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Networked R&D Units: Case Studies on Knowledge Transfer Processes

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Abstract. This paper aims at identifying the knowledge transfer processes developed among R&D units and the competencies that are locally created to earn power by knowledge within these global innovation networks. The paper's empirical section is grounded on two multinationals with R&D units in Portugal, one from a Norwegian electronic multinational and another from a Spanish automotive component multinational. Crossing the theoretical debate with the empirical results we expect to offer an insight on the understanding of knowledge transfer processes.

Keywords: knowledge flows, R&D units, innovation, automotive components and electronics industries.

1 Introduction

In the last few decades important transformations have been emerging in the society and in the economy, leading to the development of a new economic and social structure. The new concept of knowledge-based economy comes from the acknowledgement of the importance of knowledge for economic growth (Soete, 2000). Knowledge is recognized as a crucial source of economic rent and the effective management of organizational knowledge has increasingly been linked to competitive advantage and considered critical to the success of the business firm. In this way, a crucial challenge for multinationals is to combine the unique location-bound resources found in local clusters with the global resources of the firm to generate valuable and rare capabilities (Lundan, 2002). In this sense, they should assure that competencies from the different units are diffused throughout the group (Andersson et al, 2002). The aim of this paper is to analyze the knowledge transfer processes in two multinational networks (MNC) and the transfer mechanisms created to earn power by knowledge within these global value chains. The paper is structured as follows: firstly, we review the literature on knowledge accumulation and transfer in the context of MNCs. Secondly, the empirical analysis is reported, including methodology and discussion of results considering the theoretical contributes presented above. Conclusions make up the latter part.

2 Knowledge transfer processes in Global Networks

2.1. Knowledge and competencies as strategic resources: the subsidiaries absorptive capacity

The last decade evidenced a significant concern about the study of how big corporations manage knowledge and, in particular, about the process in which they are transferred (Sölvell and Birkinshaw, 2000). Multinationals that are able to teach, as well as learn, can combine the unique location-bound resources found in local clusters with the global resources of the firm to generate valuable and rare capabilities. In this way, to learn and share knowledge and competencies become essential mechanisms to the company (Caraça e Simões, in: Simões et al, 2002: 139). Therefore, a crucial challenge for multinationals is to avoid that subsidiaries become isolated from other parts of the multinational and assure that competencies from the different units of the multinational are diffused throughout the group (Andersson et al, 2002: 116). According to Andersson, Björkman e Furu (2002), the development of competencies depends on the capacity of subsidiaries to recognize the value of external knowledge, incorporate it and apply it, in other words their absorptive capacity. Absorptive capacity is the organization's current readiness and accumulated knowledge, which enable it to identify and grasp new valuable knowledge outside the organization, and to use knowledge in value-creating processes. The higher the subsidiary's absorptive capacity, the more extensive its competence development, and consequently, the more it may contribute to the competence development of the whole MNC. In this manner, to recognize and absorb knowledge, subsidiaries must establish connections with local and external networks and be able to use the acquired knowledge as an important ground for the development of new competencies. Actually, integrating the capabilities and knowledge of the dispersed subsidiaries and making use of them in other MNC units represent a special advantage of the multinational and thus are an essential task for corporate management (Andersson, 2003: 426). In fact, is MNC management task to try to exploit capabilities developed within different subsidiaries in such a way that the MNC as a whole can benefit from them. To accomplish this, Andersson (2003) emphasizes the importance of the assigned role and responsibilities given by the MNC to subsidiaries. According to the author, the assignation of a specific role to a subsidiary will mean that its capabilities, developed in the intense and deep relations with local actors (especially costumers and suppliers), will be used and may also be integrated into other units. Besides the simple diffusion of competencies and capabilities is the diffusion of "good practices" in MNCs. Sölvell and Birkinshaw (2000) argue that the ability to manage and transfer good practices on a worldwide basis is what separates the successful MNCs from the less successful. In this sense, MNCs will gain if the good practices of a subsidiary are exported to other subsidiaries of the network and, consequently, one important goal for a MNC is to develop successful practices, standardized them and diffuse them in all the subsidiaries of the multinational group.

2.2. Knowledge transfer process: barriers and support organizational mechanisms

There are a number of obstacles to transfer competence in the MNC, which are associated with the competence itself and the characteristics of the sender, the recipient and the relationship between them. One of the biggest problems of knowledge transfer is to know how to solve the issue of transmission of tacit knowledge. Actually, tacit knowledge is a part of knowledge of hard appropriation and divulgation, because it is a non-specified, personal and contextual knowledge. This kind of knowledge has been considered an important component of innovation, having a fundamental role in the developments of science and technology. Accordingly, tacit knowledge can be converted in explicit knowledge through a codification process, which makes the incorporation or diffusion of knowledge easier. However, this process evolves lost of information, due to the fact that part of the knowledge will stay only in the head of the people who have the knowledge. The other barrier is related to internal competition between subsidiaries. Subsidiaries tend to have different goals and often-limited incentives to transfer know-how to other units, particularly if it involves the time of their best people or proprietary technology that might leak out. By diffusing knowledge to other MNC units, the focal subsidiary may also lose some of its uniqueness, thus losing bargaining power within the MNC. Another barrier refers to the interaction between the subsidiary and its local context. These competencies cannot easily be used in other corporate units' business contexts. This is because the absorptive capacity required to understand and apply the competence is developed within the unique context-specific, or even relation-specific (Forsgren et al, in: Andersson et al, 2002: 117). Once more, the local context is determinant, this time to understand knowledge transfer between MNCs' units. Related to the previous barrier is the socio-cultural and institutional context emphasized by Pedersen, Petersen and Sharma (2003: 74). According to the authors, knowledge transfer is influenced by the socio-cultural institutional distance between the foreign country and the home country of the MNC. Knowledge in firms is contingent on their socio-cultural environment; what is appropriate knowledge in one country may not suit the needs of firms in other countries. In turn, this may cause problems to the knowledge transfer process. Nevertheless, it is responsibility of the multinational group to take measures that stimulate the information flows between the different units of the group. In this manner, a crucial task for corporate management will be to recognize the absorptive capacity of the subsidiaries and in particular to coordinate the diffusion of the learning outcomes of the subsidiaries, i.e., to establish integration mechanisms that engender knowledge flows from one affiliate to others. Pedersen, Petersen and Sharma (2003) also consider that MNCs should develop mechanisms to facilitate knowledge transfer between its units, but these mechanisms have to suit the specific knowledge characteristics. Tacit and non-codified knowledge is harder to transfer and requires specific organizational mechanisms. Therefore, the choice of transfer mechanism has to be related to the characteristics of the particular knowledge.

The authors conclude that in general tacit knowledge is transferred through "rich communication", which comprises face-to-face communication and informal interaction, and explicit knowledge through "written media", which, by its turn, involves manuals, database, written instructions and blueprints. According to Pedersen, et al (2003: 69), the use of unsuitable transfer mechanisms may cause loss of knowledge in the process of transmission or may involve unnecessarily high communication costs, both with potentially negative effects on the performance of the MNC.

3. Case studies

3.1. Methodology

The empirical component of this paper is grounded on one extended case study (MNC A) and one local case study (MNC B). The extended case study, is based in an electronic multinational, involves an R&D subsidiary located in Portugal, a R&D subsidiary located in the Netherlands and also the headquarters, located in Norway. The local case study has been performed on a subsidiary of a Spanish multinational of the automobile industry located in Portugal. Two techniques were combined to carry out the empirical research: in-locu observation of the work processes and semi-directive interviews addressed to key actors belonging to different departments and hierarchical levels of the firms.

In Trondheim, the headquarters of MNC A, 11 interviews have been conducted with Top Management, Operation, R&D and Sales. In the second R&D unit, located in Beilen (Netherlands), recently acquired by network A, 6 interviews were conducted and other 5 within the Portuguese subsidiary.

In the local case study, 8 interviews were conducted with professionals of the product-engineering department and 4 with professionals of the processes engineering department. We focused our interviews on those two departments, as they are central in terms of R&D product and process development.

3.2 Case Study A

MNC A is a company from the electronics industry. The company has presently 270 employees in 12 locations and representatives in 6 other countries. The headquarters, with 110 workers and the Dutch subsidiary with 28 employees are the only units with strong R&D departments. The other subsidiaries, like the one in Malaysia with 17 workers, Australia with 13 and Thailand with 10, have local development activities. The other subsidiaries have less than 10 workers and their main activity is sales. However, there are subsidiaries with just a few workers, like in Portugal (with 5 workers) and in Brazil (with 7 workers), which have engineers performing product development.

Indeed, the relations established locally are crucial to the development of MNCs (Dunning, 2000). The contacts with the customers and the local market are essential, as the gathered information from these contacts may be determinant to design the business future goals. As underlined by the vice-president for business development, the main motivation to create local units is to be closer to the customers and to the local market. "The main concern is to be able to understand what the customers really want, that's why we have these offices around them."

Another relevant aspect is the contribution local Universities and research centres could bring to firms R&D activities through researchers and high skilled workers interactions. According to the R&D Dutch vice-president "it is with the university that I have close professional relations. (...). In terms of activity, mine is more related to knowing what is happening in terms of research, and relate with the institutions that do research and to go to the conferences. Due to these relations we are members of 10 international projects and our partners are universities, governments and all that relate to this industry". The foundation of the Dutch subsidiary has been linked to the university as the owners come from there. Company's relation with the academic world was crucial in the beginning of the firm not only providing professional training of employees but also in the subsequent R&D activities developed by the company. Currently, the position of the company towards university is different as nowadays the company prefers to steer away from the connection with the academic world projecting a more "business world" image of itself.

Knowledge transfer: the predominance of informal mechanisms

The knowledge internal management is a complex question because of the context of a small MNC, where the majority of the subsidiaries are only dedicated to commercial activities or to local Development activities, sometimes so specific that its diffusion and transfer don't bring advantages to other multinational's units. Besides, this multinational network knowing the important role of the knowledge change mechanisms (even more because we are talking about activities that imply high technology activities and high levels of innovation, where the know-how transfer is always an added value) doesn't use, systematically, formal mechanisms of knowledge interchange. Observing the knowledge transfer mechanisms, we can say that the fundamental ones are the informal mechanisms. In fact, as the project manager from Norway says: "we don't have a structured program of learning and share of knowledge. People talk to each other, personally or by e-mail. The informal network functions very well because we aren't a very big company, and we don't have yet a formal way to share knowledge." The director of the portuguese subsidiary tries to systematize the formal and informal mechanisms of knowledge transfer. The informal are: "meetings and workshops, which are a mean to change information"; the "learning actions" which are developed in the headquarters for the technicians, "who are there a couple of months absorbing know how and how to work"; the "learn by doing" in which "people learn while they work, for example, in a system or a programme". The formal mechanisms are "the new software tools, available only about 8 months ago, the new internal portal, the intranet, where we introduce experiences, ask questions, see the historical of the product. And when we do specific developments, new software, the technical information is essential. It is a borrower

task but is crucial so that the knowledge doesn't stay only in people heads". The CEO of Norway emphasises other mechanisms related to the mobility and interchange of human resources and competencies. He states: "we try to use good people in other projects when they have time for that, so we try to map the competencies of people, to assure that people who gained experience locally can be used in other projects. (...) Nowadays, two engineers from Portugal are participating in the development of a central system, because they have the competencies". However, the CEO adds: "we don't transfer knowledge in a systematic way, at least not enough. We are trying but it is still everything very informal." And as the director of the portuguese subsidiary says, it is always difficult to make documentation, software specifications, and other kind of formalizations, when they are not currently done in the company. Nevertheless, the company is trying to grow on the knowledge transfer knowledge, because, as state several authors (Sölvell e Birkinshaw, 2000; Lundan, 2002; Pedersen, et al, 2003), an effective knowledge transfer can be an important competitive advantage on a MNC and, consequently, the correct use of facilitating mechanisms is very important. However, the Dutch subsidiary is a peculiar example of knowledge management. Actually, we can't forget that this subsidiary is more than an unit from a MNC. It is an R&D company with a clear strategy in what concerns its management and its goals, which was acquired by the MNC A. Consequently, the knowledge transfer process is different from the one of the rest of the MNC. In the Dutch company, there is, not only, a clear concern in formalizing knowledge, but also objective mechanisms for it, which allow keeping the knowledge in the company. The CEO of the company says: "in what concerns the knowledge management, what we do is to be sure that we keep all the knowledge inside the company. Every time someone discovers a new way of knowledge or a new method, we develop software capable to catch that new knowledge and keep it in the company". In this manner, there is a clear concern on keeping the knowledge in the company, because the strongest value of this company is its knowledge and its innovation's activities. This "knowledge keeping" is achieved by formal mechanisms of tacit knowledge explicitation. Concluding: with the exception of the Dutch subsidiary, the predominance of informal transfer mechanisms could be a result of the recent rearrangement of the management logics of the MNC by the actual CEO, which doesn't allow yet a systematic utilization of the formal mechanisms, which, by its turn, only recently began to be implemented.

The limitations of tacit and local knowledge diffusion

In MNC A the Dutch subsidiary has a big concern in formalize knowledge in order to keep it inside the company. Nevertheless, the tacit knowledge explicitation is a complex process, as the Dutch CEO states: "the knowledge issue is always complicated, because it is in the researchers' head, it is always difficult to become explicit the tacit knowledge. When we loose a researcher we always loose knowledge." As the majority of the authors state, the tacit knowledge can be converted in explicit knowledge, however this process implies inevitably the information lost, due to the fact that part of the knowledge always stays in the head of the individuals that know, and also implies high costs (Oliveira, 2008: 54, Oliveira, 2007: 278 e Lança, 2004: 39). Another problem in the knowledge transfer process is

associated with the transfer of local, contextualized and specific knowledge. The relations with costumers and the local market are crucial for the local Development of products. As the director of the Portuguese subsidiary says: "the relations with local the costumer and allied are very important to figure out the local specifications which a product needs". Nevertheless, the local Development and the associated knowledge are hardly transferable to other units of the network, due to the big specificity of those Developments. Actually, and as Foss and Pedersen (2002) and Andersson et al. (2002) argue, because the more specific the knowledge is, the more difficult it is to transfer, since it becomes harder for other units to learn it and less useful for them. This barrier is related with the sociocultural and institutional context, emphasized by Pedersen et al. (2003). The appropriated knowledge in one country cannot serve the needs of the companies in other countries. This is the case of the Center of Excellence of Malaysia where are being done Developments for manual tolls, which are common in Asia, but the knowledge associated with this kind of activities won't be useful in other cultural contexts, due to the specificities, in this particular case, of the tolls, for example, in European countries.

3.3 Case Study B

The MNC B consists of a network of 40 companies from all over the world. Founded in 1949, the company has its headquarters in Barcelona (Spain) and relies on a team of 6900 people who work in 19 countries in Europe, North America, South America and Asia. MNC B is a multinational devoted to the research, development, production and commercialization of systems and parts for the automobile, as well as for both commercial and industrial vehicles. Portugal (Oporto) was MNC B's first international expansion abroad, in the beginning of the 70's. In Portugal the company has about 550 employees.

The local relations in the development of the portuguese subsidiary

MNCB has always developed relations with its surrounding environment, i.e., other companies, costumers and, mainly, suppliers. The close relations between the subsidiary and suppliers can be seen in the words of the process-engineering director as an extension of the company: "Our suppliers are an extension of this company. We help them to grow up, and we grow up with them as well. They are a key element for us, and our relations are very important." In point of fact, MNCB always tried to establish local contacts that could allow it to grow up and to obtain the autonomy that it has nowadays. Indeed, as stated Cantwell and Mudambi (2005), the relations established between the subsidiary and the local environment, seem to be a key factor in the trajectory of this R&D unit. In this sense, the history of MNCB is strongly linked with its privileged relations with local companies. This leads to a conclusion about local processes of innovation as sources of competitiveness for multinationals (Sölvell and Birkinshaw, 2000). Actually, the MNCB is an example of the importance of local costumers as sources of innovation. One can say that this subsidiary is an example of the innovation process development in local contexts. Innovation emerged from interactions between the subsidiary and local actors. MNCB is also an example

of the Sölvell and Birkinshaw (2000) concept of "good practices" that are diffused in the multinational network, despite the specificity of competences of the different subsidiaries. As the director of product engineering says: "we have here good practices that were adopted by the group". As a matter of fact, and as we have seen above, the knowledge transfer in this firm seems to have just one direction, which is from the portuguese subsidiary to the others subsidiaries of the MNC. As the director of processes engineering points out: "the other subsidiaries come here more frequently to look for the information they need. There is a tendency to come here and search for knowledge and competencies and put them in practice in others subsidiaries of the group." Summing up, MNCB is an example of a subsidiary that took advantage from the existing resources, developed strategic relations with local agents and gained influence within the headquarters.

Knowledge and "good practices" dissemination

In MNC B there is a concern in developing knowledge management tools, which can help the diffusion of the knowledge between all the units of the network. One can see this concern by the creation of common databases, which goal is standardization of information so that any subsidiary can take advantage of other subsidiaries' knowledge. Nevertheless, this data base project is very recent and is starting to be diffused in the network and in the portuguese subsidiary. As the director of processes engineering says: "in these bases we can find factory problems, processes, standardizations, i.e. all the information that can be useful for MNC network B. And these bases have a lot of advantages, for example, if we are talking about common processes to all subsidiaries, the interest of the database will be enormous. They have a great potential." Actually, these databases facilitate knowledge transfer because they transform tacit knowledge, which is very "context specific" and hard to transfer, in explicit knowledge, which is easier to transfer and be used by other units (Pedersen et al., 2003). In this manner, MNC B through the databases, try to decontextualize and standardize knowledge in order to easily diffuse it in the multinational network. As the industrial process manager says: "we should warrant that there is a standard procedure in all the subsidiaries, so that everyone could follow the same procedures. Indeed, the Portuguese subsidiary can be considered also an example of the Sölvell and Birkinshaw (2000) concept of "good practices" that are diffused in the multinational network, through a geocentric attitude, in which good practices come from the success of a subsidiary and their dissemination is implemented in other contexts. As the director of product engineering says: "we have here good practices that were adopted by the group". We can conclude that the use of transfer mechanisms, which can facilitate knowledge transfer, is a concern in both companies. They are different multinational companies, which are in different stages of development and consequently some concerns, like the use of formal mechanisms, are more developed in one of them. However, both are trying to create formal mechanisms, essentially data bases, in order to formalize knowledge and not to keep it only in researcher's heads but inside the company.

The problem of local and specific knowledge transfer

Considering the barriers to knowledge transfer, one can observe that subsidiary B has the predominant characteristics of business area division of subsidiaries, which means that the units are divided in business areas and each unit develops a certain product. The MNCB's subsidiaries have very specific roles in the network, resulting in specialized knowledge and competences that are difficult to transfer. As stated by Foss and Pedersen (2002), the context and specificity of the knowledge influence the extent of its sharing interest. This is because the more specific and contextualized the knowledge is, the harder it will be for the units to absorb it and the less useful the knowledge will be to them. This is an important barrier to transfer competences in multinationals. As a product engineer underlined: "this company is composed of business units each one has its own competencies", and in this way the knowledge of one unit will be less useful to another unit that has different activities and practices and that require different competencies. Although, knowledge transfer happens, as the same engineer points out: "there are knowledge and information transfer when there's a problem that can be common to all units (because there are common problems even when we talk about different processes and products). In this case it is very useful to share information about the solutions for the problem." Another barrier emphasized by Andersson, Björkman and Furu (2002) is internal competition between subsidiaries. In MNC B, interviewees do not recognize that competition. What they emphasize is that MNC B is almost always the sender and rarely the receiver of knowledge and information. As the director of processes engineering says: "I don't think we can talk about competition here, because what happens is that the other subsidiaries come here to obtain information and knowledge." In this manner, we believe that competition in this case, even if it exists, is not a barrier to knowledge transfer, for the reason our interviewee pointed out and for two more reasons. First, because subsidiary B has already a privileged position in the multinational group and by diffusing knowledge to other units will not lose bargaining power within the group. Second, because the multinational is divided in business units, each unit has its own competences that are very specific and hard to transfer.

4. Conclusion

This paper aimed at understanding the knowledge creation and diffusion processes of two MNCs, one based on the general perspective of the multinational network (A) and the other based on the local perspective of a Portuguese subsidiary of a MNC (B). We reach some common conclusions. In both MNCs, in different ways, the competences of local agents are crucial. There are also some common barriers to knowledge transfer, like the difficulty of transferring specific and contextualized knowledge, which need to be passed.

Nevertheless we should emphasize, in what concerns the directionality of knowledge flows, the role of the Portuguese subsidiary of MNC B as a source of knowledge to the entire network. This subsidiary exports a lot of knowledge

(especially in the processes area), being strong subsidiary in terms of developing innovations to diffuse to the multinational network. In MNC A, despite some exceptions, the main knowledge become from the headquarters, being then transferred to the network. In general, we can say that the effective dissemination throughout the MNC organization of valuable knowledge is seen as an important source of competitive advantage. For this reasons, multinational companies try to develop mechanisms in order to facilitate the effective dissemination of knowledge inside the networks. These mechanisms consist basically, in both examples, in common databases and internal communication networks, which, in turn, allow every unit of the multinational network to accede to the same information and knowledge. The cases presented here illustrate that concern, despite being in different stages of this process of creating mechanisms to formalize knowledge.

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