

CREATION AND DIFFUSION OF COMPETENCE IN MNCs – STRUCTURES, TIES AND RESOURCES AT THE SUBSIDIARY LEVEL

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Network structures and relational characteristics have become increasingly prevalent for studying knowledge creation and diffusion. Some scholars claim that a large number of weak ties to counterparts facilitate a unit's possibilities to gather novel information while others stress strong ties between the unit and its partners in order to absorb the novel knowledge. The same bi-polarity can be seen when structures are considered; certain scholars favor open structures while others favor closed network structures. The fact that each company has restrictions regarding resources highlights the question of how structures and relationships (ties) are configured.

In this paper, we utilize different strands of theories about network structure and relational characteristics to develop an understanding of how relations and structures should be structured in order to facilitate creation and diffusion of competence in multinational corporations.

INTRODUCTION

Later years research has increasingly recognized the multinational corporation's (MNC's) role as a crucial participant in transfer of knowledge between industrial clusters. The MNCs ability to create integrated technological networks and to co-ordinate geographically dispersed activities, has become an important strand of research in international business (Kogut, 1990, 1993; Dunning, 1993; Zander, 1995; Cantwell and Janne, 1997). As knowledge creation and

diffusion in many ways is geographically bounded, the MNC have an important role, in its ability to locate subsidiaries in different countries and technological centers, and also in transferring knowledge between these subsidiaries and countries (Pearce, 1997).

This perspective on knowledge creation and transfer has a parallel development in how researchers conceptualize the strategy and structure of the MNC. Several scholars maintain that the modern MNC is a differentiated organization in which the subsidiaries may have different strategic roles (Hedlund, 1986; Ghoshal and Nohria, 1989; Forsgren, 1989; Bartlett and Ghoshal, 1989; Ghoshal and Bartlett, 1990; Gupta and Govindarajan, 1991, 1994; De Mayer, 1992; Malnight, 1996). Today it is recognized that the "center-periphery" perspective, previously dominating the research on international business, is somewhat obsolete and that subsidiaries often have substantial roles in knowledge creation depending on its location, history, human resources and administrative heritage. This new perspective has been called "multi-center" perspective, indicating that some subsidiaries can be on an equal footing with the parent company in terms of competence and importance for the whole corporation (Forsgren, 1990; Forsgren et al., 1992). Studies about knowledge transfer from subsidiaries back to the parent company and sister units reflect this new direction of MNC research (Yamin, 1997; Andersson and Forsgren, 2000; Andersson et al., 2001).

The thesis of this paper is that the characteristics of the business network surrounding the subsidiaries in an MNC have profound impact on the creation and dispersion of product development. It is argued that the subsidiary plays two different roles in this process. Firstly, the subsidiary is the unit within an MNC that has the environmental contact through its operations. This gives it the possibility to absorb new information from the environment and it is thereby an important player in renewing the knowledge base of the MNC. This means that one distinct role of a subsidiary is to search for novel information important for the MNCs continuous knowledge development in its local context. Secondly, one of the subsidiary's

most significant missions, besides the search for novel information, is the integration of knowledge so that all units within the MNC can benefit from the new knowledge.

It has been argued that it is easier to transfer knowledge within organizations compared to between organizations (Kogut and Zander, 1992). This is by no means to say that transfer of information and knowledge is unproblematic even if it takes place within the legal boundaries of a firm. Characteristics of the knowledge itself as well as of the sender and receiver and the relation between them influence the ease of which information can be transferred among units (Szulanski, 1996). However, we can conclude that a subsidiary within an MNC has two distinct and important roles from a product development perspective, the search for new and novel information in its local context and the transfer of this information to sister units within the MNC.

The notion of the subsidiary's two roles have implications for what type of network and what type of relations that are beneficial in promoting product development in the MNC. Characteristics of networks and relations between network actors have been increasingly researched during the last decades (see e.g. Granovetter, 1985, 1992; Zukin and Di Maggio, 1990; Grabher, 1993; Håkansson and Snehota, 1995; Uzzi, 1996, 1997; Gulati, 1998, 1999; Halinen and Törnroos, 1998; McEvily and Zaheer, 1999; Dyer and Chu, 2000; Gulati et al., 2000; Kogut, 2000; Rowley et al., 2000) and one notion that has been put forth is the notion of embeddedness. One important issue in studies of embeddedness has been the extent to which firms are embedded and the consequences of embeddedness for the search and transfer of novel information and innovation. If a firm becomes too embedded, the adaptation of the firm to 'new' trends or directions in the environment becomes difficult. As network relationships are tuned to specific trading partners, isomorphism within the network decreases diversity, and a concentrated level of exchange with only a few network partners reduces non-redundant information and access to new opportunities (Burt, 1992). This may lead to

decreased performance of the firm. This phenomena has also been labeled the weakness of strong ties (Granovetter, 1973). When all firms within a network are connected through deep and interdependent (strong) ties the firm becomes over-embedded. Over-embeddedness can reduce the flow of novel information into the network because redundant ties to the same network partners mean that there are few or no links to outside members who can potentially contribute innovative ideas (Burt, 1992). Studies emphasizing the problem of over-embeddedness are mainly grounded in social network theory and have studied individuals and intra-organizational relations (see e.g. Granovetter 1973, 1985, 1992; Krackhardt, 1992).

Another line of research, product innovation research, has analyzed the troublesome transfer of complex knowledge, including non-codified or tacit knowledge, (Zander and Kogut, 1995) and knowledge dependent on a larger system (Winter, 1987). In these studies weak ties may cause problems in transferring complex knowledge between actors. Further, the market as network perspective, mainly interested in activity relations between corporations, has rather emphasized the importance of close and interdependent relationships, especially in the case of product development (see e.g. Håkansson, 1989; Laage-Hellman, 1989, Andersson and Forsgren 1996, 2000). From the above discussion follows that we are dealing with two contradictory perspectives, the first emphasizes the importance of weak ties and the other accentuates the significance of strong ties.

In the following we will discuss the detection of new information external of the MNC and important to its product development. By taking the standpoint that an MNCs most prominent boundary spanners in the case of product development is its sub-units situated in different geographical markets, the subsidiaries search role will be discussed. Further, the pros and cons of different types of structures for the transfer and integration of information and knowledge within an MNC will be molded. By doing this we hope to explicate the subsidiary's other substantial role in the multi-center MNC, i.e. its knowledge integration

role. Subsequently we will discuss the implications of the subsidiary's dual role on the MNC and on the subsidiary itself. The paper will end with a discussion of the findings and implications for theory and further research.

The subsidiary's search role

The relevant questions for a subsidiary's search role comprises the content of the relationships with counterparts as such, i.e. the depth and strength of the relation. The subsidiary's search position is promoted by having a large number of weak, arm's-length, relations as they are easier to maintain compared to deep and strong relationships (see e.g. Burt, 1992; Hansen, 1999). As resources are limited there is a trade off between depth and strength on one hand and the sheer number of relations on the other. It is possible to maintain a larger number of arm's-length ties compared to deep and intense relationships with the same amount of resources. As the possibility to find novel information increases with the number of sources a company has access to we can conclude that the subsidiary's search role gains from having a large number of relatively weak relations.

On the other hand, Hansen (1999) has shown that this is only true if the information sought after is of an explicit and codified type. When the information becomes more complex there has always to be a certain depth in the relation. Strong ties or deep and intense relationships between counterparts are superior compared to weak ties when it comes to transfer and integration of knowledge of a more complex or non-codified type (Ibid.). This notion has also been eloquently stated as *absorptive capacity*, i.e., the subsidiary's ability to recognize, assimilate and commercialize new information (Cohen and Levinthal, 1990; Lane and Lubatkin, 1998).

If we concentrate on knowledge and information of use in the product development process rather than on information in general we can conclude that this type of knowledge many times is of a non-codified type. Consider for example the case where a customer

demands an adaptation of the produced product so that it better fits the customer's production process. The type of development needed probably requires a certain amount of knowledge about the customer's production process to succeed. This type of knowledge requires a certain amount of closeness between the parties. It has been shown that the success of product development is dependent on the intensity and closeness in the relationship between the buyer and the seller (see e.g. Andersson and Dahlqvist, 2001).

The discussion above reveals two contradicting forces influencing a subsidiary's search role and the configuration of the network and content of the relationships. First, there is the aspect of having as many sources for new information as possible, which means that the subsidiary should use arm's-length relations to a great extent. Second, the subsidiary's possibility to assimilate the novel information is dependent on the intensity, depth and closeness of the relationship. The more the novel information is of a non-codified and/or tacit type the greater the need for deep relationships in order for the subsidiary to have good possibilities to assimilate the information.

The informational and/or learning advantages associated with the firm's close links with other actors have been called relational embeddedness (Gulati, 1998, 1999; Gulati et al., 2000). This perspective on networks emphasizes the importance of direct sticky ties and/or deep and intense relationships as a mechanism for delicate and complex information. Actors who share deep and intense direct relationships with each other are likely to possess more common information and knowledge of each other compared to actors having arm's-length ties. A high degree of embeddedness in a relationship means that the two partners are strongly tied and close to each other and thereby are likely to develop a shared understanding of each others capabilities and trustworthiness. High embeddedness or cohesion can be viewed, as the capacity of the relationship to carry information that diminishes uncertainty (Granovetter

1973), as well as information that is non-codified and complex, needed in innovation processes (Håkansson 1989, Andersson and Forsgren 1996, 2000, Andersson et al. 2001).

In the next section we will discuss the subsidiary's transfer role, i.e. its internal connections with sister units and how different structures and embeddedness influence this role.

The subsidiary's knowledge integration role

When the subsidiary has recognized and assimilated the external knowledge the question of diffusing the knowledge among all other sub-units within an MNC arises. As said above the MNCs capability of taking advantage of the variety of knowledge sources because of its different subsidiaries and make use of the knowledge in locations other than its origin is its true competitive advantage. As was revealed in the last section, relational embeddedness i.e., the depth and intensity of the relationship, is positively related to transferring complex knowledge, but how is the network to be structured in order to successfully promote transfer and integration of knowledge within the MNC?

Structural embeddedness focuses on the informational role of the position an organization occupies in the network beyond immediate ties or relationships. In these positional perspectives the frame of reference shifts from the dyad or triad to the system. The position an actor in the network takes up is a function of that actor's relational pattern. Different positions have different informational advantages, e.g. an actor positioned between two other actors can to a certain degree control the information flow between the other actors and thereby also influence the other actors access to information. (see e.g. Cook and Emerson, 1978; Burt, 1992)

A common way to describe network structures is as open or closed systems (see e.g. Burt, 1992; Coleman, 1990; Uzzi, 1996; Kogut, 2000). The open network structure is the outcome of the competitive struggle between parties motivated by self-interest. The main construct in

this type of network is the unique, i.e. non-redundant, ties. A tie is non-redundant if it is the only path between two actors and actors that have multiple non-redundant ties to other actors who are not connected to each other have a strong brokerage position called “structural holes” (Burt, 1992). Firms positioned in structural holes have a more powerful position than others do because they control the information flows between different networks (Ibid.). Networks of this type tend to have a “hierarchical” structure although there are several hierarchies, and the firm bridging the structural holes earns the credit (Kogut, 2000).

The closed network structure builds on the notion that members in an group coordinate their efforts and actions. Coordination is improved through the continuous exchange between the actors in the network (Coleman, 1990). The redundant ties between the network partners result in a resolution to collective action problems (Kogut, 2000). Opposed to the broker earning credits in the open network the closed network benefits as a whole. The benefits in the closed network do not attribute to information transfer efficiency, rather the deep and intense relationships between the participants create trust that promotes cooperative behavior and coordination.

From an MNC point of view it is maybe not an ideal situation if one of its subsidiaries benefit from the integration of knowledge on the other subsidiaries’ expense. From a corporate point of view it is probably more efficient if the collective of subsidiaries within the MNC together improve their efficiency and develop a cooperative and coordinated way of dealing with the transfer problem.

The above discussion can be reflected in Figure 1 below.

Insert Figure 1 about here

To sum up we can say that there are benefits in having many arm's-length relations to external counterparts, i.e. a low degree of relational embeddedness, in the sense that this gives the subsidiary access to many sources of novel information. On the other hand there is a problem of transferring knowledge or information of a more complex nature in arm's-length ties, which favors more deep and intense relationships between the subsidiary and its external counterparts, i.e. a high degree of relational embeddedness. This reasoning is compatible with the findings of Hansen (1999) where he concludes that weak ties between sub-units facilitates exploration, i.e. the search for information of a novel character. Strong ties on the other hand has its advantages when the sub-unit exploits knowledge that originally resides in another sub-unit, i.e. the transfer and incorporation of complex knowledge. Concerning the integration of externally rooted knowledge in the MNC, we can conclude that an open network structure very much repeats the hierarchical structure, but in multiple ways, and that the benefits accrue to the bridging subsidiary (Burt, 1992; Kogut, 2000). On the other hand, a closed network among the corporate counterparts facilitates a positive development of the whole network, through cooperation and coordination among the participants, where the gain is being a part of the network structure as such.

The subsidiary's dual role

Based on the discussion above, summarized in Figure 1, four different situations of a subsidiary's surrounding network structure, i.e. open or closed, and its embeddedness in the external and corporate relations, will be discussed.

If we first of all consider the transfer of information, the possibilities for the subsidiary to receive novel information of an explicit or codified type increases if the subsidiary has relations to many counterparts that can provide such information. From a structural point of view this is the case when the relations the subsidiary has are not related to each other as shown in Figure 2. In an open structure (Burt, 1992), the probability of each counterpart

contributing unique, i.e. non-redundant, information increases, as they are not connected to each other. To put it differently: given that the subsidiary has a fixed amount of resources, if a subsidiary has a relation to a counterpart, A, which in turn has a relation to B it is better to relinquish a relation to B and instead use its scarce resources to engage in a new relation with counterpart C. This is because the information received from A already contains the information from B, as they are connected (Ibid.).

In the structure portrayed in Figure 2 the subsidiary can function as a link between novel information and knowledge from external counterparts to sister units, or the other way around. As the units involved does not have any relations directly with each other except through the subsidiary the risk for redundant information decreases. On the other hand we have reason to believe that coordination and cooperation that is needed for integration of more complex knowledge and innovation is difficult to achieve as the relations are not connected and therefore lack a common knowledge base (Coleman, 1990; Cohen and Levinthal, 1990; Lane and Lubatkin, 1998).

Insert Figure 2 about here

Another problem in this type of configuration is that the subsidiary in focus earn rents on the other subsidiaries expense (see Burt, 1992; Kogut, 2000). Consider for example a situation where the subsidiary, S, having received novel, non-redundant information and for any reason important information from its external counterparts, E^1 and E^2 . The subsidiary S can now charge each of its corporate sister units C^1 and C^2 arbitrage for supplying this information as they are not connected with each other or connected to any one else that can provide the information but the subsidiary S.

In Figure 3 the subsidiary is part of a closed structure in its corporate network and has an open structure in its external network. In such a system we have reason to believe that there is more of coordination and cooperation between the connected sister units compared to an open system (Coleman, 1990; Kogut, 2000). The closed structure in the corporate network therefore increase the possibility for innovation as this type of structure impose a more similar knowledge base for the sister units (Cohen and Levinthal, 1990; Lane and Lubatkin, 1998) This means that innovation can take place in the corporate part of the network through cooperation between the sister units and coordination of their activities. Further, this structure does not allow the subsidiary to make arbitrary profits on the sister units' expense, as is the case in the open structure in Figure 2.

Insert Figure 3 about here

One can maybe argue that for an MNC this is a sort of ideal situation where the development of products is processed internally and the transfer and integration of non-codified and tacit knowledge is achieved simultaneously between the subsidiaries through cooperation and coordination. At the same time the access to non-redundant information is good as the subsidiary holds relations to external business partners that are not connected to each other and thereby are in a situation of providing the subsidiary with non-redundant information and novel knowledge. The only downside with this type of structure is the low degree of relational embeddedness in the external network. If the subsidiary can manage to increase the depth and intensity in its external relationships to achieve a proper possibility of assimilating knowledge of a more complex type this could be the type of structure to settle for, see Figure 4. Note that the thickness of the line in Figure 4 indicates embeddedness. The thicker the line the higher the degree of embeddedness.

The external component of the network has the possibility of providing non-redundant information, as the structure is open. If the relationships to the external counterparts are more intense and deep compared to arm's-length relations there is maybe a possibility of both finding and integrating knowledge of a more complex type. This means giving up some of the economies of scale that arm's-length relations have for the more expensive, but at the same time more suitable for transfer, type of relationships with a certain intensity and depth.

Having a network structure as the one depicted in Figure 4 gives the subsidiary the possibility to both take advantage of non-redundant information provided by the open structure and the possibility to absorb more complex knowledge through the relations with a higher degree of embeddedness. The closed structure of the internal network increases the possibility of innovation as the closed network structure impose a more similar knowledge base for the sister units.

Insert Figure 4 about here

However, this view of the external network is maybe too simple, in the sense that the role of the subsidiary is not only to absorb new knowledge. The subsidiary's role is also to participate in a development process including several external actors, that is, a role similar to that inside the MNC as shown in Figure 4.

In the situation portrayed in Figure 5 the subsidiary has strong and tight relationships to its business partners, both corporate and external ones, i.e. a closed network structure.

Insert Figure 5 about here

As the embeddedness is high in both the external and the corporate component of the network cooperation and coordination of activities is deep, which implies that the possibilities for innovation are good. The risk of receiving only redundant information through the different relationships is taken care of by having relations to counterparts that are not connected and maybe not of such high degree of embeddedness because of resource reasons.

However, this is maybe not such a severe problem as the social network theory literature argues when business networks are studied compared to personal networks. When studying the structural network of e.g. individuals within an organization and their access to (codified) information it is definitely so that being a bridge between two other actors gives the bridging actor a better position vis-à-vis the others. It is also the case that an actor that is connected to other actors, which in their turn is connected with each other, is locked in and only receives redundant information. From this we can conclude, as social network scholars do has, that it is beneficial to have weak ties, because weak ties have the possibility to provide non-redundant information that can be utilized by the actor.

The limitations in this reasoning become obvious when we use a network perspective in the product development and learning process. In such a process the problem is not to find one piece missing in the puzzle, it is rather to learn and understand how to modify your own puzzle to better fit the other actors' puzzles. In such a situation where learning and transfer of complex knowledge is important the high degree of relational embeddedness and networks with strong connectivity are clearly superior (Hansen, 1999; Coleman, 1990; Kogut, 2000).

It is hard to think of a business network in which all the participating actors have a high degree of relational embeddedness with each other, rather the important network in a specific innovation situation is surrounded by less strong and even weak ties. These weak ties or relationships with low degree of embeddedness could help the connected network not to be trapped in a system with access to nothing but redundant information. The larger problem

with the network structure reflected in Figure 5 is the subsidiary's limitations in resources. To be an active member in both the corporate and the external network, if they are of a closed or of a high degree of embeddedness type, will definitely be more costly than being part of a more open structure.

From the reasoning above we can formulate some propositions:

Proposition 1: A subsidiary's search capability concerning codified information increases if it has a large number of arm's-length relations to business partners.

Proposition 2: A subsidiary's possibilities to absorb more complex knowledge from its business partners increases with the degree of embeddedness in its business relationships.

Proposition 3: A subsidiary's innovative capability increases with its belonging to closed network structures, both inside and outside the MNC, as closed structures promotes cooperation and coordination between the partners.

Proposition 4: An open network structure among sister units within an MNC will result in opportunistic behavior among the subsidiaries resulting in multiple hierarchies where some subsidiaries will earn rents on other subsidiaries expense.

IMPLICATIONS FOR THEORY AND FURTHER RESEARCH

The pros and cons of closed and open networks and high or low degrees of relational embeddedness depend on the specific situation. The more the subsidiary's product development process is dependent on tacit, context specific, non-codified etc. knowledge, the

more intense and deep must its relationships be, i.e. a high degree of relational embeddedness is needed.

From an MNC point of view the open network system disqualifies itself because of its tendencies of monopoly where one subsidiary earns rents on the other subsidiaries expense. Even if the structure allows transfer of explicit and codified information, it has a problem as it assumes a low degree of relational embeddedness, which rules out the transfer of complex knowledge. On the other hand the subsidiary's search possibilities diminishes when deep and intense relationships are required for assimilating and transferring knowledge, as this means that the subsidiary cannot afford to many relationships.

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Figure 1. Impact on search and integration of knowledge and information by relational embeddedness' and network structure

		Network Structure	
		Open	Closed
Relational Embeddedness	Low Degree	<p>Good search possibilities if information is explicit and codified. Assimilation of tacit and non-codified knowledge is difficult.</p> <p>Rents for transfer and integration of knowledge and information accrue to the bridging subsidiary.</p>	<p>Good search possibilities if knowledge is explicit and codified. Assimilation of tacit and non-codified knowledge is difficult.</p> <p>Rents for transfer and integration varies between subsidiaries but coordination and cooperation upgrades the whole network within the MNC.</p>
	High Degree	<p>Moderate to low search possibilities but good capability in assimilating complex and non-codified knowledge.</p> <p>Rents for transfer and integration of knowledge and information accrue to the bridging subsidiary.</p>	<p>Moderate to low search possibilities but good capability in assimilating complex and non-codified knowledge.</p> <p>Rents for integration and transfer varies between subsidiaries but coordination and cooperation upgrades the whole network within the MNC.</p>

Figure 2. The open structure network

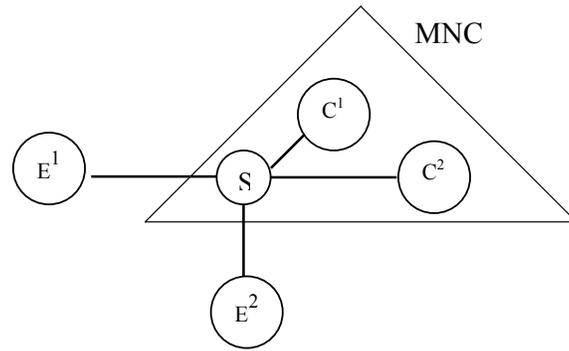


Figure 3. The closed corporate and open external structure network

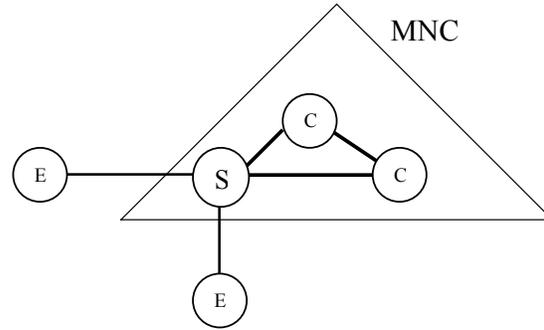


Figure 4. A closed corporate network and an open external structure network with high degree of relational embeddedness to some counterparts. (Thickness of line indicates embeddedness)

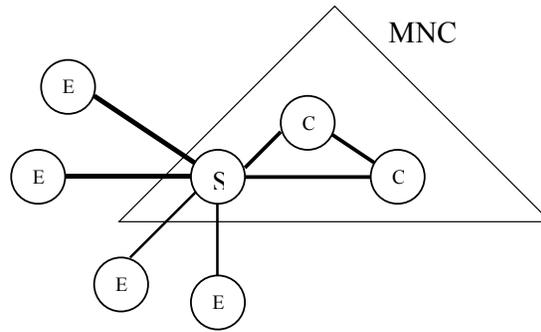


Figure 5. The closed structure network with some low degree of embeddedness relations

