusts that a knowledge source is apt for the necessary capabilities to collaborate the knowledge-seeking firm will take better note to the knowledge source (Levin and Cross, 2004). Put differently, having faith in the capabilities of the other party, in other words, competence-based trust positively influences the transfer of useful knowledge (Levin and Cross, 2004). Literature also mentions that competence-based trust influences the knowledge seeker in taking appropriate actions on the given knowledge (Levin and Cross, 2004). Appropriate actions could
be understood as the utilization of the given knowledge. Competence-based trust may thus have a positive influence on the utilization of acquired and assimilated knowledge. I therefore suggest that competence-based trust may have a positive influence on realized absorptive capacity.

Benevolence-based trust is based on the knowledge seeker admitting his lack of knowledge and is therefore the basis for learning. Alliances run smoother when one partner is growing dependent on the other and thereby learning from the other (Hamel, Doz and Prahalad, 1989). Or put differently “when both partners are equally intent on internalizing the other’s skills, distrust and conflict may spoil the alliance and threaten its very survival” (Hamel, Doz and Prahalad, 1989:192). I therefore suggest that innovation and knowledge sharing is also positively affected in an alliance when one party is lacking more knowledge and is thus more eager to learn from the other. Since benevolence-based trust includes the willingness to learn within a relationship or alliance, I therefore posit that it will positively influence a firm’s realized absorptive capacity.

**HYPOTHESES 4b) Both benevolence- and competence-based trust is positively related to transformation and exploitation of new external knowledge (that is, to realized absorptive capacity).**

According to Boisot (1995) trust can reside in a relationship and lead to shared values, norms and expectations. Values, norms and expectations have all three a suggested influence on the transformation and exploitation of new external knowledge, that is realized absorptive capacity. Firstly, whenever individuals or firm’s see themselves as part of a group they may act upon the standards and thus values of this group. Kramer et al. (1996) found that identification has a positive influence on the collective outcome of processes. When groups have opposite identities, knowledge sharing, collective learning and knowledge creation are all constrained by the lack of shared values or identity (Nahapiet and Ghoshal, 1998). Nahapiet and Ghoshal (1998) thus point out that having one group identity might have a positive influence on the creation of new knowledge. They also consider knowledge as the most powerful engine of production (following Marshall, 1965:115). I thus suggest that having shared values and a shared identity might have a positive influence on the transformation and utilization of new knowledge, thus realized absorptive capacity.

Secondly, whenever the collective has the right to prohibit an individual to carry out a certain action it is called a norm (Coleman, 1990). An effective norm may form a powerful form of social capital since it prescribes an individual to not act in self-interest but in the interest of the community. A norm demonstrates a harmony between actors in the relationship (Nahapiet and Ghoshal, 1998). Norms may open possibilities for parties to exchange knowledge (Putnam, 1993). Norms may also drive parties to value diverse ideas, be open for criticism and tolerate failure and accordingly support the creation of knowledge (Leonard-Barton, 1995). This would again suggest that knowledge creation is supported by group norms and thus may support the transformation and utilization of new knowledge. However, effective norms may also constraint individuals and yield innovativeness, since norms may be a constraint not only to deviant actions, but also to beneficial ones (Coleman, 1988).

Thirdly, obligations or expectations have suggested the same influence on knowledge creation as norms (Nahapiet and Ghoshal, 1998). Obligations or expectations are according to Coleman (1990) similar like a credit slip “held by A to be redeemed by some performance by B” (Nahapiet and Ghoshal, 1998:255). According to Fairlough (1994) formal, professional and personal obligations have a positive influence on the dedication to the collective goal and as a consequence these obligations have a positive influence on the cooperative research and development. Because these obligations have a positive influence on development I suggest that obligations might have a positive influence on the utilization c.q. development of new knowledge, and as a consequence support realized absorptive capacity. However, just like too many procedures, instructions or norm’s, obligations might also constrain firm’s to stray from the collective standard and are therefore limit creative solutions.
I therefore suggest, thereby following Dhanaraj et al. (2004), that embedded relationships create norms and a collective culture that may become potent mechanisms for promoting appropriate actions (Dhanaraj et al., 2004). Again, these appropriate actions could mean supporting the utilization of newly acquired and assimilated knowledge. I posit that common processes, values, norms and obligations have a positive influence on realized absorptive capacity.

**HYPOTHESES 4c) Common processes and values are positively related to transformation and exploitation of new external knowledge (that is, to realized absorptive capacity).**

**Cognitive Embeddedness influences Potential Absorptive Capacity**

The third dimension of social capital distinguished by Nahapiet and Ghoshal (1998) is the cognitive dimension. This dimension refers to the ingredients in a relationship that provide one shared representation or interpretation. Shared knowledge and expertise is essential for communication. Therefore, ingredients such as a shared language, shared codes or symbols and shared narratives are the basic knowledge necessary for effective communication (Nahapiet and Ghoshal, 1998; Dearborn and Simon, 1958; Katz and Kahn, 1966; Zenger and Lawrence, 1989). When the opportunity does not exist to exchange or combine knowledge between firms due to a lack of mutually understood language or code, knowledge sharing is not possible, it will keep firms apart and restrict access to each other’s information (Nahapiet and Ghoshal, 1998). Furthermore, actors share more knowledge whenever they speak the same language (Weber and Camerer, 2003).

Not only is a shared language necessary for proper communication. Language and codes create a framework that serves as a reference for observing and understanding situations and available information. People interpret situations differently because they had different experiences in life making their framework of references. Nooteboom et al. (2006) call this difference in interpretation based on diverse experiences the cognitive distance. To absorb external knowledge efficiently, a shared language, common skills and similar cognitive structures are required (Fosfori and Tribo, 2008).

This also effects organizations. People within organizations may not have similar personal goals or share the same cognitive knowledge; however they should at least have to share some basic perceptions (cognitive structure) to “sufficiently align their competencies and motives” (Nooteboom et al., 2006:3). The same is imaginable for collaborating firms within an alliance such as a supply chain. Striving towards a collective goal demands an organizational focus (Nooteboom, 2000). Imaginably, striving to a collective goal is easier for example in a supply chain when “channel members also have interest in the success of their channel partners” (McEvily and Zaheer, 1999) and thus the collective success”.

Sharing the same language, codes, visions and interpretations may indeed align organizational competencies and motives. However, amongst others, Jansen, van den Bosch and Volberda (2005) thought that these common ways of thinking provided especially confirmative ways of acting. These common ways of thinking may increase commitment among organizational or alliance members, however the confirmative way of thinking could mean that members would treat new external knowledge more selectively. It could prevent members to search for new information and cause mental prisons. They therefore tested empirically how these socialization tactics (as they call the organization structures that provide members with one language, a common goal, vision and interpretation) influenced the acquiring and assimilation of net external knowledge. They suggested that socialization tactics influenced potential absorptive capacity negatively. However, their hypothesis was not supported. This finding was not in line with previous research and Jansen, van den Bosch and Volberda (2005) identified the need for further research to find what certain socialization tactics might contribute to an open orientation and thus support potential absorptive capacity.

Merely focusing on the common goals and visions within an alliance could answer part of this need. The question for this research is now, how do common goals and visions within an organization or alliance influence the potential absorptive capacity of a firm? To understand the information that is shared, for
example among parties within an alliance, and even more important, to understand the strategic importance of this shared information one should be aware of the organization focus e.g. the goal and vision of his/ her organization. For alliances to understand the vital importance of the information they share with each other, collaborating organizations must be aware of each other’s goals and visions. Or better said their collective goals and visions. I therefore posit that being better aware of the common goals and visions, here called the collective embeddedness of an organization c.q. alliance, will have a positive influence on the acquisition and assimilation of new external knowledge.

**HYPOTHESES 5) Cognitive Embeddedness, is positively related to acquisitions and assimilation of new external knowledge (that is, to potential absorptive capacity).**

**Cognitive Embeddedness influences Realized Absorptive Capacity**

Orr (1990) demonstrated that narratives like stories, fairy tales, myths, legends and metaphors enable the creation of new interpretations of events and the sharing of practices and expertise between technicians. As a result of creative openness the discovery of new developments, practices or products are enabled by a shared narrative. Having common goals and visions may prevent the development of new products and processes on one hand. However, on the other hand, having one organizational focus could support this development.

First, according to Nooteboom et al. (2006:3), differences in organization focus, in this case meaning being less or not aware of collective goals and visions, yields cognitive distance. They found that a cognitive distance could create a way to “escape from the myopia of our personal cognitive construction, by profiting from the different insights of others, based on different experience” Nooteboom and Begenrieder (2001:3). It could lead to new opportunities and new combinations of knowledge not been thought of before. But on the other hand, too great of a cognitive distance could pose a threat. Whenever one is not able to understand the other, these opportunities will not be made possible. Nooteboom et al. (2006) also showed that there is an inverted U-shaped relationship between cognitive distance and innovation.

Jansen, van den Bosch and Volberda (2005) believed that strong organizational culture would prevent the transformation and exploitation of new knowledge. They thought that a strong culture may cause mental prisons that prohibit noticing changes in the market (de Leeuw and Volberda, 1996). This strong organizational culture, strong socialization capabilities, as van den Bosch, Volberda and de Boer (1999) call them, involve a high degree of shared values, a common language, a strong defined appropriate behavior. Organizations with high socialization capabilities leave little room for new external knowledge, delay change, foster inbreeding and suffer often from xenophobia (Ouchi, 1981, cited from van den Bosch, Volberda and de Boer, 1999).

Jansen, van den Bosch and Volberda (2005) empirically tested how socialization tactics influenced realized absorptive capacity. Their results showed that the socialization capabilities of a firm positively influenced the realized absorptive capacity of a firm. Socialization tactics as suggested by Jansen, van den Bosch and Volberda (2005) can be considered an umbrella variable. It embodies the shared systems, values and norms discussed under relational embeddedness. Furthermore, socialization tactics also contains the elements of cognitive embeddedness such as a shared language, shared codes or symbols and shared narratives. I therefore suggest that merely the elements of cognitive embeddedness, the shared language, shared codes, symbols and shared narratives have a positive influence on realized absorptive capacity.

**HYPOTHESES 6) Cognitive Embeddedness, is positively related to transformation and exploitation of new external knowledge (that is, to realized absorptive capacity).**
Absorptive capacity influences the transfer of knowledge

Collaborating with other firm’s offers possibilities to gain new external information (Chen, Lin, and Chang, 2009); Lane and Lubatkin, 1998). The absorptive capacity of a firm relates to how a firm is able to receive the new external knowledge and use is. This definition is only concerned with the receiving end of information. For a firm to receive new information, another must share the information first. Darr and Kurtzberg (2000) define knowledge transfer as the sharing of knowledge by a contributor and the receiving e.g. using by the adopter. There must thus be a sender and receiver in the communication process. The question now is how the level of absorptive capacity in a firm facilitates the transfer of knowledge. Could it be suggested that a firm that is aware of the possible success of new information, e.g. a firm that has a high level of absorptive capacity, is more willing to share and thus transfer knowledge?

Literature showed that higher levels of absorptive capacity improve the exploitation of technical information outside the firm (Gambardella, 1992). Moreover, some empirical studies demonstrate that a lack of absorptive capacity prevented the transfer of knowledge within organizations (Szulanski, 1996; Ko et al, 2005; Tsai, 2001). Minbaeve et al. (2003) assumed that subsidiary absorptive capacity would facilitate the transfer of knowledge to colleagues and this hypothesis was supported. Conclusively Ngoc (2006) and Chou (2005) empirically tested how the absorptive capacity of a firm influences the transfer of knowledge in inter-firm relationships. They both found strong support that the levels of absorptive capacity of a firm influence inter-firm knowledge transfer.

This poses the question; do potential and realized absorptive capacity have a different influence on knowledge transfer? Becker and Knudsen (2003) assumed that there was a difference. They presupposed that realized AC may be viewed as an antecedent for future knowledge transfer processes, whereas potential AC may be viewed as a mechanism for enabling knowledge transfer. However, they never tested their assumptions. Both as a mechanism and as antecedent, higher levels of potential or realized absorptive capacity would supposedly have a positive influence on the transfer of knowledge.

There is however another hurdle. Knowledge has been described in many ways (Foss and Mahnke, 2003). I use the description by Polanyi (1966) between tacit and explicit knowledge. Tacit knowledge is abstract and can only be taught through active interaction between the teacher and student. Tacit knowledge is considered the glue in learning. Explicit knowledge however is highly codified and transferable through technical drawings, procedures etc. (Dhanaraj et al. 2004:430). Processes as well as product development, production and technology are considered more explicit than for example managerial and marketing expertise (Shenkar and Li, 1999 quoted from Dhanaraj et al. 2004), Lane et al., 2001) and therefore thus easier to transfer.

According to Hamel, Doz and Prahalad (1989) firm’s mainly enter alliances for strategic reasons, for example to enhance technology and product competences. This concerns mainly explicit knowledge. The transferring of tacit knowledge is possible, however is less achievable due to the higher costs for transferring and its ambiguity. And the transfer is supposedly less necessary since especially manufacturing and process information, which is explicit knowledge, is shared. Imaginably, whenever a firm mainly needs explicit knowledge, they might lack the motivation for transferring and absorbing tacit knowledge. According to Sulanzki (1996), motivation to share information is one of the main factors influencing the transfer of knowledge.

Therefore I posit that both potential and realized absorptive capacity have a positive influence on both tacit as explicit knowledge. However, I suggest that potential and realized absorptive capacity are more positively related to the transfer of explicit knowledge than tacit knowledge.

HYPOTHESES 7) Potential Absorptive Capacity is more positively related to a) the transfer of explicit knowledge than b) the transfer of tacit knowledge.
HYPOTHESES 8) Realized Absorptive Capacity is more positively related to a) the transfer of explicit knowledge and b) the transfer of tacit knowledge.

The transfer of knowledge influences innovation

Innovation can be explained as a processes that brings forth new products, systems or processes (amongst others, (Gloet and Terziovski, 2004); du Plessis, 2007, (Chen et al., 2009). Two types of innovations can be distinguished; radical and incremental innovations. Radical innovations or exploratory innovations meet the demands of new markets and new customers and generate new markets, new distribution channels and new products. Incremental innovations, or exploitative innovations, create improved product and process designs, increase efficiency for existing markets and customers (Jansen, Van Den Bosch and Volberda, 2006); du Plessis, 2007; (Abernathy and Clark, 1985); Benner and Tushman, 2003, p. 243; Danneels, 2002). Since exploitative innovations aren’t particularly different from business as usual, they can build on existing know-how. However, exploratory innovations depart from existing skills, knowledge and often demand different management techniques. It is also more likely that exploratory innovations put business at risk, since commercializing these exploratory innovations is more difficult than commercializing exploitative ones. Furthermore, exploratory innovations are considered the decisive element for the long-term success of firms. But firm’s that are make both exploitative and exploratory innovations possible are most likely to excel (du Plessis, 2007).

Collaboration supports innovation through the transfer of information and skills. And firms need capabilities to innovate in order to survive, because markets are more and more characterized by short product life cycles and even quicker product launches (Cavusgil, Calantone and Zhao, 2003). As mentioned in chapter one, most innovation are a consequence of borrowing than truly new inventions (March and Simon, 1958) and firm’s can be more effective both in the marketplace as for innovations when they make better usage of the broad collective expertise and knowledge (Argote, 1999; Grant, 1996; Wernerfelt; 1984), for example of their alliance. This suggests that the transfer of knowledge between firms within an alliance may stimulate innovations. This poses the question how the transfer of tacit and explicit knowledge influences both exploitative and exploratory innovations.

Cavusgil et al. (2003) empirically tested that the transfer of tacit knowledge has a positive influence on the innovation capability of a firm. The value of tacit knowledge lies in the scarcity of the information (du Plessis, 2007), or put differently, the change that tacit knowledge is internalized and utilized by competitors that bring the innovative ideas faster to customers is less probable since tacit knowledge is difficult to transfer and especially though by learning-by-doing. But, tacit knowledge makes the sharing of information and thus innovation harder (Cardinal, Alessandrini and Turner, 2001), because firms aren’t often aware of their in-house tacit knowledge or they aren’t aware how to access it (du Plessis, 2007). Tacit knowledge is especially significant in areas that lack explicit knowledge, such as biotechnology (du Plessis, 2007).

Exploitative innovations are innovations that improve existing products, processes and distribution channels. This demands company specific knowledge that has been transformed into habit (Nonaka, 1994). It could thus be suggested that the transfer of tacit knowledge positively influences exploitative innovations. Exploratory innovations are radical changes demanding new knowledge and new skills. Skills are considered tacit knowledge (Cavusgil et al., 2003; Lyles and Schwenk, 1997). Also, knowledge from research and development discoveries is usually tacit in nature (du Plessis, 2007). Especially tacit information is advocated for its positive influence on innovation since the spillover risk is lower than explicit knowledge (du Plessis, 2007). The exclusivity of tacit knowledge transfer may thus positively influence exploratory innovations. I therefore pose that both exploratory and exploitative innovations are positively influenced by the transfer of tacit knowledge.

However, I suggest that tacit knowledge has a stronger influence on exploratory innovations, since exploratory innovations demand new skills and knowledge which can be generated through highly tacit R&D knowledge and the transfer of tacit knowledge that has to be thought by learning-by-doing. Exploitative innovations are
still incremental changes and I suggest that these small changes in existing products and thus existing know-how need less tacit knowledge to be transferred.

**HYPOTHESES 9a** the transfer of tacit knowledge has a positive influence on exploratory innovations.

**HYPOTHESES 9b** the transfer of tacit knowledge has a positive influence on exploitative innovations.

**HYPOTHESES 9c** the transfer of tacit knowledge has a higher positive influence on exploratory innovations than on exploitative innovations.

Although explicit knowledge does not have the same significant role as tacit knowledge in the innovation process, since it is easier to access for competitors than tacit knowledge, explicit knowledge is also an element that facilitates innovation. According to du Plessis (2007) explicit knowledge is included in the R&D process that demands a high amount of tacit knowledge to be transferred. “This process requires the capability to convert tacit and explicit product and process knowledge into explicit models (du Plessis, 2007, p. 6)”. This is supported by a research done by Zack (1999). Zack (1999) did a case study within two companies that manage explicit knowledge. One of these companies was Buckman Laboratories, a chemistry company with 1200 employees that operates in over 80 countries. Buckman Laboratories is considered a leader in knowledge management. The firm shifted from mere product selling to solving chemical-treatment solutions for customers. Besides explicit chemistry knowledge they now also need practical field information about the problems of a specific customer. This customer specific knowledge is tacit knowledge. Buckman Laboratories implemented an on-line electronic storehouse called K’Netix. Any partner of Buckman Laboratories can access K’Netix and bring information into the system about customers, products and technologies. Zack mentions that forum’s like K’Netix, make tacit knowledge explicit. This explicit knowledge can be reapplied, tacitly, within the customer specific context. Thus tacit knowledge is transferred into explicit knowledge that is easy transferable and easier acknowledgeable than mere tacit knowledge. This tacit knowledge that was made explicit improved the innovation of customer-specific chemical-treatment problems. Since these customers specific problems are different every time, solving these problems demands exploratory innovation by Buckham Laboratories. It can thus be suggested that the transfer of explicit knowledge has a positive influence on exploratory innovations.

Exploitative innovations are incremental changes in products, processes or distribution channels. I suggest that small changes in products, processes or distribution channels can be communicated within the supply chain by using procedures and technical documents. For example, when improving transport plans by delivering to customers in another sequence can be discussed and communicated throughout the supply chain with easy written procedures and explanations. I assume the same for small product changes. When small sub-parts of a product are replaced, for example due to new available materials with a longer life time, these changes are made known in the supply chain using modification documents and explaining letters. These technical documents are considered explicit knowledge. Put differently these innovations largely depend on already available know-how. Plus, the knowledge downstream in the production or execution process is considered more explicit than for example R&D processes upstream in the production sequence (du Plessis, 2007). Kumar and van Dissel (1996) suggested that that the work in inter-organizational relationships is divided between partners by assigning each other specific roles and using well-specified protocols and procedures for coordination. This supports my suggestion that within the supply chain incremental changes can be communicated especially using procedures, protocols and thus explicit knowledge. I therefore suggest that explicit knowledge has a positive influence on exploitative innovations.

I however do suggest that the transfer of explicit knowledge has a more positive effect on exploitative innovations than on exploratory innovations. Explicit knowledge might facilitate the transfer of tacit knowledge and may thus support exploratory innovations. I however suggest that exploitative innovations mainly rely on the transfer of explicit knowledge, or put differently I think exploitative innovations depend more on the
transfer of explicit knowledge than exploratory innovations. I thus pose that the transfer of explicit knowledge has a higher positive influence on exploitative innovations than on exploratory innovations.

**HYPOTHESES 10a)** the transfer of explicit knowledge has a positive influence on exploratory innovations.

**HYPOTHESES 10b)** the transfer of explicit knowledge has a positive influence on exploitative innovations.

**HYPOTHESES 10c)** the transfer of explicit knowledge has a higher positive influence on exploitative innovations than on exploratory innovations.

In sum I propose a model (see figure 2) how all suggested elements influence each other.

![Figure 2: proposed model](image-url)
CHAPTER THREE – METHODS

Setting and Data Collection
The focus of this research is how the three elements of network relations, i.e. the relational, structural and cognitive dimension, affect the innovation capabilities of a firm through the transfer of knowledge and their suggested influence on potential and realized absorptive capacity. Alliances have become a strategy to achieve competitive benefits, since some benefits "can be achieved faster, less costly and with greater flexibility than 'going it alone'" (Muthusamy and White, 2005, p. 415). One type of alliance is the vertical alliances between firms operating in subsequent stages of the value chain (Rindfleisch and Moorman, 2001), also called supply chain. Supply chains have evolved from deal specific buyer-supplier contracts to leveraging inter-organizational partnerships (Malhotra et al., 2005). More and more companies use this collaboration to jointly develop new products, enter new markets (Hamel et al., 1989) and innovate together. In these partnerships, skills, knowledge, manufacturing capacity and for example distribution possibilities are shared (Hamel et al., 1989). A supply chain is considered a partnership, used for sharing knowledge, skills and more and its goal is increasingly joint innovating. Therefore, investigating supply chains in this research seems appropriate.

This study focuses on Dutch firms that are part of a supply chain. The firms operate in a great diversity of branches, namely manufacturing, transportation, government, financial services, telecom or media and firms that provision services (such as medical services or consultancy). The sample of this study was limited to firms with more than 100 employees. Participating firms were selected using a business address database. 1104 firms matched the selection criteria firm size.

The web-based questionnaire was first administered to these 1104 firms by e-mail. The address database did not appear to be flawless, since the e-mail addresses of 196 firms did not exist (anymore). 908 firms received the questionnaire in good order. Unfortunately, the address database merely contained info-email addresses of the participating firms, which means that e-mails were not directly e-mailed to the appropriate persons. For that reason participating firms were asked to the covering e-mail to have the questionnaire answered by purchase managers, a sales manager or account manager. Since these function groups are likely to be able to answer the questions about the network relationship of their firm with customers, suppliers, distributers or other supply chain partners. Two reminders were e-mailed to the same 908 firms asking them to fill out the questionnaire. In total 908 questionnaires were administered. In total 48 questionnaires were returned (response rate 48/908 = 5.29%), however only 27 were completed and therefore usable. The low response could have been caused by the summer holiday in which the questionnaire was first administered or possibly the lack of appropriate e-mail addresses.

Additionally, the questionnaire was administered on paper to the same 1104 firms that were addressed by e-mail. In the address database there were some names of purchase, sales or general managers. If these were available, the questionnaire was mailed to (one of these) managers. From the 1104 posted questionnaires 234 were returned unopened. Reasons were incorrect addresses, firms that were closed, moved or (whenever a questionnaire was directed to a specific person) managers that did not work at the company anymore. Of the 870 correctly administered questionnaires 40 were received (response rate 4.59%), however only 32 were completely filled in.

Again, the responds rate was still low. From the overall mailed questionnaires only 88 were returned and 59 completed. Therefore, Professor van Amstel was contacted, as being a key player in Dutch businesses and having an extensive business network. He distributed the questionnaire under his supply chain connections,
that is, under another 1000 Linked-In contacts. However, the selection filter, as described above, was not applied to these contacts. From the 1000 administered questionnaires 48 were returned (4,8% response rate) and 26 were completed. Thus, in total 1908 questionnaires were administered, 136 were returned (response rate 7,12%), of which 85 completely filled in (response rate 4,45%).

To deal with possible outliers, frequencies of all items were viewed. No strange variances in answers were detected. To deal with the problems associated with response bias I tested the differences between the 3 different questionnaires collectors (digital, posted and Prof van Amstel collector). Comparing the means and correlations of these groups respondents showed no significant differences.

**Measurement and Validation of Constructs**

This study used existing scales from literature. Since the questions were in English I translated the questionnaire in Dutch. Three people that fluently write and speak English and Dutch then assessed the translation. Secondly, 3 managers assessed the questionnaire and I asked them to indicate any phrasing that was unclear or ambiguous. These managers were also invited to provide suggestions for improvement of these questions. After these two rounds of assessing the questionnaire the author, peers and teacher further enhanced the phrasing. This concept-final-version was then again assessed for proper translation from the original English constructs to Dutch. After this assessment, the final version was realized.

Some of the scales were originally a 5-point likert scale. However, in order to keep the questionnaire consistent all questions were asked on a 7-point scale. The scale of relational embeddedness and the transfer of tacit and explicit knowledge were therefore changed from a 5-point scale in a 7-point scale.

**Relational Embeddedness** (α = 0.723) is measured by four items: tie strength, benevolence and competence based trust and shared systems (Dhanaraj et al., 2004; Levin and Cross, 2004). Tie strength (α = 0.776) comprised three elements itself, namely the managerial resources, emotional support and time provided by the teacher firm to the student firm. Levin and Cross (2004) distinguished trust as benevolence (α = 0.830) and competence based trust (α = 0.860). These two elements were therefore measured Shared systems (α = 0.821) is measured using a four-item scale, especially focusing on interdependence built into common systems, the degree to which a common business philosophy is instilled and the level of informal communication.

**Structural Embeddedness** (α = 0.706) is measured by three elements thereby following Moran (2005): direct ties, indirect ties and closeness. The number of unique direct ties mentioned in the survey is put into a frequency table. The same is done for the number of unique indirect ties. On Average respondents have mentioned 4,58 direct and 4,05 indirect contacts. Closeness (e.g. connectedness) (α = 0.523) was measured using a five-item scale (Jansen et al., 2006), which focuses on the density of the network. Due to cronbachs alfa item 03 was not used in the scale (resulting in α = 0.797).

<table>
<thead>
<tr>
<th>NBR DIRECT TIES</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
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<td>4</td>
<td>4,7</td>
<td>4,7</td>
</tr>
<tr>
<td></td>
<td>2</td>
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<td>2,4</td>
<td>4,1</td>
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<td>3</td>
<td>5</td>
<td>5,9</td>
<td>12,9</td>
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<td>4</td>
<td>4</td>
<td>4,7</td>
<td>17,6</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>70</td>
<td>82,4</td>
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</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>100,0</td>
<td>100,0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NBR INDIRECT TIES</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
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<td>11,8</td>
<td>11,8</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7</td>
<td>8,2</td>
<td>20,0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3</td>
<td>9,4</td>
<td>29,4</td>
</tr>
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<td></td>
<td>4</td>
<td>4</td>
<td>4,7</td>
<td>34,1</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>56</td>
<td>65,9</td>
<td>100,0</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>100,0</td>
<td>100,0</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3: descriptive statistics structural embeddedness

**Cognitive Embeddedness** (α = 0.850) is measured using a two-item scale (Tsai and Ghoshal, 1998) focusing on the degree to which companies have a shared vision.
To measure potential absorptive capacity and realized absorptive capacity two new constructs were defined and tested (Jansen et al., 2003). Potential absorptive capacity (α = 0.808) consists of acquisition and assimilation. Six items assess the intensity and direction of efforts expended in knowledge acquisition (α = 0.768). Three items measure assimilation (α = 0.830). Realized absorptive capacity (α = 0.901) consists of transformation and exploitation. Six items measure transformation (α = 0.854) and six items measure exploitation (α = 0.822).

Two constructs are used to empirically test the transfer of knowledge. A three-item scale is used to measure the transfer of tacit knowledge (α = 0.835) and a three-item scale is used to measure the transfer of explicit knowledge (α = 0.745) (Dhanaraj et al., 2004).

Constructs for measuring exploratory and exploitative innovations are defined and tested (Jansen et al., 2006). Both exploratory innovation (α = 0.863) and exploitative innovation (α = 0.838) is measured using a 7-item scale.

Company size is taken as a control variable for the relationship between the transfer of knowledge and innovation; since larger firms may have access to different and more resources than can be used to develop exploratory and exploitative innovations (Gooding and Wagner III, 1985). However, larger firms may lack the flexibility to acquire and assimilate new knowledge (Jansen et al., 2003). Furthermore, the age of a company is also considered a control variable for this same relationship; previous studies have demonstrated that older companies may prosper from their age since they might have increased experiences that enhance innovation. However, a firm’s age may also influence the performance (for example innovation performance) of a firm negatively since it might be difficult to continuously modernize (Sorensen and Stuart, 2000). A third control variable is the age of the relationship with the most valuable business partner of a firm. Dhanaraj et al. (2004) suggested that young IJV’s were affected different by the elements of relational embeddedness than mature IJV’s. They suggest that over time organizations learn more easily from given sources. This suggests that the elements of social capital might be influenced by the age of the relationship between parties. A fourth control variable is how much an organization facilitates the learning of its employees. Selnis and Salis (2003) bring up that organizations cannot be instructed to learn from other organizations, however, managers are able to promote the learning from other companies (Chen, Lin and Chang, 2009). Companies can do so for example by facilitating information exchange, developing common learning arenas and adjusting organizational behavior to that of buyers, suppliers, partners and stakeholders (Selnis and Salis, 2003). Chen, Lin and Chang (2009) found that relationship learning (α = 0.813) increases the innovation performance of firms, however facilitation of learning could influence the exchange of knowledge. Firm’s could possibly improve learning activities and thus increase for example the assimilation of knowledge, by facilitating for exchange, creating common learning arenas and adjusting firm’s behavior to that of the partner firm. Relationship learning is measured using a five-item scale (Chen et al., 2009).
CHAPTER FOUR – RESULTS

Table 1 (Appendix I) presents descriptive statistics and correlations for the variables in this study. Table 2 presents the results of the hierarchical regression analyses for the elements of social capital and the main and sub-elements of potential and realized absorptive capacity.

Table 2: Results of hierarchical regression: Effects of social capital on potential and realized absorptive capacity

<table>
<thead>
<tr>
<th></th>
<th>PCAP Acquisition</th>
<th>PCAP Transformation</th>
<th>PCAP Exploitation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct Effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural Embeddedness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of direct ties</td>
<td>0.090 0.559</td>
<td>0.064 0.699</td>
<td>0.028 0.857</td>
</tr>
<tr>
<td>Number of indirect ties</td>
<td>0.014 0.902</td>
<td>-0.114 0.386</td>
<td>+ 0.078 0.490</td>
</tr>
<tr>
<td>Closeness</td>
<td>0.305 0.024 *</td>
<td>0.244 0.090</td>
<td>+ 0.325 0.019</td>
</tr>
<tr>
<td>Relational Embeddedness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tie Strength</td>
<td>0.072 0.502</td>
<td>0.188 0.105</td>
<td>-0.010 0.930</td>
</tr>
<tr>
<td>Benevolence based trust</td>
<td>-0.193 0.120</td>
<td>-0.168 0.206</td>
<td>-0.138 0.272</td>
</tr>
<tr>
<td>Competence based trust</td>
<td>0.018 0.877</td>
<td>-0.126 0.323</td>
<td>+ 0.046 0.703</td>
</tr>
<tr>
<td>Shared systems</td>
<td>-0.137 0.173</td>
<td>-0.100 0.353</td>
<td>-0.141 0.168</td>
</tr>
<tr>
<td>Cognitive Embeddedness</td>
<td>0.399 0.003 **</td>
<td>0.321 0.022 * **</td>
<td>0.506 0.000 ***</td>
</tr>
<tr>
<td><strong>Control Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age relationship</td>
<td>0.007 0.120</td>
<td>0.009 0.072</td>
<td>+ 9.776 5.983</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.417 0.129</td>
<td>2.028 0.004 **</td>
<td>0.892 0.346</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.144</td>
<td>0.120</td>
<td>0.217</td>
</tr>
</tbody>
</table>
| F-value | 2.571 0.014 * | 2.221 0.030 | + 3.487 0.001 | ** 3.118 0.003 | ** 2.845 0.006 | **
| N | 85 | 85 | 85 | 85 | 85 |

p < 0.10 * p < 0.05 * p < 0.01 ** p < 0.001 ***

The results on the suggested influence of structural embeddedness on potential and realized absorptive capacity show that hypothesis 1c is supported, suggesting a positive relation between closeness and potential absorptive capacity. Closeness has a significant positive influence on both the acquisition and assimilation of information. Furthermore did the results show that closeness is also positively related to realized absorptive capacity. A slight significant influence can be found (p<0.10) between the number of indirect ties and the assimilation of information. However, no significant results were found supporting the hypotheses that indirect ties would be positively related to potential and realized absorptive capacity. In addition, it was expected that direct ties would be of influence on both potential as well as realized absorptive capacity. No (significant) influences were found. Hypotheses 1a, 1b, 2a and 2b were therefore not supported.

Considering relationship embeddedness, competence based trust has a positive influence on the acquisition of new knowledge (P<0.10). However, no significant influence was witnessed in the results of competence-based trust on neither potential nor realized absorptive capacity. Furthermore, a positive influence could be deduced from literature suggesting that tie strength, benevolence and shared systems affected potential and realized absorptive capacity. However, the regression analysis does not show such results. Hypotheses 3a, 3b, 4a and 4b were therefore not supported. Also shared systems showed no affect on potential or realized absorptive capacity. Hypotheses 3c and 4c are therefore not supported.

Results are very affirmative considering cognitive embeddedness and its effect on potential and realized absorptive capacity. Hypotheses 5 and 6 are both supported because cognitive embeddedness has a significant influence on both potential (p<0.01) and realized (p<0.001) absorptive capacity.
Hypotheses 7a and 7b, which posit a positive influence of potential and realized absorptive capacity on both the transfer of tacit and explicit knowledge, are not supported. The same can be said for hypotheses 8a and 8b suggesting a positive influence of potential and realized absorptive capacity on tacit and explicit knowledge transfer. Neither hypothesis was supported.

Table 4: results of hierarchical regression: effects of tacit and explicit knowledge transfer on exploratory and exploitative innovations

Hypothesis 9a posits a positive influence on exploratory innovations by tacit knowledge transfer. This hypothesis is supported (p<0.001). Also hypotheses 9b is supported, suggesting a positive influence on exploitative innovations by tacit knowledge transfer (p<0.01). Hypotheses 9c furthermore suggested that tacit knowledge transfer had a more positive influence on exploratory innovations than on exploitative innovations. This hypothesis is supported.

Finally hypotheses 10a suggested a positive influence of explicit knowledge transfer on exploratory innovations. Regression analysis shows that there is a significant influence (p<0.05) of explicit knowledge transfer on exploratory innovations. However, this influence is negative. Furthermore, hypotheses 10b suggested that the transfer of explicit knowledge also has positive influence exploitative innovations. This hypothesis was not supported, since no significant influence can be reported between explicit knowledge transfer and exploitative innovations. Thus hypotheses 10c is therefore not supported.
The above-discussed supported hypotheses can be projected in the proposed model, for this visualization see figure 3. The green arrows indicate the supported hypotheses. The numbers in the arrows specify the strength of the relationship and its significance. The orange arrows show significant relationships between two variables; however, they did not support suggested hypotheses.

Figure 4: Analysis Model for Research Framework ($p<0.10 \, +$, $p<0.05 \, *$, $p<0.01 \, **$, $p<0.001 \, ***$)
CHAPTER FIVE – DISCUSSION AND CONCLUSION

The purpose of this study was to explore how social capital affects the potential and realized absorptive capacity of a firm. Although the relationship between social capital and absorptive capacity has been suggested for some time, the absence of correct scales prohibited the empirical testing of these suggestions. This empirical study assessed potential and realized absorptive capacity and the links with elements of social capital. In addition, this study suggested and empirically tested the relationship between absorptive capacity and the transfer of knowledge. There were some assumptions regarding this relationship, however no study before empirically tested them. And finally, this study is a pioneer in the research area testing the relationship between the transfer of tacit and explicit knowledge and exploratory and exploitative innovations.

This study therefore contributes to the great amount of present research on absorptive capacity in several ways. Most importantly, this study shows a down-to-earth representation on the influence of social capital on absorptive capacity. Many studies advocate that social capital must have a vast influence on the capability of a firm to accumulate and utilize new information. This study however tips-off that this suggested influence is less than previously expected. However, the results are not pessimistic at all. Firstly, this study further contributes to the understanding that a network of intertwined contacts aids an organization in developing its absorptive capacity. This thus shows the great importance of a close network to gather net external information. Secondly, this study pinpoints that striving to a collective goal and vision are particularly helpful in the development of potential and realized capabilities. These findings are in line with literature stating that a small cognitive distance increases a common basic perception (Nooteboom, 2006; 2000) and understanding each other has a great influence on the ability of a firm to share, gather and use information. This study thus demonstrates the vital importance of cognitive embeddedness. The relevance in the practical workplace is clear. It is of vital importance for firm’s participating in alliances to understand the strategic need for specific information. Collaborating organizations must thus be aware of each other’s goals and visions to share and use the right strategic information. In an alliance, such as a supply chain, diminishing the cognitive distance is thus very desirable and wise. Striving towards a collective goal demands an organizational focus, and to come to this collective focus only a minor cognitive distance is acceptable (Nooteboom, 2000).

And, this research is, as mentioned before, a pioneer considering the empirical testing of the relationship between the transfer of tacit and explicit knowledge and exploratory and exploitative innovations. Cavusgil et al. (2003) did empirical test that the transfer of tacit knowledge has a positive influence on the innovation capability of a firm. However, they did not distinguish between the influence on radical and incremental innovations. It gives scholars’ as well as managers more insight in how and what kind of knowledge must be transferred in an supply chain c.q. alliance in order to improve or invent. And, however unlikable, this study showed that no direct significant relationship is to be expected between potential and realized absorptive capacity and the transfer of explicit and tacit knowledge.

Limitations
The major limitation of this study concerns the measurement approach. The analysis is limited to those aspects that can be gained through a questionnaire. It is of course an assumption that the questions asked in the questionnaire embrace the rich aspects of social capital, absorptive capacity, knowledge transfer and innovation. Furthermore, the questionnaire has been administered only in a short period of time. It thus excludes any changes over time in relationships between variables or influences. Moreover, the dataset only contains companies with over 100 employees and from specific branches. Also the small sample size, although the significant results are consistent with previous research, limit the finding’s statistical power. And, the model was tested not using a partial least squares regression. The levels in the model were all tested using a
linear regression. This could well have influenced results. The previous limitations should be taken into account when reading and analyzing my findings.

**Implications**

Notwithstanding the limitations, the study contains several results that are consistent with theories on absorptive capacity, social capital, knowledge transfer and innovations. The implications of this study and discussion of results in relation to literature reviews can be found below.

Firstly, the findings indicate that the number of direct or indirect ties do not influence potential or realized absorptive capacity. Only the number of indirect ties did influence assimilation as an element on potential absorptive capacity positively. Literature points out that the number of ties, direct and indirect, provides possible information sources. More books mean a bigger library and that means the more information available. However, whenever the library is freely accessible, the change that the bunch of information contains new information is smaller. Therefore Burt (2000, 1992) suggested that a network consisting of more direct than acquainted indirect ties would be preferable due to the privileged information access and control benefits. However the results showed no significant relation between the number of ties and the two types of absorptive capacity. A possible explanation could be that absorptive capacity should be seen as a moderator between the number of ties and the transfer of knowledge. Tsai (2001) found empirically proof that the unit’s position in a network (centrality) influences innovation and that this relationship is positively moderated by the level of absorptive capacity. This lets to think that cognitive embeddedness might also be a moderator in the relationship between structural embeddedness and the transfer of knowledge. Further studies may investigate the effect of absorptive capacity as a moderator in this relationship. Considering closeness, literature supports both the opponents and proponents of the effect that closeness has on absorptive capacity. The results of this study aid the proponents in the discussion. Closeness positively affected both realized and potential absorptive capacity. A sparse network with low closeness might give overall more access to knowledge sources, however a dense network is believed to create trust and motivates to cooperate (Moran, 2005; Jansen, van den Bosch and Volberda, 2005; Cohen and Levinthal, 1990). The findings of this study suggest that this trust and cooperation aid the absorptive capabilities of a firm. Besides, the greater information access might be true in personal relationships. However, in alliances, ties with higher levels of trust, strong ties, are suggested to provide more access to non-redundant information than weak ties (McEvily and Zaheer, 1999; Achrol and Kotler, 1999; Reingen, 1994). This study thus suggests the key importance of close, dense networks in alliances such as supply chains for its positive influence on absorptive capacity. A possibility for further research would be to investigate if a closed or sparse network provides more useful knowledge. A close network might positively influence absorptive capacity; however, what effect does it have on the receipt of useful knowledge? This would deepen the investigation done by Levin and Cross (2004) and deepen the results of this and other research about the influence of closeness on potential and realized absorptive capacity.

Secondly, my findings indicated that relational embeddedness has nearly no influence on potential and realized absorptive capacity. One study researching the influence of relational embeddedness on Internet marketing also found that maintaining a good relationship with customers, e.g. high relational embeddedness, did not guarantee higher levels of absorptive capacity (Tsai, 2006). This supports my findings. But, the research area and elements of relational embeddedness in the study about Internet marketing did vary greatly from the ones in this research. The information that steered to the suggestion in this study that the elements of relational embeddedness might positively influence absorptive capacity was based on the fact that higher levels of relational embeddedness facilitate the transferring of knowledge (Dhanaraj et al., 2004). If relational embeddedness would facilitate knowledge transfer it must certainly, as suggested, also facilitate absorptive capacity. But again, the suggestion that relational embeddedness influences absorptive capacity was not backed by the results. Neither tie strength, benevolence based trust nor shared systems influenced potential or realized absorptive capacity. The only discrepancy was that competence based trust significantly influenced the assimilation of information as an element of potential absorptive capacity. This is in line with literature. A
knowledge seeker lets his mind and actions be influenced easier by a knowledge source whose competence he trusts than a knowledge source that he distrusts (Levin and Cross, 2004). Since assimilation refers to the analyzing and understanding of information, the influence of competence-based trust on assimilation is understandable. But again considering the relationship between relational embeddedness, knowledge transfer and absorptive capacity, some sort of connection is to be expected since studies showed that a lack of absorptive capacity prevented the sharing of information (Szulanski, 1996; Tsai, 2001). And in the analysis model in the study of Tsai (2006) absorptive capacity is considered as the connecting element between relational embeddedness and knowledge transfer. A possible explanation why none of the elements of relational embeddedness influence potential and realized absorptive capacity directly might be because absorptive capacity is a moderator in the relationship between relational embeddedness and the transfer of knowledge. Relational embeddedness does influence the transfer of knowledge. This has been proven by Dhanaraj et al. (2004) as well as Cavusgil et al. (2003). It might be that this relationship is influenced by the absorptive capacity of a firm. This latter would also explain why no significant influence was found from absorptive capacity on the transfer of knowledge. And this suggestion might be supported by Minbaeve et al. (2003). They found that subsidiary absorptive capacity did facilitate the transfer of knowledge. So some sort of influence of absorptive capacity is to be suggested. Further research could focus on the possibility that absorptive capacity facilitates the transfer of knowledge as a moderator. A second explanation of why relational embeddedness did not turn out to be significantly related to absorptive capacity might be found in the operationalisation of relational embeddedness. Relational embeddedness was measured following partially the study of Dhanaraj et al. (2004) and partially the study of Levin and Cross (2004). The reason was that a supply chain was taken as a hybrid organization, thereby giving way for incorporating the relational embeddedness measures of Dhanaraj et al. However, this might have been the root cause of the insignificant results. Further study could also focus on retesting the hypotheses done in this study using a different measure for relational embeddedness.

Thirdly, these findings also indicate that cognitive embeddedness significantly influences the potential and realized absorptive capacity of a firm. This is in line with literature stating that a small cognitive distance increases a common basic perception (Nooteboom, 2006; 2000). This makes it easier to understand what goal a firm of maybe alliance is striving to and what knowledge is necessary to fill the present gap. Although it has been denoted that higher levels of cognitive embeddedness could constraint creativeness and cause mental prisons (e.g. Jansen, van den Bosch and Volberda, 2005) these study results show otherwise. An explanation why this study did not observe the downside of cognitive embeddedness could be because this study merely focused on cognitive embeddedness as the striving to a collective goal and vision within the supply chain. Jansen, van den Bosch and Volberda (2005) researched the influence of the umbrella variable ‘socialization tactics’ that comprised more elements of cognitive embeddedness and they did not found any significant influence of these socialization tactics on potential absorptive capacity. Jansen, van den Bosch and Volberda (2005) therefore also identified the need for further research to find what certain socialization tactics might contribute to an open orientation and thus support potential absorptive capacity. This study adds to the current knowledge on cognitive embeddedness and the results thus suggest the crucial importance of a collective goal and vision for both potential as well as realized absorptive capacity. The relevance of these findings in the practical workplace can be suggested. For alliances to understand the vital importance of the information they share with each other, collaborating organizations must be aware of each other’s goals and visions. In an alliance, such as a supply chain, diminishing the cognitive distance is highly advisable. Hence, this study demonstrates the key importance of cognitive embeddedness. These findings enlighten managers and support them to work on broadly acknowledge collective visions within the complete supply chain. Results show how important having a collective goal or vision is for the transferring of knowledge and thus innovation. Further research could investigate the different influence of cognitive distance between same cultures and opposing cultures. Hamel, Doz and Prahalad (1989) mention the difference in culture between Western and Asian firms. Western firms naturally behave as teachers and Asian firms as students. This leads to problems in cooperation between two Asian firms since “neither side wants to open the kimono” (Hamel, Doz, Prahalad,
Chen, Lin and Chang (2009) refer to the importance of “Guanxi” in Chinese trade. Hence, culture is suggested of importance on the influence it has on cognitive distance and thus absorptive capacity. Furthermore, for the two other elements of social capital, structural and relational embeddedness, absorptive capacity could be researched as a moderator. However, the same could be relevant for cognitive embeddedness. If higher levels of cognitive embeddedness influence the absorptive capacity of a firm, does cognitive embeddedness than also influence the transfer of knowledge through absorptive capacity as a moderator?

Fourthly, this research is one of the first studies that investigates and empirically tests the relationship between the transfer of tacit and explicit knowledge and exploratory and exploitative innovations. Results are satisfactory and show that explicit and tacit knowledge transfer really influences radical and incremental innovations differently. Explicit knowledge negatively influences exploratory innovations and tacit knowledge positively influences both types of innovation. These results support previous research. Cavusgil et al. (2003) started testing how tacit knowledge transfer influenced innovation and found a significant positive relation. They however measured the tacitness on a scale varying from low to high, thereby not testing the different influence of explicit and tacit knowledge. They found that the more tacit the knowledge is, the more it positively influences innovation. Measuring tacitness on a scale was performed because Cavusgil et al. believe that no absolute tacit or explicit knowledge exists. They support the vision of Inkpin and Dinur (1998) that explicit and tacit knowledge is not a dichotomy but a spectrum. Since this study suggests that there is a significant difference between explicit and tacit knowledge transfer on the two different types of innovation, further research could deepen this finding by investigating how the level of tacitness is related to exploratory and exploitative innovations. This research for example found that explicit knowledge transfer has a negative relationship with exploratory innovations. However the influence of tacit knowledge transfer on exploratory innovation is positive. Hence, the question rises when does knowledge become more explicit than tacit and thus negative for advancing innovation. Further research is especially interesting because companies like Buckman Laboratories use databases like K’Netix to make tacit knowledge more explicit in order to transfer is more easily. The results that tacit knowledge has a positive influence on innovation and explicit knowledge has a negative or insignificant influence can be explained using previous literature as well. Explicit knowledge is less likely to be unique, rare and besides it is easier to transfer to rivals than tacit knowledge (e.g. Cavusgil et al, 2003). The impact of explicit knowledge on innovation is therefore expected to be lower than tacit knowledge. The negative influence of explicit knowledge found in this study could thus be derived from the fact that innovations that result from explicit knowledge transfer are often stolen and therefore do not sum up to winning innovations. The negative influence could also be produced by the dataset. Since the survey was administered to businesses in branches that most likely participate in supply chains, it could be that most these branches lack explicit knowledge. Because Cavusgil et al. (2003) mention that tacit knowledge is supposedly especially significant in businesses that lack explicit knowledge. Further research could therefore repeat this study in different branches to analyze if results match.

As mentioned before, this study also suggested that absorptive capacity might influence the transfer of knowledge. The reasoning that firms with high levels of absorptive capacity might have better understanding of the importance of sharing information and as a consequence share more information than firms with lower levels of absorptive capacity was based on previous studies. Because literature had proven that higher levels of absorptive capacity improved the exploitation of technical data and both Ngoc (2006) and Chou (2005) found strong support that the levels of absorptive capacity influenced inter-firm knowledge transfer. This posed the question whether a different influence could be found analyzing the relationship of potential and realized absorptive capacity on explicit and tacit knowledge transfer. However, the suggested relation between absorptive capacity and the transfer of knowledge was not significant. A reason why the results of this study are not in line with previous literature could lay in the different measures of knowledge transfer. Both Ngoc (2006) and Chou (2005) do not use the difference in tacit and explicit knowledge, but studied knowledge as a whole or as a distinction between low and high specific knowledge. Furthermore, Ngoc (2006) explicitly
mentions that both potential and realized absorptive capacity are necessary to ensure the sharing of explicit and tacit knowledge, and transforming explicit knowledge in tacit knowledge and vice versa. Separating between potential and realized absorptive capacity might have caused the insignificant results. Further research could focus on getting more insight on when absorptive capacity does have a significant influence on knowledge transfer.

Finally, in the analysis on whether potential and realized absorptive capacity have an influence on explicit and tacit knowledge transfer, relationship learning was taken as a control variable, because I suggest that it influences the degree in which management facilitates knowledge transfer. It was expected that the amount of knowledge transferred would be higher in cases in which management creates joint learning arenas and explicitly mentions the importance of knowledge transfer. However, no significant relation was found between potential and realized absorptive capacity on knowledge transfer, although the control variable relationship learning did turn out to be significant. To my knowledge no studies have been done investigating the influence of relationship learning on explicit and tacit knowledge transfer. It could thus be interesting for future research to look into this possible relationship.
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</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
### Appendix II: Measures

<table>
<thead>
<tr>
<th>Measure (on a 7-point likert scale)</th>
<th>o</th>
<th>mean</th>
<th>st.dev</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relational Embeddedness (Dhanaraj e.a., 2004)</strong></td>
<td></td>
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<tr>
<td><strong>Tie Strength</strong></td>
<td>0.776</td>
<td>3.694</td>
<td>0.527</td>
</tr>
<tr>
<td>- To what extent have you received support from your most valuable business partner in the area of managerial resources?</td>
<td>In welke mate heeft uw organisatie ondersteuning gekregen op management gebied van uw belangrijkste handelspartner?</td>
<td></td>
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<tr>
<td>- To what extent have you received support from your most valuable business partner in the area of emotional support?</td>
<td>In welke mate heeft uw organisatie emotionele ondersteuning gekregen van uw belangrijkste handelspartner?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- To what extent has your most valuable business partner liberated time to support you?</td>
<td>In welke mate heeft uw belangrijkste handelspartner tijd vrijgemaakt voor uw organisatie?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shared systems</strong></td>
<td>0.821</td>
<td>3.665</td>
<td>0.278</td>
</tr>
<tr>
<td>- In the following section, we would like you to indicate the extent to which you agree with the following statements about your company and your most valuable business partner</td>
<td>Beantwoord de volgende vragen over uw belangrijkste handelspartner:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Our systems have been tailored to those of our most valuable business partner (or visa versa).</td>
<td>Wij gebruiken dezelfde systemen (denk hierbij aan bijv ICT systemen &amp; programmatuur, voorraadssystemen o.d.).</td>
<td></td>
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<tr>
<td>- We monitor the extent to which established procedures are followed.</td>
<td>Wij controleren bij elkaar of we dezelfde afgesproken procedures handhaven.</td>
<td></td>
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</tr>
<tr>
<td>- We developed specific procedures.</td>
<td>Wij hebben duidelijke gezamenlijke procedures met elkaar afgesproken.</td>
<td></td>
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<tr>
<td>- We have instilled a common business philosophy.</td>
<td>Wij hanteren een gezamenlijke organisatiefilosofie.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Benevolence based trust (Levin &amp; Cross, 2004)</strong></td>
<td>0.83</td>
<td>4.725</td>
<td>0.274</td>
</tr>
<tr>
<td>- I assumed that our most valuable business partner would always look out for our interests.</td>
<td>Wij gaan ervan uit dat onze belangrijkste handelspartner altijd rekening zal houden met onze organisatiebelangen.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Our most valuable business partner would go out of his way to make sure our company was not damaged or harmed.</td>
<td>Onze organisatie heeft het gevoel dat onze belangrijkste handelspartner onze organisatie niet wil schaden.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Our most valuable business partner cares what happens to me.</td>
<td>Onze organisatie heeft sterk het idee dat onze belangrijkste handelspartner geeft om wat er met onze organisatie gebeurt.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Competence based trust (Levin &amp; Cross, 2004)</strong></td>
<td>0.86</td>
<td>5.471</td>
<td>0.09</td>
</tr>
<tr>
<td>- I believe our most valuable business partner approaches his job with professionalism and dedication.</td>
<td>Onze organisatie is ervan overtuigd dat onze belangrijkste handelspartner zijn werkzaamheden met toewijding en professionaliteit uitvoert.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Our company has no reason to doubt the competence and preparation of our most valuable business partner.</td>
<td>Onze organisatie heeft totaal geen twijfel over de competenties van onze belangrijkste handelspartner.</td>
<td></td>
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</tr>
<tr>
<td><strong>Structural Embeddedness (Matzat &amp; Snijders, 2007)</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Direct ties</strong></td>
<td>0.797</td>
<td>5.356</td>
<td>0.125</td>
</tr>
<tr>
<td>- Please note the names, unique initials, or nicknames of at most 5 companies you have direct contact with. You can use pseudonyms as long as you can remember who the real company behind the pseudonym is. Please mention every name only once.</td>
<td>Noem maximaal 5 unieke directe contacten die uw organisatie heeft. Dit moeten 5 verschillende contacten zijn waar uw organisatie direct contact mee heeft. Hier mag uw beste handelsrelatie bij zitten. U mag initialen of pseudoniemen gebruiken van dezelfde organisatie.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indirect ties</strong></td>
<td>0.85</td>
<td>5.106</td>
<td>0.022</td>
</tr>
<tr>
<td>- Please note the names, unique initials, or nicknames of at most 5 companies you have indirect contact with. These are your acquaintances or your friend's friends. You can use pseudonyms as long as you can remember who the real company behind the pseudonym is. Please mention every name only once.</td>
<td>Noem maximaal 5 unieke indirecte contacten die uw organisatie heeft. Dit zijn organisaties waar uw handelsrelatie voor iets met uw organisatie doet. Men mag initialen of pseudoniemen gebruiken van deze organisatie.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Closeness (Jansen et al., 2006)</strong></td>
<td>0.797</td>
<td>5.356</td>
<td>0.125</td>
</tr>
<tr>
<td>- There is ample opportunity for informal &quot;hall talk&quot; with our most valuable business partner.</td>
<td>Er is voldoende gelegenheid om informeel contact te zoeken met onze belangrijkste handelspartner.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Employees from different departments both from our own firm as well as our most valuable business partner feel comfortable calling each other when the need arises.</td>
<td>Medewerkers van verschillende afdelingen van zowel onze eigen organisatie als onze belangrijkste handelspartner vinden het geen probleem om elkaar te bellen wanneer dat nodig is.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Managers discourage employees directing work-related matters with our most valuable business partner.</td>
<td>Leidinggevenden ontmoedigen onze medewerkers om werkhorenden zaken te bespreken met medewerkers van onze meest belangrijke handelspartner.</td>
<td></td>
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</tr>
<tr>
<td><strong>Cognitive Embeddedness (Tsai &amp; Ghoshal, 1998)</strong></td>
<td>0.85</td>
<td>5.106</td>
<td>0.022</td>
</tr>
<tr>
<td>- Our company shares the same ambitions and vision with our most valuable business partner.</td>
<td>Onze organisatie deelt ambities en visie met onze belangrijkste handelspartner.</td>
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</tr>
<tr>
<td>- People in both our company as well as our most valuable business partner are enthusiastic about pursuing our collective goals and missions.</td>
<td>Zowel onze organisatie als de organisatie van onze belangrijkste handelspartner is enthousiast over het streven naar de gezamenlijke doelen en missie.</td>
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<tr>
<td>Measure (on a 7-point likert scale)</td>
<td>α</td>
<td>mean</td>
<td>st.dev</td>
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<tr>
<td><strong>Potential Absorptive Capacity (Jansen e.a., 2003)</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Acquisition</strong></td>
<td>0,808</td>
<td>4,656</td>
<td>0,176</td>
</tr>
<tr>
<td>- Our firm has frequent interactions with corporate headquarters to acquire new knowledge.</td>
<td>- Medewerkers van onze organisatie bezoeken regelmatig andere organisaties of branches.</td>
<td></td>
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<tr>
<td>- Employees or our firm regularly visit other branches.</td>
<td>- We verzamelen bedrijfsinformatie langs informele weg (bijv. lunch met kennisgenoten uit dezelfde bedrijfstak of een gesprek met een handelspartner).</td>
<td></td>
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<tr>
<td>- We collect industry information through informal means (e.g., lunch with industry friends, talks with trade partners).</td>
<td>- Onze organisatie heeft frequent contact met spilers binnen de keten voor het inwinnen van nieuwe kennis.</td>
<td></td>
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<tr>
<td>- Other divisions of our firm are hardly visited.</td>
<td>- Andere afdelingen van onze organisatie of andere afdelingen in de keten worden nauwelijks bezocht.</td>
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<tr>
<td>- Our firm periodically organizes special meetings with customers or third parties to acquire new knowledge.</td>
<td>- Onze organisatie organiseert periodiek speciale bijeenkomsten voor de klanten en andere organisaties binnen de keten om nieuwe kennis in te winnen.</td>
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<tr>
<td>- Employees regularly approach third parties such as accountants, consultants or tax consultants.</td>
<td>- Onze medewerkers benaderen geregeld andere marktpartijen zoals accountants, consultants en/of belastingadviseurs.</td>
<td></td>
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</tr>
<tr>
<td><strong>Assimilation</strong></td>
<td>0,835</td>
<td>4,598</td>
<td>0,119</td>
</tr>
<tr>
<td>- We are slow to recognize shifts in our market (e.g., competition, regulation, demography).</td>
<td>- Wij zijn langzaam in het onderkennen van veranderingen in de markt (concurrentiepositie, wet- en regelgeving, demografie).</td>
<td></td>
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</tr>
<tr>
<td>- New opportunities to serve our clients are quickly understood.</td>
<td>- Nieuwe kansen en mogelijkheden om service aan een klant te bieden worden snel onderkend.</td>
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<tr>
<td>- We quickly analyze and interpret changing market demands.</td>
<td>- Wij zijn snel in het analyseren en interpreteren van veranderingen in de marktverandering.</td>
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</tr>
<tr>
<td><strong>Transformation</strong></td>
<td>0,901</td>
<td>4,709</td>
<td>0,187</td>
</tr>
<tr>
<td>- Our firm regularly considers the consequences of changing market demands in terms of new products and services.</td>
<td>- Onze organisatie denkt veelvuldig na over de consequenties van de veranderingen in de markt met het oog op nieuwe producten en diensten.</td>
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<tr>
<td>- Employees record and store newly acquired knowledge for future reference.</td>
<td>- Medewerkers documenteren en slaan nieuwe kennis op om later te gebruiken.</td>
<td></td>
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</tr>
<tr>
<td>- Our firm quickly recognizes the usefulness of new external knowledge to existing knowledge.</td>
<td>- Onze organisatie herkent snel de bruikbaarheid van nieuw externe kennis in combinatie met bestaande kennis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Realized Absorptive Capacity (Jansen e.a., 2003)</strong></td>
<td>0,854</td>
<td>4,598</td>
<td>0,119</td>
</tr>
<tr>
<td><strong>Exploitation</strong></td>
<td>0,822</td>
<td>4,82</td>
<td>0,264</td>
</tr>
<tr>
<td>- It is clearly known how activities within our firm should be performed.</td>
<td>- Het is voor elke medewerker duidelijk hoe activiteiten binnen onze organisatie zouden moeten worden uitgevoerd.</td>
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<tr>
<td>- Client complaints fall on deaf ears in our firm.</td>
<td>- Klachten van klanten zijn binnen onze organisatie aan doemans oren gericht.</td>
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<tr>
<td>- Our unit has a dear division of roles and responsibilities.</td>
<td>- De verdeling van taken en verantwoordelijkheden is helder binnen onze organisatie.</td>
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<tr>
<td>- We constantly consider how to better exploit knowledge.</td>
<td>- Onze organisatie is constant op zoek naar manieren om kennis beter te benutten.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Our firm has difficulty implementing new products and services.</td>
<td>- Onze organisatie heeft moeite met het implementeren van nieuwe producten en diensten.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Employees have a common language regarding our products and services.</td>
<td>- Medewerkers delen nauwelijks praktische ervaringen met elkaar,</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transfer of tacit knowledge</strong></td>
<td>0,745</td>
<td>3,8</td>
<td>0,329</td>
</tr>
<tr>
<td>- To what extent have you learned new marketing expertise from your most valuable business partner?</td>
<td>- In welke mate heeft uw organisatie kennis opgedaan van uw belangrijkste handelspartner over nieuwe marketing expertise?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- To what extent have you learned knowledge about foreign cultures and tastes from your most valuable business partner?</td>
<td>- In welke mate heeft uw organisatie kennis opgedaan van uw belangrijkste handelspartner over de cultuur binnen uw bedrijfstak?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- To what extent have you learned managerial techniques from your most valuable business partner?</td>
<td>- In welke mate heeft u kennis opgedaan van uw belangrijkste handelspartner over managementtechnieken?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transfer of explicit knowledge</strong></td>
<td></td>
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</tbody>
</table>
Measure (on a 7-point likert scale)  α mean st.dev

Explorative Innovations (Jansen e.a., 2006)

· Our company accepts demands that go beyond existing products and services.
· We invent new products and services.
· We experiment with new products and services in our local market.
· We commercialize products and services that are completely new to our company.
· We frequently utilize new opportunities in new markets.
· Our company regularly uses new distribution channels.
· We regularly search for and approach new clients in new markets.

α = 0.863, mean = 4.492, st.dev = 0.343

Exploitative Innovations (Jansen e.a., 2006)

· We frequently refine the provision of existing products and services.
· We regularly implement small adaptations to existing products and services for the market.
· We improve our provision’s efficiency or products and services.
· We increase economies of scale in existing markets.
· Our company expands services for existing clients.
· Lowering costs of internal processes is an important objective.

α = 0.838, mean = 5.042, st.dev = 0.104

Control Variables

· Sexe
· Year of birth?
· How many years do you have a relationship with your most valuable business partner?
· In what branche does your company operate?
· When was your organization founded?
· How many employees does your company have?

Relation learning (Chen e.a., 2009)

· Whether the company exchanges information related to changes in the technology of products with its relevant partners.
· Whether the company exchanges information related to changes in the market structure, such as mergers, acquisitions or partnering with its relevant partners.
· Whether the company is frequently influenced by its relevant partners to adjust its common understanding of trends in technology related to its business..
· Whether the company is common to establish joint teams to analyze and discuss strategic issues with its relevant partners..
· Whether the company and its relevant partners frequently meet face-to-face in order to refresh the personal network.

α = 0.813, mean = 4.652, st.dev = 0.262
References


