

## **KNOWLEDGE ACROSS BORDERS: MULTINATIONAL'S R&D UNITS IN PORTUGAL**

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### **ABSTRACT**

One of the crucial aspects of world economy globalization relies on the new forms of creating and spreading knowledge. It is now commonly accepted that knowledge ranks first in the hierarchy of strategically relevant resources (Grant, 1996).

The aim of this paper is to analyse the knowledge transference process developed among the worldwide multinational's R&D units and the competencies that are locally developed to earn power within these global value chains.

Based on the results obtained by the R&D.COM - Local R&D COMpetencies within Global Value Chains - project, the paper's empirical section is grounded on two portuguese subsidiaries from the automotive components and software industries.

**KEY WORDS:** internal and external knowledge, R&D competencies, knowledge transference, innovation, FDI, subsidiaries autonomy, local embeddedness.

## **Introduction**

The expression globalization is often used to describe the recent increasing coordination of innovation activities within the multinational corporation. One of the central roles played in this process by global networks, as described by the literature, consists on the shift from a simple knowledge vehicle to new technology creators. The strength that allows a company to invest and control its operations across borders is its ability to innovate and take advantage of that innovation in different locations through its own organization.

The economies that emerge from the globalization process, in which multinational companies (MNCs) are the key actors, are knowledge economies, where the knowledge management activity, related to the innovation process, becomes decisive in the competition between economic actors on a global scale (Murteira, 2004).

Actually, the last decades have shown a generalized concern about the study on how multinationals create knowledge and, particularly, about how they operate its transference. 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.

Based on preliminary results of R&D.COM – Local R&D COMpetencies within Global Value Chains (FCT/MCTES) – project, in this paper we aim to analyze, specifically in the portuguese context, the knowledge and technology transfer processes developed among the worldwide R&D units and the competencies that are locally developed to earn power 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. In this way, we broach several issues: the internationalization and delocalization of functions and processes, the new understanding of MNCs as horizontal networks, the new approach to subsidiaries, the importance of localization and local innovation processes, the understanding of knowledge and competencies as strategic resources and the clarification of related concepts, such as activities, practices, capabilities and resources. Secondly, the empirical analysis is reported, including methodology and discussion of results considering the theoretical contributes presented above. Conclusions make up the latter part.

## **1. Knowledge creation in global value chains: theoretical concepts**

### **1.1. Foreign direct investment as a mechanism to innovation and knowledge development on a global base**

The advent of the knowledge society, by the deep transformations operated in the environment where multinational companies act, give rise to new demands in the way companies acquire and develop their competitive advantages.

In the last decades, the activity of multinationals enterprises (MNCs) has grown, not only in extension, but also on variety and intensity. These developments are commonly associated with the economy globalization process, more specifically with the increase of the interdependences outside borders between different markets.

As written by Dunning (in: Cantwell et al., 2001), this process has lead to an increase of the extension and forms of international transactions and to deepen

the interdependence between the actions of economical actors located in a country and others located in different countries.

In a growing way, companies tend to invest abroad, in order to explore resources and activities already in place, but more and more trying to create new activities and competencies (Cantwell et al., 2001).

If before, the multinationals were seen mainly in terms of their capacity to explore the advantages generated in the headquarters of the multinational, recently, this point of view has changed, emerging, increasingly, the potential to create knowledge by companies fitted in chains of global value.

This new perspective has been driven by structural changes in global economy, as well as by the tendency to the internationalization of R&D functions in multinational companies that we have been testifying. As a matter of fact, the internationalization of companies has contributed to the delocalization of an important part of strategic functions, as, for example, R&D.

According to this alternative perspective, an important source of competitive advantage to multinationals is the capacity of subsidiaries to generate innovations based in resources of the local environments where they are positioned (Frost, 2000: 21). In this manner, the foreign direct investment (FDI) may be interpreted as a mechanism through which companies try to develop new resources and capacities in a global base.

In this sense, technological innovation should be analyzed not only within the organizations borders, but also outside it, analyzing the interactions between corporations, universities, research centres, suppliers and clients. Various studies (Cantwell et al. 2005; Foss and Pedersen, 2002; Andersson et al., 2002) point out

the importance of external sources of knowledge to the progress of the technological innovation.

The global generation of innovations requires an extend space of competencies and capacities that only companies with certain infrastructures, organization and management can obtain (Archibugi and Iammarino, 1999). This explains why there was a shift from the attention given to the multinational as simple vehicle of technology transference to the crucial role that plays as creator of innovations and technological knowledge (Chesnais, 1988).

The distinction that rises from this discussion is supported by the orientations that March defined for subsidiaries: *exploitation* and *exploration* (in Cantwell e Mudambi, 2005: 25 and Frost, 2000: 105). This distinction is analogous to the distinction made later by Cantwell and Mudambi (2005) between *competence-exploiting* and *competence-creating* subsidiaries.

According to the authors, from an historical point of view, multinationals use to locate the R&D in subsidiaries in other countries especially with purpose of adapting the products to the countries where they were developed. In this way, the subsidiaries depended on the competencies of other companies and their role was mainly the exploration of those competencies (*competence-exploiting*). Recently, some subsidiaries acquired a more creative role, generating new technologies, innovation and new competencies. This transformation lead to an increase of the R&D destined to these subsidiaries creators of competencies (*competence-creating*).

Cantwell e Mudambi (2005) analyzed, precisely the factors that influence the level and type of R&D developed in the subsidiaries, which determine subsidiaries to be creators of competencies or, simply, exploiters of competencies.

These factors were related to the local context, in which subsidiaries should develop relations with strategic actors; to the multinational, which develop strategies, such as the acquisition of subsidiaries with existing competences, which, in turn, can be a supporter factor for the subsidiary; and to the subsidiary itself, which autonomy and strategic independence influence positively the creation of competencies.

In this sense, multinationals appear as flexible horizontal networks, characterized by processes of lateral decisions, where the headquarters are no longer the company brain, but instead, the whole company is faced as a brain (Schmidt et al., 2002: 45).

This new horizontal understanding of multinationals and of the subsidiaries' behaviour gives a great relevance to the subsidiaries' autonomy issue, which should be seen not only in the unidirectional and hierarchical relations context between headquarters and subsidiaries, but also in the subsidiaries development point of view (Cantwell and Mudambi, 2005 and Cantwell and Iammarino, 2003). Subsidiaries are not only instruments doing tasks imposed by headquarters, but they play an active part in the multinational network (Simões et al., 2002).

Therefore, we can say that subsidiaries are seen by the literature as having three organizations sides. On the one hand, they are members of an international group, which provides them with resources (financial, knowledge, trade marks and reputation), sharing common perspectives and strengthens the links and synergies with other members. There is, thus, a face turned towards the group. On the other hand, subsidiaries are located in a given country and develop relationships with other economic agents established there. This is the second

face, turned towards the recipient economy. Finally, subsidiaries have competencies and resources which influence their behaviour and development, and their activities are not just a mere consequence of the interplay between the two faces – corporate and local – pointed above, there are internal factors to be taken in account. This is, thus, a third face turned to the subsidiary (Simões et al., 2002: 143-144).

We can conclude that there has been emerging a more complex view of the MNC as an integrated, heterarchy, horizontal and also a more flexible organization, where subsidiaries play an active role in the multinational network, developing and creating new knowledge, competencies and capabilities

## **1.2. Knowledge accumulation and innovation as interactive processes in a local context: the importance of location**

As we have seen before, the localization of a subsidiary is a key issue when we talk about MNCs and foreign direct investment, and also when we discuss the knowledge accumulation and transfer in multinational networks and, especially, in local clusters. In this way, the local context is essential for innovation processes of MNCs, so it is the competencies and knowledge transfer between subsidiaries and local actors (suppliers, customers, etc.).

In this sense, making the right location choice for particular foreign direct investment can, itself, be an important competitive advantage. In other words, a carefully planned and executed locational strategy of MNCs is becoming an increasingly important factor influencing their global competitiveness (Dunning, 2000).

In this way, the unique competitive advantage of MNCs in a knowledge based, globalizing economy is its ability to identify, access, harness, and effectively coordinates and deploys resources and capabilities from throughout the world. This must surely include an explicit and appropriate locational strategy. And such strategy should embrace not only all the activities and practices of the MNC, but also those of its competitor, suppliers and customers, over which it has some influence or control (Dunning, 2000: 27-28).

In the innovation literature we find several factors pointing to localization advantages (Dunning, 2000, Sölvell and Birkinshaw, 2000). Ideas behind an innovation are frequently originate outside the firm that carries out the actual development or manufacturing work. The importance of costumers as sources of innovation has been several studied. Therefore, innovation is a highly interactive process, between firms and the basic science infrastructure, between suppliers and users at the interfirm level, and between firms and their wider institutional setting (Lundvall, in Sölvell and Birkinshaw, 2000: 86).

This explanation leads to the conclusion that the local processes of innovation and interaction represent an increasingly important source of competitiveness for firms operating in a global economy system.

In point of fact, a good locational strategy is crucial for MNCs, in the sense that a subsidiary's local context, in terms of its costumers and suppliers, other companies, universities, research centers and all the surrounding environment, can be an extremely important contribute to the development of the MNC. Therefore, one can say that the exchange of ideas, competencies and capabilities between the local agents and the subsidiary and the integration of the



results of this process in all the multinational network represent a special advantage for these companies.

### **1.3. Knowledge and competencies as strategic resources: the importance of subsidiaries absorptive capacity**

The constant connections between subsidiaries, the surrounding environment, the multinational group and other external agents, direct us to a question of primordial importance which refers to the expansion of knowledge and competencies transfer in multinational networks.

As a matter of fact, 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).

Lundan (2002) point out that multinationals that learn, but are unable to disseminate the knowledge within the firm, benefit locally, but such benefits cannot be leveraged within the firm. 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 utilize the 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.

Mahnke, Pedersen and Venzin (2005) also emphasise the role of the subsidiaries' absorptive capacity. According to them, if subsidiaries are able to recognize, assimilate and use external knowledge this indicates a high absorptive capacity and this will increase knowledge inflows, which will, by its turn, influence positively the subsidiary performance. The authors also state that knowledge management tools, such as knowledge teams, corporate university and benchmarking influence the subsidiary's absorptive capacity. In this sense, the application of knowledge management tools could be an important source of competitive advantage in the MNC, especially when they increase the ability of the subsidiary to use knowledge inflows from other units (Mahnke, 2005: 115).

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 is an essential task for corporate management (Andersson, 2003: 426). In this manner, 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) emphasises 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<sup>1</sup>.

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<sup>1</sup> However, is important to point out that the practices standardization issue has raised questions from the authors, that question themselves if this standardization come from ethnocentric attitudes, i.e., if the practices emanate from head office and are uniformly overseas in an almost imperialistic style, or in the contrary, if the firms tend to adopt a geocentric attitude, in which good practices come from the success of a subsidiary and their dissemination is implemented in other contexts but, at the same time, are tailored to the demands of the local context.

#### **1.4. The knowledge transfer process: barriers and support organizational mechanisms**

There are a number of barriers 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. It has for instance been argued that idiosyncratic, specific, tacit and non-codified knowledge is difficult to transfer from one unit to another, due to the problem of separating such knowledge from the unit that carries the knowledge and adding it to another actor's knowledge base. Other problems have been related to the recipient's ability or willingness to absorb new information, to the relationship between the sender and receiver, and to the willingness of a unit to share information with other units (Anderson et al, 2002: 117). Concerning the factors associated with the sender subsidiary, we emphasize two of them.

The first one refers to competencies that result from the interaction between the subsidiary and its local context. These competencies can not 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 this first 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.

The other one 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 important issue is related to subsidiaries' motivation to transfer knowledge to other subsidiaries or to headquarters. A non-dynamic context is an important barrier. In a non-dynamic setting, subsidiaries are not motivated to transfer knowledge to each other (Foss and Pedersen, 2002: 94-95).

Nevertheless, it is responsibility of the multinational group to take measures that stimulate the information fluxes 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. As we have seen before, 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, data base, written instructions and blueprints.

According to the authors, 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 (Pedersen, et al, 2003: 69).

Mudambi (2002) also believes that the use of correct knowledge transfer mechanisms can solve transmission losses and, consequently, communication costs. This conclusion is part of a knowledge flows perspective. According to it, knowledge flows are subject to transmission losses, which can be influenced by several factors, such as the nature of the knowledge. To minimize these transmission losses, organizational mechanisms, such as the correct knowledge channel choice, are needed. For instance, and as argued by Pedersen, Petersen and Sharma (2003), Mudambi says that the use of rich communication media can solve the transmission losses of tacit knowledge.

In this knowledge flows perspective, the author identifies the flows between a source and a target which occurs along a channel in a MNC. The author identifies four flows: from the subsidiary to parent, from location to subsidiary, from subsidiary to location and from parent to subsidiary. We can find all these flows in a MNC but some of them can be more characteristic of a MNC

than others, according to the specificities of the multinational organization, as we will exemplify later.

We can conclude that the issue of knowledge and competencies transfer between the different units in a multinational network is, in this way, unavoidable, when talking about the internationalization of companies and, specifically, of the relocation of strategic operations. As we have been seeing, the effective dissemination throughout the MNC of knowledge and competencies acquired by its local affiliates is seen as an important source of competitive advantage. In this manner, a crucial task for MNC is to develop appropriate knowledge transfer mechanisms to assure the dissemination to all the units of the multinational organization.

## **2. Methodological note**

Concerning the methodological aspects, we used the case study method. The empirical component of the R&D.COM – Local R&D COMpetencies within Global Value Chains – project (in which this paper is based on) is grounded on two local case studies and one extended case (that involves a local R&D unit, a foreign R&D unit and also the headquarters of the global chain).

The results presented here are based on the two local case studies in two portuguese subsidiaries: Ficosa and Microsoft<sup>2</sup>. In the first subsidiary we made eight interviews to professionals of the product engineering department: the process engineering director, one laboratory responsible, one quality responsible,

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<sup>2</sup> It's important to notice that the collection of information on the subsidiaries is not concluded yet. Although, we believe we have enough information with the required methodological rigour to draw some relevant conclusions.

one product engineering responsible, two product engineers, two CAD technicians and one prototype responsible. We also interviewed four persons of the processes engineering department: the director and three processes engineers and an industrial process manager from the headquarters.

We focused our interviews on those two departments because they are central departments of the portuguese R&D unit. The product engineering department is one of the most important and competitive product development centers of the Ficosa's group. In the portuguese unit this department has a strong weigh, in terms of the numbers of workers and of the importance in the company. The process engineering department, in spite of having a smaller number of workers, is also a crucial department which gives a very strong contribute to the Ficosa's group in terms of the exportation of knowledge and competencies to other units.

Finally, we consider the interview with the industrial process manager from the headquarters also important because can help us to understand the logic of the multinational network and the position of the portuguese unit.

In the second subsidiary we made five interviews to technicians of the Microsoft Language Development Center (MLDC): one lead software development engineer, one lead software development engineer in test, one program manager and two regional guest employees.

The first three interviewees are in the MLDC from the beginning and because of that are the persons who better know the center and more information can give us about the its evolution. The two regional guest employees are also important sources of information, mainly about the headquarters and other units of



the multinational network, in which they have already been working, and, consequently, about the multinational network as a whole.

### **3. R&D units in Portugal: examples of delocalization of knowledge and competencies**

#### **3.1. The foundation context of R&D units: a key element for units' development understanding**

We considered important to make a general presentation of the R&D units, describing its foundation context, because it is, in the two cases studied, a key element to understand its development, its position and status in the multinational network, and consequently, its competences and capabilities and its relations with external and local actors, where those competences and capabilities are transferred and diffused.

The first example is Ficosa, a multinational corporation devoted to the research, development, production and commercialisation of systems and parts for the automobile. Founded in 1949, the company has its headquarters in Barcelona (Spain), being in 19 countries.

Portugal was Ficosa's first international expansion, during the seventies. Since then, Ficosa Portugal has grown in turnover, product port-folio and team, until the consolidation as an excellence centre and Ficosa's central operative base world-wide for the door and seat systems' business unit. Nowadays, Ficosa Portugal has two production centres, an R&D centre and a commercial office.

In the R&D center there are two main processes: research, known in the company as *Ficosa Research System* (FRS), in which the inputs are the market

needs; and development, known as *Ficosa Development System* (FDS), which involves the development of an already conceived product which needs to be adapted to the customer solution. This last process is the one who prevails in the firm.

Nevertheless, Ficosa Portugal is a particular case, not only because is in the first stage of the multinational expansion abroad, but also because emerges from another company that already existed, with competences in the area. We are in the presence of what Cantwell and Mudambi (2005) called “a strategy of subsidiary acquisition”, i.e., the MNC acquires a firm, which already existed, already developed certain activities and practices and had already acquired knowledge and certain capabilities and competences. In this manner, the subsidiary that will be arisen from the existing firm will have competences that other subsidiary arising from no “acquisition strategy” won’t have. And this is, naturally, a supporter factor for the subsidiary. Actually, we observed that this factor was very important for the development of Ficosa Portugal, since it took advantage of the existing resources and competencies. Nowadays, the subsidiary has a unique position in the national network, which is a result from the strategic competencies that the subsidiary has been conquering.

As we will see, this important support in the beginning of the subsidiary development helped the local relations development, and there’s no doubt that those relations were crucial for the position that the portuguese subsidiary has at the present time.

The second example is Microsoft Corporation. Founded in 1975 and with the headquarters in USA, it is the greater multinational computer technology corporation in the world.

Microsoft Portugal is a subsidiary especially dedicated to commercialization. Nevertheless, has a R&D center, the Microsoft Language Development Center (MLDC).

MLDC was founded in 2005. This Microsoft Development Center, integrated in the portuguese Microsoft subsidiary, is the first, outside of the USA, dedicated to local language development. MLDC acts as an expansion branch of the Redmond-based product development group, responsible for speech in Microsoft.

The creation of the MLDC is related to the fact of the portuguese being one of the languages more spoken in the world while mother language. On the other hand the stable political situation of Portugal, its strategic linking with the European Union and the existence of academia and enterprise communities that promotes R&D in speech and natural language processing, have been decisive factors for the accomplishment of this investment by Microsoft in MLDC.

As we can see, MLDC was founded very recently, is an extension of the american language development center and is giving now the first steps to a greater autonomy and to a relevant position inside the multinational. Furthermore, the creation of the center was always connected with the academia context. Otherwise, the responsible person is a university professor and the first researchers arriving to the center came, precisely, from the academic context.

In summary, the two cases have foundation contexts and then evolutions and developments completely different. Ficosa is an example of a subsidiary that took advantage from the existing resources, developed strategic relations with local agents and gained an enormous autonomy from the headquarters. MLDC is yet a unit in an embryonic stage and very dependent from the headquarters.

Although, is driven, step by step, the portuguese subsidiary to a more relevant position in the multinational group.

### **3.2. The interchange of knowledge between local agents and subsidiaries: the importance of local relations**

The knowledge and competencies interchange is, without any doubt, a focal point in studies concerning multinational corporations and in our study in particular. One of the main goals of our research is, in fact, to understand how the transference of competencies and knowledge does occur in multinational networks.

First of all it is important to understand the subsidiaries absorption capacity of the knowledge provided by external and local sources that will later be redistributed through the network.

According to Andersson, Björkman and Furu (2002), the subsidiaries that integrate knowledge from institutions, enterprises, research centres and other external organizations, can use this knowledge as an important source for the development of new competencies in the subsidiary and in the entire network.

Although we lack the measurement mechanisms to accurately determine the knowledge incorporation level of the studied subsidiaries, one can underline that both enterprises have established contacts with universities, research centres, in the particular case of Microsoft, and with costumers and suppliers, in the case of Ficosa, and consequently they incorporate knowledge and competencies from those relationships, which are at the same time examples of local processes of innovation (Sölvell and Birkinshaw, 2000).

Actually, Ficosa have always developed relations with its surrounding environment, i.e., other firms, costumers and, mainly, suppliers. We can see that there is an important knowledge interchange between Ficosa, local companies and suppliers. Indeed, suppliers are central agents to the portuguese company.

The close relations between the subsidiary and the suppliers can be seen in the words of the process engineering director: “Our suppliers are an extension of this firm. We help them to grow up, and we grow up with them to. They are a key element for us, and our relations are very important.” Actually, there is a lot of knowledge and know how that is shared between Ficosa and the suppliers, as the words of the process engineers illustrate: “sometimes our suppliers don’t have the know how and we have to develop it together. For example, a member of the process engineering team spent a period of time planning new concepts on a local supplier.” As we said before, the importance of suppliers as sources of innovation is unquestionable and Ficosa is an example of that importance.

Costumers are also important sources of knowledge, mainly because the process which prevails in the R&D unit is the development of an already conceived product which needs to be adapted to the costumer solution. In this case, more than interchange knowledge, the portuguese unit absorb and incorporate knowledge from the relations with the costumers. In this sense, there is a deep contact between the engineers who are responsible for the development and the costumer and the engineers frequently stay in the client in order to develop ideas. As the actual laboratory responsible who were already a product engineers says: “every time we are developing something and want to present valid solutions, we go to the client, stay there and have a lot of meetings. This is quite frequent.” We can see that Ficosa absorb knowledge and competencies from

the clients and, therefore, the relations established with them are important ways of knowledge transfer.

Following the perspective of Mudambi (2002) of the knowledge flows, we can identify two flows in what concerns the relation with the suppliers: one from the local to the subsidiary and other from the subsidiary to local. In this relation there is not a unidirectional knowledge flow but an interchange of knowledge. In the case of the relation with the costumers there is a predominant flow: from the local to the subsidiary, where the subsidiary goes to the client to absorb knowledge and directions.

As we can see, Ficosa Portugal always tried to establish local contacts that could allow it to grow and to obtain the autonomy that it has nowadays. In this sense, the know how, the competencies and the knowledge shared with local agents, became crucial to the portuguese unit development and gave it an unique force in the multinational network.

Analysing now MLDC, one can see that the portuguese development center has close relations with academia. As matter of fact, and in a researcher words: “one of the reasons that contributed for the opening of this center in Portugal was the fact that the academic institutions have already been developing work in the speech area (...) and that is part of the group strategy, i.e., establish protocols and partnerships with research centers and universities.” In this manner, also in this case but in a very different way than in Ficosa’s case, local context has an enormous importance for this R&D unit because is an essential support for its development. This context was based in the privileged relations with universities and other research centers.

We can say that both subsidiaries, in different ways, were capable of recognize the value of local knowledge, incorporate it and apply it, i.e., both subsidiaries had great absorptive capacity.

### **3.3. The knowledge dissemination in multinational networks: the importance of transfer mechanisms**

The importance of the concept of absorptive capacity is also about the contribution which the knowledge absorbed by a subsidiary can give to the other subsidiaries of the network. And in this sense, Mahnke, Pedersen and Venzin (2005) say that knowledge management tools influence the subsidiary's absorptive capacity and consequently the ability of the subsidiary to use knowledge from other units and this can be an important source of competitive advantage in the MNC, as argue also by Andersson (2003). Actually, the authors consider that MNC should assure that the competencies and knowledge of a subsidiary could benefit all the subsidiaries of the network.

In the two examples there is a concern in developing knowledge management tools, which can help the diffusion of the knowledge between all the units of the network. If we focus on Ficosa, 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.

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 Ficosa's group. 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, Ficosa, through the databases, try to decontextualize and standardize knowledge in order to easily diffuse it in the multinational network<sup>3</sup>.

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. (...) That’s our goal: to standardize and to identify the best practices which can be developed in any subsidiary.”

Indeed, Ficosa Portugal 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”.

As a matter of fact, and as we have seen above, the knowledge transfer in this firm seems to have mainly one direction, which is from the portuguese subsidiary to the others subsidiaries of the MNC. As the director of processes engineering point out: “more and more, Ficosa comes to Portugal to get our good practices. There is a trend to come here and get our knowledge and our competencies and apply them to the other subsidiaries of the group.” The

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<sup>3</sup> Nevertheless, tacit knowledge can be transferred without being codified if the suitable transfer mechanisms are used. As argued by Pedersen. Petersen and Sharma (2003), tacit knowledge can be easily transferred through face to face communication and informal interaction, which in the case of the interaction between suppliers and the Portuguese subsidiary.



industrial process manager from the headquarters also emphasizes this trend: “there are solutions which were developed in the portuguese subsidiary and are now being implemented in other subsidiaries. (...) The portuguese subsidiary is clearly one of those who contributes the most for the development of Ficosa’s group and who export more knowledge.”

We can see that namely in terms of processes, Ficosa exports a lot of knowledge and competencies, as we can see by the words of the director of processes engineering: “we export to other companies of the group, like China and Mexico, the assembly lines that are developed here (...) and now Ficosa’s group gave us a project in which we develop all the process here and make the standardization to all the group.”

Actually, in Ficosa we observe more exportation than importation of knowledge, due to privileged position and weigh that the portuguese subsidiary has today and to the knowledge and competencies that the subsidiary already absorbed and is now diffusing in other units. And according to Andersson (2003) these two factors seem to be connected, i.e., the diffusion of knowledge through the different units of the network and the recognition by the headquarters of the subsidiary’s capabilities as expressed in the role and responsible assigned to it. In this sense, the assignation of a specific role and certain responsibilities to the portuguese subsidiary mean that its capabilities will be used and integrated into other units. Actually, this is what is happening now in Ficosa, which has today a special role and great responsibilities in the network and an unquestionable recognition of its competencies by the headquarters (as stated above by the industrial process manager from the headquarters) and is diffusing those competencies in the other units (with the help data bases, as we have seen).

Analysing now Microsoft example, we observe that there is a great concern in exchange information and knowledge through an internal communication network. According to the responsible of the development area: “through the internal network we have access to everything: documentation, technology, everything and we can also communicate with our colleagues. So the major part of our knowledge we learn from here.” The responsible of the test area also emphasise the constant communication through the internal network: “we are always in contact through the internal network and we have access to all that they (headquarters) develop. Besides, “our interaction with them is made through conference calls; it’s all made by the phone.” These contacts are, according to the responsible for the test area a very important source of learning to the portuguese subsidiary: “I think we have much to learn (...) and we see that their procedures work much better. Probably we will adapt them to all the projects.”

In this sense, knowledge transfer is made, almost exclusively, through a virtual information network and the interchange of investigators between the portuguese subsidiary and the headquarters and other subsidiaries is not frequent, however it happens sometimes, as the responsible for the test area says: “that doesn’t happens frequently but there are exceptions. Our colleague was in China to understand how the work was being developed. So she was there, understood how they worked how they were organized, the technologies they used and brought all that to here (...) and one time we had to teach one colleague from other unit to work with a tool we develop. It was strange but worked very well.” Actually, the interchange of persons doesn’t take place very often because prevails in the company the interaction through the internet or the phone.

We can observe that in Microsoft there is a big concern to avoid that the subsidiaries become isolated from the other parts of the multinational, and to assure that the competences of all the parts of the multinational are diffused in the group. And all this is made through an organized intern network of information, through which every subsidiaries of the group can accede to the same kind of information and knowledge.

In this way, it seems that both units studied here try to develop mechanisms to assure the effective dissemination of knowledge throughout the multinational.

### **3.4. The barriers to knowledge transfer: from the knowledge characteristics to subsidiaries characteristics**

Considering the barriers to knowledge transfer, one can observed that Ficosa has the predominant characteristics of business area division of subsidiaries, which means that the units are divided in business areas and each units develop a certain product. This results in great knowledge and competences specificity and it means that there is an increased difficulty in knowledge transfer.

As pointed out by Foss and Pederson (2002) and Andersson, Björkman and Furu (2002), context-specific knowledge is harder to transfer because the more specific and contextualized the knowledge is, less capable are the units of absorbing it and less useful will be for them. This is an important barrier to transferring competences in multinationals.

Another barrier emphasized by Andersson, Björkman and Furu (2002) is internal competition between subsidiaries. In MLDC this competition doesn't take place because since the center is very recent, it wouldn't make sense if the center

refused itself to diffuse and transfer information. Furthermore, it is the portuguese center that almost always gets the information from other subsidiaries and from the headquarters and not the opposite. In Ficosa, interviewees do not recognize that competition. What they emphasize is that Ficosa is the 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 others 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 Ficosa Portugal has already a privileged position in the multinational group and by diffusing knowledge to other units will not loose 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.

Another important issue, brought by Pederson and Furu (2002), is the motivation of subsidiaries to transfer knowledge. As Szulanski (in Pedersen et al, 2003) points out, the motivation to acquire and receive knowledge is very important. We can say that both Ficosa and Microsoft are motivated to exchange knowledge with other units, although there are differences. MLDC is a recent center that is learning with other units and because of that is highly motivated to absorb knowledge. Ficosa, despite absorbing knowledge from other units, predominantly export knowledge.

In this sense and as a general conclusion we can say, using Mudambi's approach of the knowledge flows, that in Ficosa we find a predominant flow from the subsidiary to parent and in Microsoft we find a reverse flow: from parent to

the subsidiary (Mudambi, 2002). Evidently, there are other flows in other directions but these are these constitute the dominant pattern. As we have seen, Ficosa has now a unique position in the network, which is a consequence of the strategic competencies, which the portuguese subsidiary has been developing. Actually, Ficosa is one of the subsidiaries who contributes the most for the development of the multinational group and who export more knowledge.

Microsoft, as an embryonic development center, absorb a lot of knowledge from other units and from the headquarters, but is having a more active role in the knowledge transfer process. Indeed, there is an attempt to acquire specific competencies that allows the portuguese subsidiary to gradually occupy a more important position in the group.

## **Conclusion**

The effective dissemination throughout the MNC organization of valuable knowledge is seen as an important source of competitive advantage on a global economy. To an increasing extent the success of MNCs is considered to be contingent upon the ease and speed by which valuable knowledge is disseminated throughout the organization. In this way, is now commonly accepted that knowledge plays a central role in the internationalization process.

We presented two R&D units of two MNCs that are completely different<sup>4</sup>. They have totally different foundation contexts, which influenced their

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<sup>4</sup> The results presented and discussed here are part of a research project that is still in progress, and so that is not concluded. Nevertheless, our results and conclusions are also supported by theoretical contributes and will be, on a posterior stage, sustained by additional data.

development, the characteristics they have at the present time and, consequently, the knowledge transference.

Ficosa arises from an existing firm with certain competences, which were an important advantage for Ficosa. The portuguese subsidiary developed those competencies and other strategic ones (especially through crucial local relations), which explain the singular status that the subsidiary has in the multinational network. Ficosa is, now, a subsidiary with a great autonomy, very independent from the headquarters and the others subsidiaries and clearly, in the words of March (in Cantwell e Mudambi, 2005) a “competence-creating subsidiary” which gives an important creative contribute to the group. Consequently, the subsidiary diffuses a lot of information to others subsidiaries but more rarely absorbs knowledge from them. Besides, generally spoken, the knowledge transfer in Ficosa’s group is not much frequent because Ficosa is divided in business areas, which means, that each unit have specific competences, which are, in turn, harder to transfer.

Microsoft is a very recent R&D unit, which is more dependent from the headquarters and others subsidiaries. Its creation and posterior development were always associated with the relations with particular local actors – universities and research centers. This portuguese subsidiary is also “competence-creating” but on an embryonic stage. The extent of knowledge transfer is more frequent because this subsidiary has the need of absorbing knowledge from the other subsidiaries and from headquarters and is also highly motivated to diffuse its own knowledge.

In spite of being two distinct examples of delocalization of R&D competencies, the two subsidiaries have a similar concern, which is the development of mechanisms to facilitate knowledge transfer. These mechanisms

consist basically 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.

We can conclude that, even if in cases (like Ficosa) where the subsidiaries develop very specific processes, which requires specific competences and knowledge hardly absorbed by other subsidiaries, their transfer is, even so, a concern for MNC's. We believe, they realize the competitive advantage of effective knowledge transfer.

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