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Resumen:

El presente trabajo tiene como objetivo principal el de contribuir a un mejor conocimiento de la posición de los países de tamaño intermedio en el actual proceso de internacionalización de las actividades innovadoras, liderado por las empresas multinacionales. Para ello, tras una discusión de los instrumentos teóricos que pueden emplearse para este tipo de estudio, se lleva a cabo un análisis en profundidad de la economía española como caso representativo de aquel grupo de países. De forma particular la atención del estudio se centra en conocer mejor las repercusiones que tienen las actividades tecnológicas e innovadoras de las filiales de las empresas multinacionales establecidas en España. Para ello, se efectúa un análisis comparado de la actividad de aquellas empresas con respecto a la de las empresas innovadoras de capital nacional. Finalmente, se establecen algunas conclusiones que pueden ser tenidas en cuenta por parte de para la política tecnológica.

**MULTINATIONAL AND NATIONAL FIRMS IN THE PROCESS OF
TECHNOLOGY INTERNATIONALIZATION:
SPAIN AS AN INTERMEDIATE CASE.**

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1. INTRODUCTION:

One of the central issues related to the new international competitiveness has to do with the relationships between technological innovation and internationalization of economic activity. Within this general topic the process by which firms carry out strategies designed to create, diffuse or exploit technological skills on a multinational basis is particularly important.

To some extent, it is not totally a new matter insofar as considerable attention has been paid since the 1960's to the technological behaviour of multinational corporations (MNCs), especially to their role in transferring technology to less developed countries (Vaitsos, 1974; Chudnovsky, 1974; Lall, 1987; Katz, 1976).

Nevertheless, important changes in the international economy have taken place in the recent decades and they introduce significant modifications in the conditions ruling the division of technological labour. Hence, MNCs have had to modify their behaviour to take advantage of this new framework (OECD, 1997; Meyer-Krahmer & Reguer, 1997).

Most current research is concentrated in answering the question of how widespread is the process of MNCs innovating at the international level. Thus, considerable effort has been devoted to clarifying their strategies, the relationships between mother houses and subsidiaries, the establishing of technological alliances, the role of national governments and European agencies and so on (Patel & Pavitt, 1991; Archibugi & Michie, 1995; Cantwell, 1994; Mytelka, 1991). However, a great majority of analysis rests on the experience of MNCs in most developed economies - in which, undoubtedly, the process has achieved more dynamism – and few studies have been focused on other experiences, particularly for the enlightening of those which cannot be included in that select club, in spite of their level of development; in other works we called them "intermediate countries" (Molero, 1997). Furthermore, current investigation is done to understand the activities of large MNCs – also the most dynamic agents - while there is lack of research about the behaviour of medium and small firms which also are entering into the process.

The aim of this chapter is to contribute to a better understanding of the way in which other countries different from what has been called the "triad" and other firms different from large MNCs participate in the internationalization of technological innovation. To achieve that goal we are going to analyse the Spanish case. Spain is undoubtedly a significant case in that group because it is still today a country with a low level of technological effort among European nations. Moreover, for a long period of time, Spain has been a net receiver of important amounts of foreign direct investment (FDI), with less developed outward flows. This analysis will be carried out from a twofold perspective.

- First, by studying the technological behaviour of MNCs' s subsidiaries located in Spain and its repercussions for the National System of Innovation (NSI). Through a systematic comparison with domestic companies, we shall show in which aspects MNCs act like comparable national firms, and in which others they behave differently. The weight of the sector of activity and size of the firms will be taken into account as two critical features of the group of MNCs.
- Second, by investigating the complementary process, that is to say, how Spanish firms which revealed technological skills organize their process of internationalization, whatever the level it reaches, including technological activities. Thus, we wish to find out more to what extent the existence of technological advantages reinforces the probability of undertaking international commitments.

In the next section, we shall review the theoretical background from which we approach the study as well as the available evidence supporting the use of that framework. In section three, the analysis will deal with the technological behaviour of MNCs in Spain. After gathering and discussing existing information and research results, we shall carry out a systematic comparison with Spanish innovatory firms, as a way of delving into the repercussions MNCs have for the System of Innovation. Section four is devoted to the study of the internationalization of Spanish innovatory companies, seeking for the consequences this process has for the active participation in the new international scenario already exposed. Finally, in the conclusions we shall comment on two main issues; first, the analytical consequences of the findings, highlighting the fact that diverse models co-exist in reality and there is not a dominance of a single, general one. Second, the repercussions the

former has for designing and implementing technological policies.

2. THEORETICAL FRAMEWORK AND AVAILABLE SUPPORTING EVIDENCE.

The analysis of a case with the features the Spanish one has, faces two main restrictions. One is the lack of theory which systematically analyses the relationships between innovation and the internationalization process; this obliges us to look for useful elements in theories elaborated for other purposes, mainly the internationalization of firms. On the other, a great majority of empirical works on internationalization and innovation have been focused on the behaviour of large MNCs or on the experience of most advanced economies. In spite of it being justified by the availability of much more information for those cases, it limits its usefulness to us for understanding the Spanish case.

2.1. Theoretical approach.

Two major theoretical sources can be considered: the first comes from the analysis of FDI in its different expressions and the second derives from the enrichment of innovation studies, particularly around the debate of "techno-globalism".

Traditionally studies on firms' internationalization are gathered around the eclectic paradigm or the OLI synthesis, which can be used as a general framework. However, when the interest consists of expounding the particular case of a country in an intermediate position, we need a more dynamic approach which allows us to understand the process of change of those economies. This is the intention of the so called "Investment Development Path" (IDP), (Dunning, 1988; Dunning and Narula, 1996; Narula, 1996), already described in previous chapters. Among the five stages established by IDP, for the specific case we shall deal with, it is especially important to concentrate the attention on the third stage which marks a turning point in the process (Narula, 1996).

According to this approach we might expect Spain to be situated at this stage and therefore, that inward FDI plays a special role in technology intensive sectors (to a great extent due to the scarce development of local firms) and a renewed one in other less advanced branches by incorporating more domestic inputs with a higher level of quality, including some available R&D resources. As far as outward FDI is concerned, we might expect Spanish firms to follow a relatively traditional path, based on economies of scale and looking for lower

production costs; to a great extent it is similar to what more mature MNCs did in their initial stages. Nevertheless the historical moment is different and the prevailing international circumstances introduce the need for the possibility of following different strategies: a particular example in that regard is the existence of international networks, in many cases supported by public policies, which gives new options to the traditional decision making alternative of investing versus exporting. Only a few firms have initiated a search for newly created firm advantages –including R&D facilities- in more advanced countries, constituting the first step to a "conventional", global MNC.

Nevertheless, in order to deal with the experience of Spanish firms going abroad, other theoretical inputs must be taken into account. We shall refer to two of them: the "Uppsala" approach and the one arising from development studies. The first one brings interesting elements on introducing a temporal dimension in the investigation of how firms (usually small or medium) from countries with less international tradition and lower levels of development begin to develop international commitments (Johanson & Vahlne, 1977; Luostarinen, 1979; Welch & Luostarinen, 1988). In its view, it is an evolutionary process in which learning is crucial. Firms should initiate the international experience through exports and the subsequent knowledge of the environment allows them to undertake other more complex tasks, including FDI. Thus, the accumulated experience would permit a more suitable perception of the opportunities and risks by reducing the effects generated by the firms' unfamiliarity with the conditions of that environment.

Technological factors have a twofold role within this approach. On the one hand, they constitute a basic dynamic factor to delimit the possibilities of international expansion. On the other, they are an alternative way for penetrating foreign markets as compared with exports and FDI. The most important feature of this approach consists of the factors influencing the determination of internationalization having different signs, which forces us to a specific analysis in each situation of the firms and the environment.

Not very far from this are the contributions from development studies. In the 1980's some authors advanced a kind of "learning pattern", which some newly industrialized countries had followed in those years, mainly in Latin America and Asia (Katz, 1984; Teitel, 1984; Lall, 1992; Dahlman et al, 1987). Basically the common experience consisted of processes of industrialization based on import-substituting policies. In those cases, a considerable amount of embodied and disembodied technology was imported to face the needs for industrializing those economies following technological patterns already existing in developed countries.

Although not always, some firms and/or sectors carried out different forms of a gradual improving of the original technology as well as processes of adapting it to the particular conditions of their countries. This behaviour led to a learning mechanism which enabled some of the agents to initiate the exploration of other markets, in most cases in neighbouring economies, as a way of reducing risks and uncertainties. Thus, countries like Argentina, Brazil or India knew a first moment of outward FDI and, what is more relevant to our work, started to export some technological devices and services. (Katz, 1984; Lall, 1987; Dahlman & Sercovich, 1984). To a great extent, it coincides with what has been called the "first wave" of outward FDI from developing countries (Dunning, Hoesel, Narula, 1996).

These two models suggest Spanish enterprises can be studied as learning firms with step by step international strategies. After a long time of protectionism and "internally oriented" development, a group of firms accumulated experience and capabilities enough to begin the international adventure. However, this was followed in a gradual way, reaching more sophisticated stages only after a period of consolidation in more basic

procedures, such as exports, in which Spanish companies enjoyed advantages created in the immediate past. A critical issue to answer is whether this process has some peculiarities which differentiate them from former traditional paths. In other words, to what extent the current trend of new (and usually small and medium) firms initiating international commitments is a repetition of the trajectory already followed by classic and older MNCs or, on the contrary, does it have some new features determined by the new framework in which those companies carry out their strategies.

Another set of contributions arises from innovation studies, as a consequence of the debate about the globalization of R&D and innovation. The starting point is the consideration that globalization is a process reaching the overall economic and social life and hence affecting also to R&D and the creation of new technologies (OECD, 1992, 1996). Leaving aside other theoretical and empirical considerations of that perspective, this "pure" model is not useful for dealing with intermediate experiences. In fact, as the IDP model predicts, the participation of countries such as Spain in the process is still relatively secondary and practically no domestic firm is an active "global innovator". Thus, we find more interesting those approaches which differentiate among various levels within the "globalization" process.

According to Archibugi and Michie (1995) – see the introduction and chapter five- three different types of activities can be distinguished in the internationalization of innovation. A) the *international exploitation of technology* produced on a national basis, B) the *international techno-scientific collaboration of partners* in more than one country, and C) the *international (or global) generation of innovation*.

There have been different efforts to improve the knowledge of the third level. In fact, a considerable amount of research has been devoted to delve into the process of MNCs reorganizing their international division of technological level (Casson, 1991; Pearce and Slight, 1991; Cantwell, 1995; Graastrand et al, 1993, Patel, 1995, Pavitt, 1997). After the analysis of different empirical cases, some nuances can be added to the general process. Thus, the technological activity of MNCs must be considered as a dynamic and changing one; in the course of time, their implication in the local economy is a positive stimulus to upgrade the level of commitment and, therefore, to carry out other tasks more complex than simply accompanying production (Pearce & Singh, 1991; Papanastasiou & Pearce, 1994).

In a complementary way, other works (Casson, 1991; Pearce & Singh, 1991; Molero & Buesa, 1993) have insisted on the suitability of establishing taxonomies for a better understanding of the relationships of MNCs' technological activities with the National System of innovation. From a theoretical point of view it is important to underline how, apart from general factors of the recipient country and the sector of activity in which MNCs operate, there are other determining elements which depend directly on the firm's trajectory; some of them cannot be identified separately from the firm itself and its particular path, albeit others can be indirectly approached through the country of origin. Again, some suggestions of the IDP help us to see why that origin can be important; issues such as factor endowment, natural or created advantages, sectoral specialisation, etc., are incorporated or can be detected through the country which FDI comes from. Those taxonomies have especial interest in the case of hybrid experiences such as the Spanish one.

What is relevant for current research is how former approaches can throw light on the role of intermediate cases. Our understanding is that the most advanced level is much more restricted because only a few firms (the largest and most internationalised) and countries (where most of them come from) would be involved in that stage. On the contrary, the active experience of Spain and other similar economies might be concentrated in the

first and partially the second levels. Actually, Spain has interesting advantages to host demand oriented technological activities, insofar as the Spanish market is growing more rapidly than others because the endowment of technology intensive products and services is clearly less than in other European economies. Moreover, Spain has some non-negligible advantages for exporting to other areas, mainly Latin America and the Mediterranean zone, and so, for producing or adapting particular sets of products and services.

2.2. What previous evidence indicates.

As has been mentioned, until very recently, there are very few studies –if any- dealing with the relationships between innovation and internationalization in the Spanish economy. Nevertheless, there was some general research which can allow us to make a preliminary approach to the degree in which current theories explain this particular case. Thus, before entering into the analysis of firms' strategies, it is useful to establish a framework within which they can be integrated.

As far as the theory of FDI and the role of technological factors is concerned, the following stylised facts can be highlighted:

- a. During the last decades since 1960, Spain has been an important receiver of FDI. In spite of the dynamism of services in the second half of the eighties, the dominant position –in terms of accumulated stocks- is occupied by industrial activities, mainly manufacturing ones. If we consider the sectoral distribution, we find FDI is spread in most industrial branches, whatever the technological level they have, with two highlighting clusters of sectors: chemistry and metal-mechanical industries. However, if we weight FDI by the economic importance of the branch (for instance, by its Value Added), we find that low or medium technology intensive sectors receive much less FDI than what could be expected from their importance, while highly intensive sectors received much more FDI. Interestingly enough, "very highly intensive" ones, received FDI in a lesser proportion: approximately what corresponds to their economic weight. In other words, the capacity of attraction is especially important in medium to high sectors such as vehicles or some chemical branches (Buesa & Molero, 1998).
- b. This distribution fits very well into the technological advantages of the countries of origin (Molero, Buesa, Casado, 1995). Thus, we could interpret it as a signal of the capacity of MNCs for making effective their O advantages in Spanish markets above mentioned.
- c. There is not a good correlation between the international technological specialisation of the Spanish economy - measured by the Revealed Technological Advantages - and the FDI specialisation – approached by the sectoral distribution of the FDI of Spain compared with the average position of a group of developed countries – (Molero, 1997). Thus, what has been said in point a, does not mean Spain has had the capacity for capturing FDI according to its overall sectoral technological capabilities, as revealed by its international advantages.

Summarising the former points, it seems that MNCs do take advantage of their technological position, they invest in sectors where that is possible and with remarkable economic dynamism. However, there is

no evidence for stating MNCs integrate domestic R&D inputs to a great extent; furthermore, when they do something in this direction, it is of lesser content than what they carry out in other developed economies (Wortman, 1991).

- d. Outward FDI has increased very rapidly in the last ten years to the point that in 1997, it caught up with inward flows. In comparison with other developed European countries, Spain shows a high specialisation in services, as table 1 shows. Interestingly, a considerable part of the FDI allocated in "services" has its origin in manufacturing firms, which reflects the fact that there is a non negligible part of them which are investing in supporting activities, in many cases related to exports². Also Spain stands out for its specialization in destination areas such as Latin America or the two European neighbours (Portugal and France). So, learning models seem to have a place in understanding the Spanish case.

TABLE N° 1: Distribution of outward foreign direct investments of Spain and other European countries.

SECTOR	1985-1990			1991-1994		
	SPAIN	AVERAGE	(a)/(b)	SPAIN	AVERAGE	(a)/(b)
	(a)	(b)		(a)	(b)	
AGRICULTURE	2.08	0.41	5.09	0.98	0.22	4.45
INDUSTRY	24.08	54.73	0.44	21.60	46.37	0.46
SERVICES	73.84	44.86	1.64	77.42	53.41	1.45

Note: Average = average of four countries: Germany, France, United Kingdom and Italy

Source: OECD and own elaboration

- e. According to IDP predictions, some Spanish firms can compete with MNCs in what has been called "niches" or specific market segments in technology intensive sectors. This position has been achieved through two basic trajectories: one, very common in countries with industrial backwardness, has been the importation of foreign technology and a later process of adaptation-learning-modification; the importance of MNCs' presence in this trend is not negligible. The other is, generally speaking, much more recent and consists of the creation of new, technology intensive companies, on many occasions conceived as a way of exploiting a particular technological niche. However, in most high-technology branches MNCs continue to hold a dominant position (Martinez Serrano & Myro, 1992; Buesa & Molero, 1998).
- f. Among the factors explaining the growing outward FDI, there is a combination of those which seek to maintain traditional advantages such as low salaries (investment in less developed countries), the exploitation of new advantages related to scale economies (opening new markets) and, to a much lesser extent, the search for newly created advantages in economies with higher levels of development. (Mate, 1996; Buesa & Molero, 1998).

The evidence regarding the discussion of technology globalization is much less conclusive. In fact, only general findings can be considered; a summary of them is as follows.

- a. On dealing with the sectoral associations of the international position of Spanish economy, there are no significant correlations between either inward or outward FDI with international technological advantages.

Thus it seems that in spite of the existence of some company experiences in which technological base has been one of the relevant factors for the process of internationalization (Bueno & Morcillo, 1990), there are not enough accumulation of cases to make the corresponding sectors a reflection of micro cases. In fact, the Spanish pattern of linking those variables differs from the one observed in core European countries, and has noticeable similarities with other Mediterranean cases (Molero et al, 1997a). Nevertheless, our conclusions on this point have to be considered provisional insofar as the indicators usually employed – R&D and patents- are especially poor for explaining the dynamism of services, where Spain has clear advantages.

- b. Hitherto, exports have been the most important way of entering international markets. Two indicators show this process is well related with technological capabilities. At a macro and sectoral level, there are significant and important relations between technological advantages and exports as a whole or indexes of penetration in foreign markets (Sánchez & Vicens, 1991; Buesa & Molero, 1992; Merino, 1998). At a micro level, a considerable percentage of innovatory firms are also exporting; this "probability" is much higher than the one existing for the overall industry (Molero, 1998; Fonfria, 1998).

- c. Little research has been carried out about the involvement of Spanish firms in international alliances. However available information allows us to assert that the level of acceptance of this form of internationalization is greater than outward FDI or foreign technological commitments. It can reasonably be said this is the second mechanism in importance within firms' strategies to reach new international goals (Molero, 1998; Fonfría, 1998).

- d. The Spanish presence in the measurable R&D internationalization is poor. Thus, using the study of Warrant (1991) we could see how, from a total of 618 R&D laboratories of industrial groups established abroad, Spain hosted twelve (1.9 per cent) and was not home for any of them. As a comparison, France was host for eight per cent of the laboratories, UK 10.7 per cent, Germany twelve per cent, Belgium 1.9 per cent and Holland 4.2 per cent. Nevertheless, the technological tasks carried out by those MNCs have a considerable importance for the Spanish economy, as can be approached by the ratio of R&D expenditures on total national R&D. According to OECD (1997), Spain was among the nations in which the ratio is over thirty per cent, while other national calculations situate it in a higher position, exceeding fifty per cent . (Molero, 1997).

3. MNCs IN THE SPANISH INNOVATION SYSTEM.

3.1. General outlook.

As we said, in spite of previous results, the knowledge of the central issue of technology-internationalization relationships has been very poor. Therefore, it is necessary to incorporate some recent data and investigations

directly focused on that specific relationship and with especial attention devoted to companies' experiences.

A general view can be obtained from the Innovation Survey (the Spanish section of the European one). As can be seen in table n ° 2, foreign firms are 4.66 per cent of the total, but represent 14.85 per cent of those with R&D centres. Their contribution to the NSI is more visible when we compare their technological activity with national averages. Thus, while in total national only 10.71 per cent can be classified as innovative, within foreign ones this ratio rises to 50 per cent or even more. Similarly, in the sample, about a quarter declares having R&D activities, against 62.33 per cent or 72.31 per cent in the case of foreign companies. Finally, only 17.83 per cent of national firms have R&D laboratories in contrast to up to 64.10 per cent in the group of non-EU firms.

TABLE N ° 2 : Technological activity of foreign firms, 1994

	Percentages of foreign groups on each total firms			Percentages of companies doing technological activities within each group		
	Total number of firms	Innovatory firms with R&D	Innovatory firms with R&D centres	Innovatory activities	R&D activities	R&D centres
Firms of a foreign group from EU	3.80	9.50	11.63	47.24	62.33	52.11
Firms of a group from other countries	0.86	2.48	3.22	53.16	72.31	64.10
Total firms	100	100	100	10.71	24.94	17.83

Source: Own elaboration with data from the Spanish Innovation Survey, 1994. I.N.E. (1997)

This superiority in innovatory activity is one of the most general findings of recent research (Molero, 1995; Bajo & Lopez, 1996; Martín & Velázquez, 1996; Merino & Salas, 1996, González, 1997, Circulo de Empresarios, 1995); however, there are underlying factors - apart from the nationality - which can explain a considerable part of those differences. In fact, all available studies confirm two basic causes of the distance between Spanish and foreign enterprises: the size and sector of activity. Thus, when both elements are controlled, the technological effort is quite similar between the two clusters (Merino & Salas, 1996; Martín & Velázquez, 1996). However, these results must be carefully interpreted; it is misleading to assert that MNCs do not represent any especial contribution to the technological development insofar as they basically allocate resources similarly to the Spanish firms. In fact, as we shall see, MNCs actually constitute a central part of the Spanish NSI because they usually have a longer tradition in organising innovative activities, have a size more adequate to carry them out and are more active in those sectors which concentrate today's technological development, notwithstanding the fact that Spanish companies can face firm to firm comparisons when they enter into the same world.

The situation is different if we consider technology importation. In this case, all studies reveal MNCs import foreign technology more intensely (Sánchez, 1984; Martin & Velázquez, 1996; Merino & Salas, 1996; González, 1997). Leaving aside other factors, the critical one refers to the special link they have with their mother houses, which constitute the first external source of technological know how (Molero, 1982; Molero, Buesa, Casado, 1995; Pelegrin, 1997).

Former quantitative data do not give an account of the inner process of innovation. To deal with it we need to refer to several investigations made on the technological behaviour of German, Dutch and Japanese subsidiaries, from which we arrive at the following general conclusions (Molero, Buesa, Casado, 1995, Pelegrin, 1997):

1.- Parent companies are the main suppliers of product technology. As far as process technology is concerned, the position is more balanced between parent companies and subsidiaries. That close technological relationship is not extended to other foreign firms outside the group.

2.- There is a majority of Spanish subsidiaries which do not develop R&D programmes. Nonetheless, the number of firms with this sort of task is not negligible: in all cases it is between forty and forty-four of the corresponding samples.

TABLE N° 3: Taxonomy of german subsidiaries' technological behaviour

	TYPE OF SUBSIDIARY				
	Passive Adaptation	Active Adaptation	Technological Collaboration	Partial technology autonomy	
				(A)	(B)
Technological development	Low	Average	High	Average	High
Source of technology	Parent	Mixed	Mixed	Parent	Own
R & D	None	Poor	Average	None	High
Share in group production	Low	Average	Average	Low	Very high
Rate of novelties incorporation	High	Average	Low	Low	Very high
Local market position	Low	Average	High	Average	High

Exporting propensity	Average	Average	Low	Average	High
Model sector	Automobile auxiliary	Vehicles; Machinery	Electrical material; Metal products	Particular cases	

Key: A= Characteristics corresponding to the company as a whole B= Characteristics corresponding to the products of exclusive responsibility

Source. Own elaboration

3.- The estimated average effort of R&D ranks from 1.5 to 1.86 per cent of sales volume. In cases for which there are available comparative data, we have proved that that effort is significantly lower than that of other subsidiaries in most advanced countries (Wortman, 1991).

4. MNCs' subsidiaries are quite active in introducing new products and processes. In comparison to large Spanish firms, they are more dynamic, although they behave very similarly to most active Spanish companies.

5. In spite of the basic similarities we have commented on, there are some by no means negligible differences. On this basis, we made a taxonomy of cases for delving deeper into the German subsidiaries' variety³. Thus, the diversity of strategies is collected in table n^o 3, in which three basic traits can be outlined.

* One is the very particular case of subsidiaries having a Partial Technology Autonomy; any attempt at analysing them as a homogeneous totality is condemned to misunderstand their complex position in this group.

* A second one is reflected in the Passive Adaptation type. They operate on the basis of an external flow which allows them to incorporate innovation rapidly. Nevertheless, the technological level and effort are low. Thus, in spite of the possibility of new incorporations, their market positions are modest in comparison to that of other subsidiaries.

* Finally, the two intermediate types (Active Adaptation and Technological Collaboration) show how the greater the technological effort and level of the plants, the higher is the participation in group activities and the stronger are the market shares in the two intermediate cases.

3.2. A comparative analysis of MNCs versus domestic firms.

One way to enrich the knowledge of the repercussions MNCs have on the Spanish NSI is to compare their technological strategies with those of domestic companies. In a previous study (Molero, Buesa, Casado, 1995) we made a comparison using a sample of 151 innovatory companies from the Madrid region, twenty-seven of which were controlled by foreign capital⁴. Some provisional results showed that in most aspects the corresponding behaviour had important similarities; thus, the contrasts we established were based on qualitative nuances of a relatively similar pattern. Nonetheless, we had in mind some restrictions of the analysis, mainly the small number of foreign firms, which prevented any comparison broken down by size or sectors.

Very close in time, an entrepreneurial organization carried out another investigation for the ensemble of large firms (Circulo de Empresarios, 1995). On the basis of 305 valid answers⁵, it provides interesting findings to delve deeper into the behaviour of MNCs subsidiaries (called "Multinational Group" in the study), compared with a similar group of large domestic firms.

A first outstanding result is that MNCs constitute a fundamental part of the sample. In fact, they add up to 45.9 per cent of the total compared to 19.7 of family firms, 11.5 of public companies, 11.5 of enterprises linked to private banks and another 11.5 classified as "other private firms". So, on analysing the consequences for Spanish NSI, the first – I would say most important- factor to consider is their size and hence their weight within big companies. This quantitative contribution is qualified by a number of differences arising from the comparison with the rest of national firms. Results, summarised in table nº 4, allow us to make the following statements.

TABLE N ° 4: mncs' innovation behaviour versus domestic large companies

Percentages of firms	Public firms	Firms linked to banks	Multinational group	Family firms	Other private firms	TOTAL
Classified as innovative	77.1	65.7	80.0	61.7	65.7	72.8
Classified as highly innovative	14.3	17.1	27.1	10.0	14.3	19.7

Introducing radical new products	42.9	31.4	47.1	33.3	22.9	19.7
Substituting products	57.1	25.7	59.3	46.7	34.3	41.8
Qualifying public programmes as important	48.6	31.4	22.1	23.3	34.3	27.9
Qualifying public purchases as important	14.3	14.3	5.0	10.0	17.1	9.5
Using collaboration with users as source of innovation	54.3	43.9	58.6	53.3	57.1	55.1
Using collaboration with suppliers as source of innovation	54.3	51.4	62.1	66.7	51.7	59.7
% of sales in innovation expenditures	0.89	0.67	3.06	0.82	0.35	1.57
% of sales in R&D expenditures	0.30	0.41	1.41	0.31	0.26	0.72
% Self-financing	70.2	75.9	93.4	89.9	95.1	82.5
% EU financing	3.9	3.8	0.1	0.1	0.0	1.9

Source: elaborated with data from Circulo de Empresarios, 1995

- The percentage of innovative firms in national groups is higher than in other clusters. This superiority is reinforced if we use a more restrictive concept of innovation.
- Those companies more frequently introduce totally new products. Only public firms show a comparable behaviour.
- Innovation culture is strongly established within multinational group. The substitution of products is highlighted as an innovation objective and is linked to the purpose of improving market shares.
- They seem to appreciate more the role of users and suppliers, although differences with other groups are not totally clear.
- MNCs make a greater effort in financing R&D as well as other innovatory activities.
- For these firms public programmes have little importance as a source of innovation. The same can be said for public purchases and for the financial contribution of EU funds.

More recently we have carried out a new investigation in the context of the TSER project with a larger and more representative database of innovatory firms. It corresponds to 1354 firms which during a period of eleven years (1984-1994) had financial support from the CDTI (the largest Spanish agency for technological development). This sample, although it is not a random one, accounted for a great part of Spanish innovatory firms⁶. The survey was answered by 545 companies, ninety-nine of which (18.2 per cent) are foreign, and allows us to carry out analysis with subgroups of firms⁷. In order to improve the reliability of the results we have followed a two-

step method:

* First, we have classified all answers in separate groups (National -N- and Multinational -MN) and we have estimated statistical measures (c^2) of the similarities of corresponding distributions. Thus, we can have a preliminary approach to the topics which appear to be different for the two clusters.

- Second, we complete the study in a twofold direction. On the one hand, by analysing how previous variables behave when they are taken together; this can be approached through multivariate techniques. On the other, by controlling the effect of sector and size on the differences. Thus, we have estimated Logistic Regressions to identify which factors explain the membership of N or MN clusters. Variables incorporated in the models are those which were significant in the first stage, plus some others of especial interest in this work. In order to control size and sector effects we have divided the sample into several sub-samples and the analysis has been repeated for large, small or medium companies and for different branches⁸.

Results of the first step are shown in table nº 5 in which we list all variables with their statistical significance level. In the third column we comment on the actual meaning of statistically verified differences.

Two general findings can be underlined. First, there are not too many variables which can suggest the existence of radically different patterns among innovatory firms, in spite of the kind of ownership⁹. In fact, as we advanced in 1995, the general pattern has many similarities in the two subgroups; in other words, we state MNCs subsidiaries perform a model of technological change very close to Spanish innovatory companies, exploiting similar institutional and economic advantages; from this point of view, their contribution to the Spanish NSI cannot be totally differentiated from the one produced by Spanish firms. Second, a large number of the differences confirm what we obtained in other research. The most interesting differences can be summarised as follows:

* Regarding *structural and economic variables*, foreign innovatory firms are clearly larger, older and more open to international competition. They also have better international competitive positions and a different sectoral distribution.

* *Technology sources* are more oriented to internal learning in national companies, especially in product technology. Design activities show higher importance in MNCs' subsidiaries. National firms usually have smaller innovation teams although they made a more intense financial effort.

TABLE N^o 5: Comparative analysis between national (**n**) and foreign (**f**) firms

TOPICS	VARIABLES	COMMENTS	
	Size (*)	F firms are larger than N	
	Sector (*)	N and F firms have different sectoral presence	

	Year of firm's establishment (*)	F firms are older	
	Year of control by present partners		
COMPARISON	Product quality		
VERSUS	Price of the products		
NATIONAL	Services to the customers		
COMPETITORS	Sales position (#)	F firms have better commercial positions	
	Technological level		
COMPARISON	Product quality		
VERSUS	Price of the products (**)	F firms have better prices than N	
FOREIGN	Services to the customers		
COMPETITORS	Sales position (*)	F firms have better commercial positions	
	Technological level (**)	F firms have better technological level	
	Leadership in its market		
	Product technology autonomy (#)	N firms are less dependent on external sources	
	Process technology autonomy		
KIND OF	R&D activities		
INNOVATORY	Industrial design activities		
ACTIVITIES	Production engineering activities		
	R&D activities		
IMPORTANCE	Industrial design activities (#)	F firms give more importance to Design	
OF:	Production engineering activities		
	Industrial experience & learning		
	R&D effort (on sales) (#)	N firms devoted more resources	
EFFORT IN	Other innovatory activities effort (#)	N firms devoted more resources	
INNOVATION	R&D personnel (*)	F firms have more personnel	
	Personnel in other innov. Activities (#)	F firms have more personnel	
OBJECTIVES OF	Development of new products		
INNOVATION	Improvement in existing products (*)	F firms give less importance to product improvement	
(IMPORTANCE	Development in new processes		
OF:)	Improvement in existing processes		
	Adaptation of acquired technology		
	Other objectives		

ROLE OF:	User's role in innovatory activities		
	Suppliers role in innovatory activities		
	Basic research (#)	N firms carry out more basic research	
IMPORTANCE	Applied research		
OF:)	Technological development		
	Only in the firm		
IMPORTANCE	Collaboration with public institutions (*)	N firms collaborate more frequently	
OF:	Collaboration with firms of the group (*)	F firms collaborate more actively within the group	
	Collaboration with other firms (**)	N firms collaborate more frequently	
	New products (% of sales)		
	New processes (% of sales)		
	New products (% of exports) (#)	F firms have higher proportion of new products in their exports	
	New processes (% of exports)		
	Totally new products		
INNOVATIONS	Totally new processes		
OBTAINED	New products for the firm but not for		
IN THE LAST	the market		
FIVE YEARS	Modified products (**)	F firms get more modified products	
	Modified processes		
	Patents		
	Brands, designs (#)	N firms give more licences	
TECHNOLOGY	Technical assistance		
TRANSFER TO	Installations and factories		
NATIONAL	Equipment goods		
FIRMS	Software		
	Others		
	Patents		
	Brands, designs		
TECHNOLOGY	Technical assistance		
TRANSFER TO	Installations and factories		
FOREIGN	Equipment goods (**)	F firms sell more capital goods	
FIRMS	Software		
	Others		
INDUSTRIAL	Number of patents		

PROPERTY IN	Number of models		
LAST 5 YEARS	Number of brands (#)	F firms register brands more frequently	
	Number of industrial designs		
	Patents		
	Utility models		
APPROPRIATING	Brands		
TECHNOLOGICAL	Industrial designs		
RESULTS	Industrial secrecy		
IMPORANCE OF:	Regularity in innovation		
	Foreign direct investment		
	Number of trading subsidiaries		
INTERNATINALI-	Number of production subsidiaries		
ZATION	Licensing to foreign firms		
	Technical assistance to foreign firms		
	R&D centres in other countries (*)	F have more R&D centres abroad	
	Participation in internat. Programmes		
	Export propensity (*)	F firms are more open to foreign trade	

Note: X2 tests: *= significant at 0.01: ** significant at 0.05: # significant at 0.10

Source: own elaboration

* *Objectives of innovation* are very similar, although national firms have greater interest in improving existing products. Users and suppliers seem to play similar roles in the process of innovation of both clusters. With regard to types in R&D, national firms carry out basic research more often. Collaboration with firms of the group is higher in MNCs' subsidiaries while domestic companies collaborate more with other kinds of firms and with public universities or public research centres..

* There are no significant differences in *the rate of introducing innovations*. Similarly there is a great parallelism in the kind of innovation obtained; the exception is that foreign firms get more products after modifying existing ones. Activities of transferring technology to other Spanish firms is very similar, albeit national companies seem more active in licensing "utility models". Regarding other foreign firms, the national group shows less intensive activity in selling capital goods.

* There is also considerable similarity in activities of *protecting industrial rights*; only foreign ones are more active in registering "utility models". The same can be said in considering the importance of different ways of

appropriating the results of innovation.

Variables used in LOGIT analysis –listed in the annexe- come from the association study plus some others which, although they were not significant in that analysis have a considerable importance for discovering the relationships of the firms with the system of innovation; that is the case of variables measuring collaboration or patenting. Results are shown in tables 6 and 7. The basic considerations we can make are the following:

From forty two variables only seven discriminate the belonging of the companies to the groups. As a general consideration, this confirms what has been said with regard to the similarities of the innovatory activities in these clusters of firms. So, table 6 allows us to state that MNCs' subsidiaries differ from national ones because they collaborate more with other firms from the group and they are more active in transferring technology to foreign firms by selling capital goods. On the contrary, domestic innovatory firms expend more resources in R&D, look more actively for product improvements, collaborate more with firms not belonging to the same group and give more importance to the transfer of technology to Spanish companies via non-patent licences and to other foreign ones via plant building.

TABLE N ° 6: Logits between foreign and national firms

TOTAL	LARGE FIRMS_
<u>VARIABLES & SIGNIFICANCE</u>	<u>VARIABLES & SIGNIFICANCE</u>
RDEXPEND -0.27 0.010	OTHEXPEND -1.26 0.011
PRODIMPROV -0.22 0.011	USERS 1.34 0.002
GROUPELL 0.62 0.000	OTHERCOLL -1.38 0.001
OTHERCOLL -0.17 0.040	SOFTWARE1 3.46 0.010
OTHLICEN1 -2.08 0.050	ASSISTANCE2 -5.02 0.001
PLANTBUILD2 -1.15 0.019	PRODAUT -0.06 0.005
CAPGOOD2 1.29 0.002	Chi square: 47.075 % cases correctly classified: 88.06
Chi Square: 104.905 % cases correctly classified: 83.49	MEDIUM FIRMS_
	<u>VARIABLES & SIGNIFICANCE</u>
	INGPRO -1.25 0.0250
	UNIVCOLL -0.72 0.0004
	GROUPELL 0.69 0.0011
	Chi square: 32.857 % cases correctly classified: 85.33

Note: significance levels of the three logits are £ 0.001

Source: Own elaboration.

The analysis by sizes reveals there are no significant differences in the group when considering firms under 250 employees, either taken as a single group or if we break down the sample in groups (fewer than 100 and from 100 to 250 employees). Nevertheless, some significant differences arise on analysing medium firms (250 to 500) and, particularly, when we take into account only large companies (more than 500). Regarding sectoral desaggregation, it must be emphasised that the more concrete the analysis is, the lower is the number of discriminating variables; this is a consequence of the importance of the sector in unifying innovation conditions and a confirmation of the already exposed "relative" -instead of "absolute"- character of the differences.

TABLE N ° 7: Logits between foreign and national firms (selected sectors)

<p>CHEMICALS_</p> <p><u>VARIABLES & SIGNIFICANCE</u></p> <p>PRODIMPROV -1.84 0.04</p> <p>GROUPOCOLL 0.82 0.02</p> <p>Chi square 26.812 % cases correctly classified: 85.37_</p>	<p>PHARMACY_</p> <p><u>VARIABLES & SIGNIFICANCE</u></p> <p>PRODIMPROV -1.46 0.01</p> <p>OTHERCOLL -1.04 0.08</p> <p>PATENTS 1.04 0.09</p> <p>Chi square: 20.436 % cases correctly classified: 84.85</p>
<p>MECHANICAL MACHINERY AND EQUIPMENT_</p> <p><u>VARIABLES & SIGNIFICANCE</u></p> <p>GROUPOCOLL 0.55 0.07</p> <p>PRODAUT -0.05 0.03</p> <p>Chi square: 16.06 % cases correctly classified: 93.75</p>	<p>ELECTRONIC INDUSTRY_</p> <p><u>VARIABLES & SIGNIFICANCE</u></p> <p>OTHEXPEND 3.65 0.06</p> <p>GROUPOCOLL 2.02 0.05</p> <p>CAPGOOD2 5.56 0.06</p> <p>Chi square: 29.99 % cases correctly classified: 88.57</p>
<p>FOOD & BEVERAGES_</p> <p><u>VARIABLES & SIGNIFICANCE</u></p> <p>GROUPOCOLL 0.81 0.009</p> <p>NPROCINT -1.45 0.01</p> <p>SECRETREL 1.02 0.005</p> <p>Chi square: 22.88 % cases correctly classified: 90.16</p>	<p>SERVICES TO FIRMS</p> <p><u>VARIABLES & SIGNIFICANCE</u></p> <p>RDEXPEND -1.20 0.04</p> <p>NPRODINT -1.55 0.07</p> <p>SOFTWARE2 4.87 0.01</p> <p>Chi square: 22.44 % cases correctly classified: 90.48</p>

Note. significance levels of all models are ≤ 0.001)

Source: Own elaboration.

With regard to size, we can underline that medium firms are much more similar than large ones. In fact only three variables explain the activity of foreign versus national firms: in two cases - collaboration with universities and public centres and the existence of production engineering activities as part of the innovatory process- domestic companies are more active than subsidiaries of MNCs. However, the latter collaborate more often with group's firms.

The situation is different among large firms. Within this size, clusters are more clearly differentiated. Thus, an important part of the differences with respect to domestic companies arises from the different behaviour of large firms. Two characteristics linked to technology transfer have the most powerful discriminating strength: in one case -technical assistance to other foreign firms- national firms have stronger positions while in the other - software to national companies- subsidiaries give more importance to that way of transferring technical knowledge. With less weight, albeit significantly enough, we have another variable in which foreign firms are more active - the role of users in innovation- and three other showing higher results for national firms - expenditures in non R&D innovatory activities, collaboration with firms outside the group and technological product autonomy.

Sectoral analysis confirms very definitely the statement of the existence of greater similarities within any branch. In fact, no more than three variables discriminate well in each case. A general view of the findings can be given:

* From all variables related to technological autonomy and different ways of developing the inner technology only autonomy in products discriminates between groups in Mechanical Machinery and Equipment, with a greater value for domestic companies.

* In two cases, variables related to innovation effort appear as significant. R&D expenditures have higher value in the national group of Services to Firms, while other expenditures are more important in foreign firms within the Electronics Industry.

* Those variables measuring the importance of several innovation goals perform similarly within the groups except in Chemicals and Pharmacy, in which the improvement of existing products has a more important presence within national firms.

* Users and suppliers seem to play similar roles in all the cases.

- * Variables related to collaboration are among the ones with highest discriminating power. In fact, the more active collaborative attitude of foreign firms with other companies of the group is significant in four of the six cases. Moreover, collaboration with other firms- effectively separate the groups in Pharmacy where domestic companies carry out this activity more frequently.
- * Results of innovative activity appear as significantly different in Food and Beverages. In this sector, the introduction of products made with new processes is more important in Spanish firms. In addition, the importance of new products on sales is more relevant for national companies in Services.
- * Types of innovations actually achieved never differentiate the groups.
- * Activities for transferring technology to other foreign organizations have some differences between the clusters. Thus, MNCs' subsidiaries are more active than national ones in selling capital goods in Electronics and in selling software in Services.
- * Regarding patenting, only in Pharmaceuticals do foreign firms show greater levels. With regard to methods of appropriation, keeping secrets is more valued by MNCs subsidiaries only in Food and Beverages.

4.- TECHNOLOGICAL CAPABILITIES AND INTERNATIONALIZATION OF SPANISH COMPANIES.

Certainly the discussion we have had would be incomplete if we did not devote some attention to the necessary complement: the process of international expansion of domestic firms and the role played by technological capabilities. Previously, we had different studies showing how R&D effort is a significant factor explaining the internationalization of the Spanish economy via outward FDI either from a global perspective or analysing the sectoral behaviour (Martin & Velazquez, 1996; Molero, 1996). Very frequently that fact is presented as the confirmation of the eclectic approach insofar as R&D is assimilated to a proxy of company' advantages.

Despite little research having been done at the firm level, there is useful research as far as commercial expansion is concerned; thus Alonso & Donoso (1994) indicates R&D does not discriminate effectively among firms when we try to analyse their behaviour towards exportation; as they say, even today many exporting Spanish companies do not consider technological effort as a strategic variable. Moreover, technological learning is operated in a majority of cases via other non R&D ways, so that indicator does not adequately meet the technological upgrading of the firms in a recent period. Other research done at company level had to do with technology exports and they found a close link between technological effort -even measured by R&D- and exportation of technology in different ways (Sanchez & Vicens, 1991).

In spite of this partial evidence we had no comprehensive studies. In recent research (Molero, 1997, Molero, 1998, Fonfria, 1998) two samples of firms have been used to delve into that topic. The first one refers to innovatory firms from the Madrid region to which we sent an specific questionnaire about their international activities, including commerce, investment and technology. Basic findings of that work allow us to have a preliminary knowledge of the relationships between innovation and internationalization. Unfortunately we did not have a complementary sample of non-innovatory firms, so we can not compare the activity of technologically active firms with non active firms; what we are able to analyse is the behaviour of innovatory firms in different aspects of internationalization. The outstanding facts have been presented in Molero (1998).

A further step in the same direction is the research done within the TSER programme (Molero et al , 1997b). In this current work we are using the sample we mentioned before, referring to CDTI's innovatory firms. As we have information for their international activity we can compare several aspects. Although we do not have final results we can advance some interesting findings in two aspects: the relations between innovative intensity and different forms of enterprises' internationalization and the differences among firms according to their membership of national or foreign clusters.

TABLE N ° 8: Internationalization of spanish innovatory firms*

Firms' size (n ° of employees)	Probability to export	Probability to FDI**	Probability to licensing	Probability to technical assistance	Probability to R&D laboratories	Probability to international R&D Prog.
Up to 50	65.30	15.10	7.80	30.10	1.80	23.70
51 to 250	87.00	28.80	13.00	34.20	2.70	29.90
251 to 500	93.30	48.00	22.70	54.70	10.70	42.70
More than 500	91.00	47.80	22.40	55.20	7.50	61.20
TOTAL	79.60	28.30	13.40	37.90	4.00	33.00

Notes. * = Number of firms doing each activity/ total number of firms, in percentages.

** = Including commercial and productive subsidiaries

Source: own elaboration

The relationship between internationalization and innovation is presented in table n° 8. With regard to the first point, we have estimated χ^2 tests among the distribution of internationalization variables according to the levels of intensity either of R&D or other innovation tasks. As table 9 clearly shows, two internationalization mechanisms of firms are very closely related to the explicit effort of the companies: export propensity and

participation in international R&D programmes. To a considerable extent, these findings coincide with others obtained for Portugal and Italy (Simoes, 1997; Archibugi

et al, 1997): the clearest method of entering into the international economy and exploiting their technological capabilities is through commerce; moreover, the participation in collaborative programmes is another crucial way of increasing the international commitment of the firms because it helps them in solving the difficulties SMEs have in order to be involved in internationalisation operations.

Other variables are related but only with one of the two effort measures. Thus, the level of R&D resources is well associated with two mechanisms of transferring technology to foreign countries: licences and technical assistance, so firms devoting more R&D resources are more frequently engaged in those forms of internationalizing their capabilities. Similarly, the level of economic resources assigned to innovation tasks distinct from R&D is clearly associated with the experience of investing abroad. The only variable measuring international activity not related to any effort variables is the existence of R&D laboratories abroad. As table 8 shows it is the least frequent way of accessing to international developments.

TABLE N° 9: Relations among innovation effort and ways of internationalization

INTERNATIONALIZATION VARIABLES	ASSOCIATION WITH INTENSITY IN R&D EFFORT	ASSOCIATION WITH INTENSITY IN OTHER INNOVATION EFFORTS
Export Propensity	Significant (0.023). Linear	Significant (0.000). Linear
Foreign Direct Investment	Not significant	Significant (0.001). Linear
Licences to Foreign Firms	Significant (0.001). Linear	Not significant
Technical Assistance	Significant (0.002). Linear	Not significant
R&D Laboratories	Not significant	Not significant
Participation in International R&D programmes	Significant (0.000). Linear	Significant (0.008). Linear

Note: Associations measured with X^2 Tests

Source: own elaboration

The last point under consideration is the extent to which the fact that one firm is a purely domestic company influences its international activity in comparison with the same behaviour within the group of MNCs subsidiaries. To deal with this we have estimated a logistic regression between all internationalization variables and the dichotomic one of belonging to each of the clusters. Results of table 10 allow us to assert that the presence of foreign capital within innovative firms implies a higher level of commitment in export activities, while the opposite is true for the propensity to invest and to participate in international R&D programmes; however, there is not any significative difference in the behaviour of the two groups regarding other ways of internationalization via technological activities outside. In other words, paths followed by innovatory firms in their

internationalization processes are influenced by the presence of foreign capital although only in one aspect – percentage of exports on sales- this influence seems to accelerate the outward internationalization.

TABLE N ° 10:

Logit between internationalization of national and foreign innovative firms.

Independent variables	β (significance)	Comment
Export propensity	0.669 (0.04)	higher in foreign firms
FDI abroad	-1.535 (0.03)	higher in national firms
Licenses	0.968 (0.29)	Not significant
Technical assistance	-8.865 (0.26)	Not significant
R&D laboratories	8.472 (0.74)	Not significant
International R&D programmes	-1.450 (0.02)	higher in national firms
c ² = 27.180 significance = 0.0001 % cases correctly classified = 76.12%		

Source: Own elaboration

5. CONCLUSIONS AND POLICY RECOMMENDATIONS.

In this paper we have tried to contribute to the understanding of intermediate countries' participation in the current trend of internationalization of technological activities, taking the Spanish experience as a representative case. To carry out our analysis we have considered two complementary dimensions. The very important presence of MNCs in the Spanish NIS and the less developed process of domestic innovative firms doing business abroad.

Regarding the impact of MNCs, despite the heterogeneity of the studies on which the results are based, there are important regularities which allow us to make a provisional balance.

In the first place, to a considerable extent the influence of MNCs on Spanish NIS comes from several structural features of that group: size, sector of activity and external opening. Size has shown itself to be a fundamental

factor which has to do with the state of competitiveness of the markets and with the capacity of the firms to develop technological innovations according to the requirements imposed by cumulative conditions in new international scenarios. Thus MNCs contribute so fundamentally because they are large in a country in which the lack of this kind of firm is one of the most permanent characteristics of the industrial structure (Buesa, Molero, 1998).

With regard to sectors in which MNCs undertake their activities, we have seen how those firms are more frequent in branches in which technological accumulation is more rapid, as is the technological opportunity. So, the contribution to the system is very critical, as they constitute the bulk of those sectors. Furthermore, it has been proved that when domestic companies are present in the same market, the "modus operandi" tends to be similar in both collectives, although some shades ought to be considered, such as patenting activities in pharmacy.

Nonetheless, the fact is that in some relevant cases – electronics, vehicles, some chemicals, etc- that domestic counterpart does not exist or is very reduced, therefore, the dependency of NSI on the contribution of foreign companies is very acute. Two complementary findings in this direction are, on the one hand, the important market position occupied by many MNCs subsidiaries and, on the other, the fact that they are more oriented to product improving as a way of upgrading their market share.

Something similar can be said regarding the level of external openness. In countries in which the process of industrialisation has had important degrees of protectionism until very recently, the incorporation of firms with higher levels of technology and with international experience is still today a very relevant factor of the Spanish technological learning process.

The former notwithstanding, there are other features of technological behaviour which can be remarked upon. Thus, of considerable interest is the fact that MNCs' affiliates usually give more importance to technological sources not belonging to the firm as such. Domestic firms appear as being more internally oriented in the process of learning. Apart from the influence of basic characteristics already mentioned, such as size, there are two other important facts to take into account: on the one hand, the central factor that MNCs belong to a group, and hence the importance of other group firms as sources of technology. On the other, the importance MNCs give to users in the innovative process. Although this difference is not confirmed by intrasectoral analysis, it seems that these companies have a more integrated concept of the innovation process than Spanish firms.

Nevertheless, in order to have a more balanced view of their contribution to NSI, it is important to bear in mind that technological collaboration with firms outside the groups is not very important in absolute values, which casts some doubts on the net balance of their contribution. The same direction is indicated by the fact that MNCs' subsidiaries usually collaborate less with other R&D institutions, which can be a consequence of a lesser integration in the system. Similarly, they claim to be less influenced by the administration and they give less importance to programmes of public purchases.

With regard to the intensity of effort, it is certainly difficult to give a simple answer. The superiority some sources give to MNCs in the process of resource allocation is not confirmed by others, especially when we control the effect of size and sector.

The other side of the coin also reveals interesting facts to be weighted. Generally speaking, a majority of domestic firms are not involved in international commitments and, even more important, firms with considerable technological capabilities either do not operate outside the country or they only carry out commercial activities. Insofar as there is a clear positive relationship between international expansion and pro-active technological activities, this unfinished process is a crucial issue for the near future.

Nevertheless, international expansion does not follow a single common pattern. To a considerable extent, SMEs of those countries develop dissimilar strategies compared to the ones followed by large MNCs. Moreover, they show remarkable differences among themselves. The model of gradual engagement in transnational activities is by no means general; the pure learning or evolutionary pattern has been only partially confirmed by empirical research. Thus, together with the incremental path followed by a cluster of firms, which begin the investment adventure after having considerable experience in exporting to international markets, there are other strategies; some firms directly concentrate their international commitment almost exclusively on exports and others initiate the trajectory with a combination of FDI and trade or other formulas including technological links.

Finally, we wish to underline the fact that a majority of enterprises enter into international activities through commerce and inter-firm co-operation, including both classic linkages -such as contracts of technology transfer- and more recent ones, like the participation in international R&D programmes. Therefore, part of the policy options must be oriented to using these mechanisms more intensively.

Now, with regard to policy recommendations, we must start with a declaration of modesty: we are facing a quite complex problem, namely to improve the possibilities of the EU obtaining benefits from the new international panorama. Furthermore, intermediate countries are more heterogeneous than the frequently studied "triad" ones. Thus, it is even more difficult to define recommendations.

First, we have to mention general policies which are on the basis of other more concrete actions, insofar as they are still less developed in Spain and generally in other intermediate countries. Thus, it is important to increase the level of resources - financial and human- devoted to innovative activities, with especial attention paid to R&D, insofar as it provides basic knowledge and skills for the system as a whole. Additionally we must remember the importance of improving the interactions within the NSI by firmly pushing relationships among different parts of the structure, such as between universities and research centres and the productive system.

Having said that, our work has been oriented to highlighting the existence of differences, so there is a need for renewing policies with the aim of bringing them closer to reality. We do not forget this approach makes the process of elaborating policies more complex and gives them a higher level of risk.

In a world of very fast changes in technology division of labour, with more active roles of subsidiaries, it is important to upgrade those factors of host countries which allow them to be better placed to receive more (and higher quality) FDI in the new context of MNCs' division of technological labour. These firms need more and

more heterogeneous inputs, while carrying out strategies of some production specialization. These facts open up new opportunities for local companies with good technological capabilities, which must receive greater attention from public bodies to improve their capacity of absorption. Here is a clear niche for policies. Moreover, the internationalization of technology is quite advanced in sectors technologically less intensive; the relatively better position of Spain and other intermediate countries in these sectors and some of the associated technologies, reinforces the possibilities for an active policy in this field.

Further, the way in which MNCs' subsidiaries organise their technological activity in Spain responds to different patterns, with diverse effects on national resources and firms; therefore, there is a place for policy options with differentiated effects on MNCs' decisions.

A final consideration within this point is the necessity of rethinking national policies which explicitly or tacitly exclude MNCs when they implement many policy instruments. Within the framework of intending to obtain better results from their presence and stronger associations with the national system, MNCs might play a new and more active role in future decisions.

Regarding the increasing outward internationalization of domestic companies, our basic suggestion is to reinforce that process by helping the firms either to start this way or to enter into more complex phases of it. As we have shown, there is valuable potential in those firms which can be a substantial push for EU movement towards better international positions. The incorporation of that "reserve" can be a remarkable help for the EU to meet new competitiveness challenges.

This general suggestion can be divided into several actions. Thus, in the first place, we have to pay attention to the needs of those firms without any international experience but with technological capabilities. Additionally, we could develop instruments for those firms which, although they have international experience through commerce, have possibilities for carrying out other more complex activities -such as investments, collaborative agreements or technology exports-, which would improve their possibilities of upgrading and exploiting their capabilities.

For many Spanish firms, globalization and European integration are not separable issues. Throughout the more than ten years Spain has been in the EU after its accession, the process of opening up to international competition and the abandoning of its former protectionism has been very directly a consequence of the process of integration. However, to the extent that there appear limits to the fruits of the integration (the monetary union notwithstanding) the debate between the two processes is taking on other dimensions. Thus if the EU has been the inevitable first reference for Spanish firms international expansion, which usually has been very positive, given the present competitive conditions, the reduction to the European context could be a future obstacle for the evolution of domestic companies. Thus, the idea must be supported of opening the space in which those firms collaborate, for example through the consideration of programmes which especially referred to this collaboration. Among others, East Asia and Latin America are two clear areas to be considered.

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ANNEXE : Variables included in multivariate analysis

VARIABLE	DESCRIPTION
DESIGN	Industrial design activities carried out in the firm
INGPRO	Production engineering carried out in the firm
RDREL	Relevance of R&D activities
DESIGNREL	Relevance of design activities
INGPROREL	Relevance of production engineering activities
EXPEREL	Relevance of industrial experience
RDEXPEND	R&D expenditures over sales (%)
OTHEXPEND	Other innovation expenditures over sales (%)
NEWPROD	New product as objective of innovatory activities
PRODIMPROV	Product improvement as objective of innovatory activities
USERS	Relevance of users for innovation
SUPPLIERS	Relevance of suppliers for innovation
UNIVCOLL	Relevance of collaboration with universities or public laboratories
GROUPOCOLL	Relevance of collaboration with firms of the group
OTHERCOLL	Relevance of collaboration with other firms not belonging to the group
NPRODINT	% of new products in total sales
NPROCINT	% of products made with new processes in sales
NPRODEXP	% of new products in exports
NPROCEXP	% of products made with new processes in sales
WORLDPROD	World level new product in the last 5 years (yes or no)
WORLDPROC	World level new process in the last 5 years (yes or no)

FIRMPROD	Firm level new product in the last 5 years (yes or no)
MODPROD	Essentially modified product
MODPROC	Essentially modified processes
PATLICEN1	Patent licences to national firms
OTHLICENC1	Other licences to national firms
ASSISTANCE1	Technical assistance to national firms
PLANTBUILD1	Plant construction for national firms
CAPGOOD1	Capital goods supply to national firms
SOFTWARE1	Software supply to national firms
PATLICEN2	Patents licences to foreign firms
OTHLICENC2	Other licences to foreign firms
ASSISTANCE2	Technical assistance to foreign firms
PLANTBUILD2	Plant construction for foreign firms
CAPGOOD2	Capital goods supply to foreign firms
SOFTWARE2	Software supply to foreign firms
NOPAT	Number of patents in the last 5 years. Normalised by sector mean.
PATREL	Relevance of patents for results appropriation
SECRETREL	Relevance of secrets for results appropriation
REGULAREL	Relevance of regularity for results appropriation
PRODAUT	Product technological autonomy
PROCAUT	Process technological autonomy

NOTAS

1. This chapter summarises the main findings of our participation in the TSER Project: "Technology, Economic Integration and Social Cohesion" (TSER CT95-1005). The author received a complementary aid from the Spanish R&D National Plan (CICYT: SEC96-1743-CE/95). Moreover, the author must express his gratitude to the research group of the University Complutense, especially the co-ordination tasks carried out by Monserrat Casado and the work done by Mikel Buesa, Antonio Fonfría and Inés Granda. Also I wish to give my thanks to the rest of the European group, all included in this book, for their comments, critics and suggestions to previous versions.

² According to Spanish sources, if we consider the sector of origin, industrial and building firms account for 33.46 per cent of total FDI in the period 1993-1997; however, if we group FDI by destination sectors, those branches receive just 14.22 per cent of the total.

³ It was possible in this case because we obtained regular information from a substantial number of parent companies, which not only complemented information coming from our questionnaires and interviews, but also helps us in qualifying the answers of the subsidiaries (Molero & Buesa, 1993).

⁴ In fact, the topics analysed were: Sectoral distribution and size. Export orientation. Ways and means of acquiring technological inputs from other sources. Ways of creating own technological resources. Product and process innovation incorporation. Technological level in relation to national or foreign competitors. Technology transfer to other firms. Forms of protecting technological knowledge. R&D activity, including intensity, types and organization.

⁵ The questionnaire was sent to the 754 largest Spanish firms. The error margin is estimated to be $\pm 4.4\%$ at 95.5 % of confidence level.

⁶ The Spanish Innovatory Survey, corresponding to the European Survey on Innovation, indicates there are 1783 firms which have regular R&D activities. The CDTI database included nearly 2000 firms, although for different reasons, the questionnaire was sent only to 1354. This collective concentrates more than sixty per cent of total R&D personnel working in all innovative enterprises. More information can be obtained in Molero et al (1997b). The rate of response is rather high, so we have great confidence in the representative nature of the results, without forgetting the problems of statistical representation of CDTI database over the unknown collective of innovatory firms

⁷ See Molero et al, 1997b, for details.

⁸ In fact, although we had the possibility of breaking down the sample in a very detailed sectoral classification, we have reduced this analysis to sectors in which the number of firms is higher than twenty five, in order to avoid statistical instability. Unfortunately we had to leave out sectors like Electrical machinery, Vehicles and Rubber and plastics.

⁹ From twenty five cases in which the comparative analysis brings significant differences, in seventeen these differences coincide with the findings if Molero, Buesa and Casado (1995).

RESUMEN

El presente trabajo tiene como objetivo principal el de contribuir a un mejor conocimiento de la posición de los países de tamaño intermedio en el actual proceso de internacionalización de las actividades innovadoras, liderado por las empresas multinacionales. Para ello, tras una discusión de los instrumentos teóricos que pueden emplearse para este tipo de estudio, se lleva a cabo un análisis en profundidad de la economía española como caso representativo de aquel grupo de países. De forma particular la atención del estudio se centra en conocer mejor las repercusiones que tienen las actividades tecnológicas e innovadoras de las filiales de las empresas multinacionales establecidas en España. Para ello, se efectúa un análisis comparado de la actividad de aquellas empresas con respecto a la de las empresas innovadoras de capital nacional. Finalmente,

se establecen algunas conclusiones que pueden ser tenidas en cuenta por parte de para la política tecnológica.

ABSTRACT

The aim of this chapter is to contribute to a better understanding of the way in which other countries different from what has been called the "triad" and other firms different from large MNCs participate in the internationalization of technological innovation. To achieve that goal we are going to analyse the Spanish case. Spain is undoubtedly a significant case in that group because it is still today a country with a low level of technological effort among European nations. Moreover, for a long period of time, Spain has been a net receiver of important amounts of foreign direct investment (FDI), with less developed outward flows. This analysis will be carried out by studying the technological behaviour of MNCs' s subsidiaries located in Spain and its repercussions for the National System of Innovation (NSI). Through a systematic comparison with domestic companies, we shall show in which aspects MNCs act like comparable national firms, and in which others they behave differently. The weight of the sector of activity and size of the firms will be taken into account as two critical features of the group of MNCs. In the conclusions we shall comment on the repercussions the former has for designing and implementing technological policies.

PALABRAS CLAVE: Innovación Tecnológica, Empresas Multinacionales, Sistemas Nacionales de Innovación