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# The Localization Choice of Multinational Firms' R&D Centers: A Survey in the Piedmont Area

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*Research on the linkages between R&D, environment, strategy, and localization choices is quite new and often lacks empirical investigation. The aim of this article is to study the localization choices of MNE R&D activities in Piedmont. Specifically, it investigates the extent of locating in a specific place on the strength of several drivers and the level of satisfaction of the choice after 3 years from the settlement. The findings aim to verify the main drivers that led 51 MNE to choose Piedmont as the ideal area for their R&D activities and also to show how the high level of presence after 3 years from the settlement confirms the result.*

**KEYWORDS** *multinational, localization choice, R&D Centers*

## INTRODUCTION

Multinational Enterprises (MNE) are increasingly adopting a global strategy for their activities of research and development (R&D); consequently, academics have shown growing interest in this phenomenon since the 1990s. The most debated areas of interest include the classification of the activities carried out abroad (Kuemmerle, 1999; Y. Sun, 2003), the choice of the location of R&D centers (Dougherty, Inklaar, McGuckin, & Van Ark, 2003; Belderbos, Lykogianni, & Veugelers, 2008), the organization of R&D networks all around the world (Alfaro & Chen, 2009) and the MNE strategies to run a global R&D process (Arora, Fosfuri, & Gambardella, 2001; Chesbrough, 2003; Ernst, 2005). Furthermore, the majority of studies are focused on a national-single country dimension or on a supranational level, with particular attention to the United States (Florida, 1997) and to the EU (Basile, Castellani, & Zanfei, 2008). Hence, there is a lack of

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contribution related to the location of foreign R&D at a regional/local level. This topic has always been underrated by academics (only a few interesting studies have been developed by Appold, 2005; Cantwell & Piscitello 2005). However, with regard to Italy, recent studies have concerned Piedmont firms working abroad (Ferrero, Lanzetti, Marchi, Resegotti, and & Vitelli, 2007), or internationalization of firms through Foreign Direct Investment (FDI) inflows and outflows (Mariotti & Mutinelli, 2010).

Most of the existing studies of localization choices are supported by quantitative analysis performed using econometric models (Belderbos, 2001; Cantwell & Piscitello, 2005; Siedschlag, Smitha, Turcub, & Zhanga, 2009), whereas only a small part of research is performed using qualitative analysis and case studies (Florida, 1997; Y. Sun, Du, & Huang, 2006). Much of the literature in international business analyzing multinational enterprises uses the country as the relevant environmental parameter. Following Rugman and Oh (2012), this article presents empirical evidence to demonstrate that country-level analysis now needs to be augmented by analysis at the “re-gional” level, finding that the home region effect outperforms the country effect. As a result, the article has a dual purpose. First, it investigates the reasons for multinational enterprises to locate R&D subsidiaries in Piedmont (one of the 20 regions of Italy, with an area of 25,402 square kilometers and a population of about 4.4 million), identifying the drivers for this choice. In particular, it will be investigated if and how the choice is influenced by the quality of human resources in the location (Bresciani, Vrontis, & Thrassou, 2012), by the facilities of the local area (i.e., funds to support foreign firms location), by the possibility to link to the local environment through partnerships, and by the level of infrastructures (i.e., highways, rails, airports). Piedmont is an interesting case due to its geographical position and its vocation to R&D: there are more than 200 R&D public and private centers, 380 laboratories, 4 universities, 6 scientific and technological parks, 12 innovation clusters, and 6 incubators; yet, Piedmont represents only 8% of the Italian GDP.

Second, it investigates company satisfaction after settlement. In particular, a structured questionnaire allows an understanding of the level of satisfaction of those firms that chose to locate their R&D centers in Piedmont, analyzing the strengths and the weaknesses factor by factor. In other words, it will focus on the differences between their choice (which factors influenced it) and what they really found (did those factors prove to be what they thought before the choice or not).

Our results suggest that, on average, the choice to locate in Piedmont increases with agglomeration economies, R&D intensity and proximity to centers of research excellence. It appears that Piedmont regional policy, as well as regional characteristics such as infrastructure levels and human capital, contributed significantly to the attractiveness of the region to R&D foreign investment. Moreover, most of the foreign companies located in Piedmont

are happy with their choice, but ask for more support by institutions and regional policy.

The article is organized as follows: the second section describes the literature review, referring mainly to the drivers of the location of MNE R&D centers; the third section describes the empirical methodology; the fourth section presents the results of our research; and, finally, the fifth section offers our conclusions.

## LITERATURE REVIEW

Hypercompetition made the R&D function more and more important as a driver of success; hence, in recent years it has been noted that MNE are spreading these activities beyond national borders. As a first consequence, the literature about the globalization of R&D increased, analyzing some-times the evolution of the R&D internationalization process and, at other times, the localization choice of R&D centers, the organization of R&D activities, and the presence of networks. Niosi (1999), for example, was one of the first academics who analyzed the process of internationalization of R&D by MNE, underlining three main phases. First, until 1980, R&D was characterized by the principle of “Product Lifecycle Management,” the main part of the process was made in house and then results were sent abroad in order to be suitably adapted to the target market. Second, from 1985 to 1990, a centralized structure appeared and, finally, in the 90’s new models such as networking and knowledge sharing were born. However, the focus of this article is on the MNE R&D localization choices. Academics propose two main models to explain these choices: (a) the rational choice model and (b) the behavioral imitation model. According to the first model, the analysis of the external environment and the internal organization determines a deliberate decisional process leading to the selection of R&D activities location. The second model is based upon the theory that the R&D localization process is cumulative and path-dependent.

### Rational Model Studies

During recent years, many studies supporting the rational model were pro-posed. Siedschlag et al. (2009), for instance, considered 446 location de-cisions of foreign affiliates in the R&D sector incorporated in the European Union over 1999–2006. Through the analysis they suggested that, on average, the location probability increases with the market demand, low production cost, R&D intensity, flexibility of labor markets, access to skilled labor, and information technology infrastructure. In the same direction, Colovic and Mayrhofer (2011) found that in the automotive industry R&D centers are

located close to the production activities in order to permit flexibility and low production cost. Serapio and Dalton (1999) analyzed 701 R&D foreign centers in the United States, finding that 75.2% of those structures were located in the 11 principal States of the country. Those data support the theory that there is a strong trend toward concentration of these activities in certain areas characterized by particular features; this thesis has been endorsed by other academics such as Cappellin (2010).

Dunning (1998) identified some variables influencing the location of value added activities by MNE in the 1970s and 1990s depending on four different types of FDI (resource seeking, market seeking, efficiency seeking, and strategic asset seeking). Tellis, Eisingerich, Chandy, and Prabhu (2008) showed that the degree of attractiveness of a geographical area is closely linked to the number of Ph.D.s in Science and Engineering available in that country. Ke and Lai (2011) examine the determinants of regional multinational enterprise R&D in 30 provinces of China. The authors apply a two-equation recursive model to find out that the main determinants of MNE R&D location are regional infrastructure, the availability of scientists and engineers, the average salary of R&D personnel, and spill-overs of MNE R&D into the neighboring regions.

The important role of infrastructure has also recently been highlighted by other scholars such as Koschatzky, Zenker, and Baier (2012) in terms of better embeddedness with the territory, J. Sun and Chen (2012) with regard to the international strategy of Chinese MNE and Meyer, Mudambi, and Narula (2011) with regard to the increasing importance of the multinational-local relationship. Therefore, according to the latter authors, firms choose their location not to gain from a transfer of knowledge (a direct or indirect transfer), but simply to give themselves access to assets they can only find in a specific location (such as qualified human resources, specific know-how and facilities, infrastructures).

Belderbos et al. (2008) analyzed strategic interaction in R&D internationalization decisions by two multinational firms competing both abroad and in their home markets. Examining different incentives of foreign R&D faced by technology leaders and technology laggards, they discovered that greater efficiency of intra-firm transfers and greater spillovers increases the attractiveness of home R&D to the technology leader. Cantwell and Piscitello (2005) stated that the location of foreign-owned research tends to agglomerate because of the intra-industry spill-overs or specialization externalities associated with the presence of a wide-ranging collection of firms active in the same sector, the inter-industry spill-overs or diversity externalities associated with the co-presence of firms working in different fields and because the science-technology spill-overs and externalities stem from the presence of an excellent scientific and educational infrastructure.

Alcacer and Zhao (2012) showed that strong internal linkages help firms increase internalization and create higher levels of technological interdependence across firm locations and a good relationship with the local

institutions. On this point, Von Zedtwitz and Gassmann (2002) conclude that companies decentralize research to take advantage of proximity to universities and centers of innovation, access to science communities, or to make up for a limited domestic science base. Kuemmerle (1999) uses a logistic regression and finds that a firm's propensity to establish activities increases with its relative commitment to a country, the educational attainment of the labor pool, and the country's scientific achievement. He also finds that labs are near universities, existing markets, and factories. This is consistent with the drivers of development identified by Gassmann and von Zedtwitz, local markets and proximity to customers and production. So, according to the latter authors, firms choose their location in order to gain from a direct or indirect transfer of knowledge. Moreover, another important localization driver is the capacity to maintain the R&D results. The studies on this specific topic generally state that the probability rises where the use of intellectual property protection is high (Branstetter, Fisman, & Foley, 2006).

Finally, MNE often chose to locate R&D centers close to their other functions such as production, marketing and sales, in order to easily control communication, resources sharing, coordination (Malecki, 1980a, 1980b; Zaheer & Nachum, 2011); Quer, Claver Cortes, and Rienda García (2012) found that Chinese MNE chose their foreign location analyzing host market size, market-supporting institutions, political risk, and cultural distance.

### Behavioral Model Studies

According to the behavioral imitation model the MNE location process is cumulative and path-dependent. This approach asserts that there are contrasting results in traditional research. Often the conventional rational choice, relying mostly upon factors such as market size, labor costs, and infrastructure cannot convincingly explain the degree of concentration. On the contrary, site location decisions are also the product of imitative behaviors among decision makers faced with uncertainties and multiple risks (Y. Sun et al., 2006; Y. Sun & Wen, 2007; Piscitello, 2011). Uncertain information leads people to follow signals from others, sometimes even without questioning the rationales. When companies look for R&D locations, they look at other companies to see where similar R&D facilities have been set up. In other words, within the same industry, prior location decisions of firms affect subsequent strategic decisions of other firms. This leads to a concentration of R&D centers of the same industry in the same state/country.

### Other Studies

There are several studies focusing on the internationalization of R&D activities not only from the point of view of drivers, but also from the organization point of view. The aim of these studies is to investigate how a MNE organizes its R&D activity in order to manage the trade-off between the necessity

of being global and the need of being close to the local market with its subsidiaries.

Bartlett and Ghoshal (1990) identified four models of R&D organization in MNE: central-for-global (centralized development of technology at home for the global markets), local-for-local (decentralized development of technology for the local markets), locally-linked (development of specified technology at each location for the global markets), and globally-linked (development of technology through R&D cooperation in different countries for the global markets). Considering the importance of the local environment and the competences of the group, Bartlett and Ghoshal (1986) stated four general roles for the subsidiaries: *strategic leader* (strong location and skills advantages), *implementer* (low location and skills advantages), *contributor* (low location advantages but strong skills benefits), and *black hole* (strong location advantages but poor skills). Rugman, Verbeke, and Yuan (2011) reframed these four generic roles from a *resource bundling* point of view, asserting that they change considerably according to the specific task they play in the value chain.

Other authors (Alfaro & Chen, 2009) put more attention on the establishment of internal and external networks by MNE. The studies of Narula and Zanfei (2005), Moncada-Paterno-Castello, Vivarelli, and Voigt (2011), and Sala, Landoni, and Verganti (2011) analyzing the processes of globalization are interesting due to their analytical perspective. The studies conducted by Gerybadze and Reger (1999), instead, emphasize the presence of multiple centers of knowledge in different places, showing the increasingly important role of subsidiaries and the various types of links between the involved players. Other authors, such as Arora et al. (2001), Chesbrough (2003), Ernst (2005), Tardivo (2008), and Song, Asakawa, and Chu (2011) emphasize the importance of an open system of innovation and the knowledge sharing network importance. Finally, some authors underline the importance of the presence of R&D facilities in foreign locations (i.e., technological level of the area, institutional support, fund raising, tax incentives, etc.).

The pioneering studies of Ronstadt (1977) of technological activities inside American MNE identified four structures: Technological Transfer Unit (TTU), Indigenous Technology Unit (ITU), Global Technology Unit (GTU), and Corporate Technology Unit (CTU). Moreover, tax policies and facilities are commonly used to alter firms' incentives to conduct R&D in particular countries (Hines, 1995) and in the EU (Basile et al., 2008; Guimon, 2011). Many authors (Koenig & MacGarvie, 2008; Jensen, Thursby, & Thursby, 2011; Cincera, Cozza, & Tuebke, 2012) studied the use of tax incentives to attract multinational investment, as well as investment requirements for market access, showing an important interest by MNEs in this factor.

However, most researchers divide the reasons to undertake R&D in foreign countries into two categories: knowledge exploitation and knowledge increase (Kuemmerle 1997, 1999; Ambos, 2005; Belitz, 2006). Y. Sun (2003)

indicates an alternative approach based on two different categories: strategic or tactical according to their relevance. Strategic R&D gives more importance and relevance to the MNE global markets and it has a long-term aim. Tactical R&D, on the contrary, has a short-term relevance and focuses on local markets.

## METHODOLOGY

We used a large firm-level data set which enabled us to consider a wide range of location choices of multinational firms in the R&D sector. We used the database “R&P-Politecnico di Milano” combined with data from “Centro Estero per l’Internazionalizzazione del Piemonte” (CEIP) and other databases (Cerved-Lince, AIDA-Bureau Van Dijk, Hoover’s-D&B), which allowed us to find 412 Piedmont-based foreign companies over the 2001–2011 period.

We assume that a firm’s location decision is part of a three-step decision-making process which starts with the firm’s decision to serve a foreign market and follows with the choice to undertake foreign direct investment and the location choice. In this article, we focus on the last step of this process (Devereux & Griffith, 1998; Head & Mayer, 2004; Basile et al., 2008).

On these bases, this article investigates the determinants of the location choice of multinational R&D firms across the Piedmont region analyzing the drivers which make Piedmont a suitable place to locate R&D activities and at the same time the level of satisfaction of the investigated MNE concerning their choice. It also investigates the relations between MNE and the local environment (potential spillovers) underlining possible critical situation and areas for improvement.

The large number of location choices enables us to obtain robust estimates of determinants of the attractiveness of the region to R&D foreign investment (companies linked to the hotel industry, to personal services and all those companies without a local executive manager are excluded from the list). So, we specifically analyze the location choice of a sample of 181 companies. Finally, a structured questionnaire was sent during the second half of 2011 to the 181 companies of the sample. Fifty-one companies responded with acceptably completed questionnaires (a successful response rate of 28%).

To define the determinants of the location we asked questions such as where the multinational R&D enterprises are located, who the main foreign investors in the R&D activity are, what factors drive the location choice of multinational R&D activity, and what is their return in terms of satisfaction.

To define the return in term of satisfaction we asked for the differences between their choice (which factors influenced it) and what they really found (were those factors borne out).



**TABLE 1** MNE Home Countries (%)

Home country	%
USA	25.88
Germany	18.42
France	14.29
UK	9.43
Spain	5.39
Japan	5.12
Sweden	4.58
Switzerland	4.00
Netherlands	3.50
Other EU countries	4.00
Other non-EU countries	5.39
Total	100.00

*Source:* personal research.

Tables 1, 2, and 3 show some basic descriptive statistics of the responding companies (sample). Most of them come from the United States (25.88%), Germany (18.42%), and France (14.29) (Table 1).

The most interested sectors are those embedded in the territory, that is, the manufacturing sector (due to the presence of the automotive industry) and those linked to the trading business. However, Piedmont is characterized by the presence of several sectors (Table 2).

The subsidiaries interviewed run several activities/functions: 56.90% of them are present with an entire BU, 66.7% of them with a production unit, whereas 64.7% have a commercial office; and 45.1% based an independent unit fully focused on R&D in Piedmont (Table 3).

## RESEARCH RESULTS

This section presents the results of the analysis of the data and questionnaires. Most literature has examined the location decision of multinational firms assuming that R&D is located where production takes place and it has

**TABLE 2** MNE Sectors

Sector	%	Revenue	%	Employees	%
Manufacturing	35	146,541	50.86	1,247	64.15
Trading and GDO	27	31,906	11.07	157	8.08
Services and R&D	22	54,265	18.83	332	17.08
Chemicals and plastic	9	24,841	8.62	108	5.56
Logistics and transport	5	9,825	3.41	28	1.44
Other	2	20,759	7.20	72	3.70
Total	100	288,137	100.00	1,944	100.00

*Source:* personal research.

**TABLE 3** Functions of the Local Branches

Function	MNE	%
Business Unit (BU)	29	56.90
Production units	34	66.70
R&D center	23	45.10
Representative office	12	23.50
Technical center (Technical assistance)	21	41.20
Commercial office	33	64.70
Warehouse	21	41.20
Other	3	5.90

not specifically addressed the case of the location choice of R&D foreign af-filiates. Thus, the literature finds that the location of foreign R&D depends on a variety of factors: besides the specific type of R&D establishment consid-ered, home versus host country advantages (Le Bas & Sierra, 2002), spatial proximity, cultural distances, institutional similarities, relational links, and virtual links all shape the location decisions of MNE with respect to foreign R&D (Squicciarini & Loikkanen, 2008).

Moreover, this literature analyses the multinational enterprise using the country as the relevant environmental parameter. As we have just explained, following Rugman and Oh (2012), this article presents empirical evidence to demonstrate that country-level analysis now needs to be augmented by analysis at the “regional” level, finding that the home region effect outper-forms the country effect. Therefore, as we stated previously, the article has a dual purpose: first, to investigate the reasons for multinational enterprises to locate R&D subsidiaries in a particular region (Piedmont); and second, to investigate the satisfaction of firms after the settlement. In particular, we tried to answer questions relevant for both research and policy as to why the multinational R&D centers are located in Piedmont, what kind of enterprises they are, which factors drive the location choice, and what is their return in terms of satisfaction.

Our results mostly confirm prevalent literature. They permit the drivers of the choice of Piedmont as location of R&D activities by MNE to be iden-tified. In particular, we found four main reasons: (a) the quality of human resources in the location, (b) the facilities of the local area, (c) the pos-sibility to integrate well with the local environment, and (d) the level of infrastructures. Moreover, for each of these drivers, the MNE expressed a qualitative opinion about the difference between what they expected before the settlement and what they really found after it.

### Quality and Flexibility of the Human Resources

More specifically, companies considered human resource preparation below expectations in 14% of the cases, whereas 78% of the MNE consider them

according to expectations (or partially even better than expected). More specifically, companies gave a positive opinion on the professional training, university and postgraduate education (over 66% consider themselves more than satisfied). This is particularly important due to the fact that most research found the quality and flexibility of the human resources to be a key factor in the localization choice (Serapio & Dalton, 1999; Siedschlag et al., 2009; Cappellin, 2010). The American GM Diesel Hybrid Center, for example, chose Piedmont for its strong knowledge and know-how in the automotive industry and the possible interaction with scientific and technological partners such as the polytechnic and other industries, but also with local institutions, which supported their decision. Another firm, AR Metallizing (created in 2009 by the merger of two leaders in vacuum metallization: the Belgian Alupa and the Italian Rotoflex), decided to settle in Piedmont because of the knowledge and know-how heritage of the employees and the strong support received at all levels from the territory.

## Facilities

As we showed in the literature review, tax policies and facilities are commonly used to alter firm incentives to conduct R&D in particular countries (Hines, 1995) and in the EU (Basile et al., 2008; Guimon, 2011). The use of tax incentives to attract multinational investment, as well as investment requirements for market access, is well documented (Koenig & MacGarvie, 2008; Jensen et al., 2011; Cincera et al., 2012). Following this literature, our analysis highlights two main results.

Two of the involved companies (the Belgian AR Metallizing, the Latvian Aenergo), for example, joined the last settlement agreement that the region launched back in 2011. On the one hand, the “Piano Pluriennale Competitivita” (multi-year competitiveness plan) has met with widespread satisfaction. It is a project financed by the Piedmont Region allocating 500 million euro with the aim of starting a new era of reforms in supporting innovation, business and development. On the other hand, there are some misgivings as far as utilities and bureaucracy are concerned. Half of the interviewed companies expressed a negative opinion on the quality (considered low) and the availability (considered restricted and inadequate) of the utilities; a slighter percentage underlines dissatisfaction for the price/quality ratio of the services. Finally, the analysis shows that 40% of the interviewed MNE are not satisfied at all with the bureaucracy; more than one half highlight problems in getting urban concessions and authorization. According to the MNE interviewed, these procedures need to be simplified, they need strictly defined timing, and it is essential to build more contacts between MNE and local authorities.

## Integration with the Local Environment

As we stated in the literature review, nowadays local contexts have a central role in international business research. In fact, the interaction across multiple territorial contexts is the key distinction between international and domestic business. Contextual variation may be particularly relevant for MNE bridging large physical, cultural, and economic distances. In the literature on the internationalization of R&D, firms are also motivated by the possibility of connecting with local systems and accessing high quality labor markets (OECD, 2008; Song et al., 2011). Our results in this field are particularly interesting, because the most positive result emerges with reference to this driver.

The incidence and the quality of the relations between local entities drive the process of “embeddedness.” Therefore, these results confirm our literature review. As we stated, to the extent that location is motivated by access to advanced technology or university knowledge, the investment can be called home-base augmenting (HBA) (Kuemmerle, 1997, 1999). Thursby and Thursby (2006a, 2006b) found university faculty expertise and the ability to collaborate with universities to be an important factor for multinational location in both developed and emerging country sites. Data attest that 74% of the MNE develop R&D activities in cooperation with some partners (75% of these activities are developed with Universities and the Politecnico of Torino, 21% with innovation clusters, and 63% with other companies outside the group). The most relevant data are provided by utility/service companies, 61% of which develop joint R&D activities exclusively with Piedmont actors (Table 4).

The embeddedness in the territory is also confirmed by current involvement: 63% of the foreign MNE are joining innovation clusters through contributions to projects and activities together with other companies from Piedmont and 14% of other MNE have decided to fully join a cluster by themselves. Moreover, regarding the type of research activity (Table 5), the results show that more than 60% of the MNE develop both industrial and experimental research. This percentage grows when analyzing only the data of the service companies. For example, Aenergo Sia, a Latvian engineering and strategic consulting company that works in the field of renewable energy,

**TABLE 4** Collaboration in R&D

Sector	No cooperation (%)	Piedmont (%)	Non-Piedmont (%)	Both (%)
Manufacturing	41.00	9.00	0.00	50.00
Services	14.00	61.00	8.00	17.00
Total	26.00	40.00	4.00	30.00

*Source:* personal research.

**TABLE 5** Type of R&D Performed by Local Unit

Sector	Industrial research (%)	Experimental research (%)	Both (%)
Manufacturing	9.00	39.00	52.00
Services	7.00	22.00	69.00
Total	8.25	31.50	60.25

*Source:* Personal research.

chose Piedmont to start energy production and achieve the energy optimization of a textile finishing company, and Finitex, which consumes 2 million cubic meters of natural gas a year to produce hot water, and is therefore the ideal user to start a recovery process of thermal energy that is generally lost when electricity is produced.

Another firm, Ardea Seal, decided to locate the start-up of a business activity purchased by the Guala group within the Science and Technology Park of Rivalta Scrivia (Tortona). The company says that the decision to settle in the Park of Rivalta Scrivia was determined by the opportunities that this “environment” offers for collaboration with the Proplast consortium and with other companies in Piedmont. Concerning the degree of dependence from the parent company on the R&D issue, the survey reveals that only 28% of the local subsidiaries in Piedmont do R&D activities exclusively for its parent company (i.e. a good level of autonomy is guaranteed), whereas 25% do them for other companies and the other 47% for itself. In conclusion, we can state that MNE create value by internalizing market transactions over geographical borders. This organizational focus of international business research has a significant location aspect, most of all with reference to the high level of engagement with the local context involved.

## Infrastructures

Infrastructures are a key point in the decision to locate in a specific area. Our results confirm the literature (Basile et al., 2008, Ke & Lai, 2011; Meyer et al., 2011; Koschatzky et al., 2012; J. Sun & Chen, 2012), and the important role of infrastructure in terms of better embeddedness within the territory, with regard to the international strategy of MNE and to the increasing importance of the multinational-local relationship (Bresciani & Ferraris, 2012). The interviewed MNE seem pretty satisfied with the infrastructures of Piedmont. In particular, they give a sufficient feedback about logistics in general, as well as the highway system. On the contrary, they give negative feedback about the rail system and public transport. For example, The Opde Group, one of the largest European groups for the development and construction of photovoltaic plants, chose Piedmont for the construction of power stations, the production of solar trackers with a logistic hub and the implementation

of a research and monitoring center. The main reason for this choice was the good base of infrastructures, including a larger electricity network. The main local commercial airport (Torino Caselle) has been judged positively over accessibility but negatively over the lack of international links.

## CONCLUSIONS

In this article we have estimated the determinants of the location choice of MNEs R&D subsidiaries across the Piedmont region over the period 2001–2011. Then, we have investigated the satisfaction of firms after the settlement. As a result, this article contributes to the debate on the topic not also because it analyses the factors driving the choice to locate a R&D subsidiary in a certain area, but also because it examines the return of that choice in terms of satisfaction. Our results suggest that, on average, the major determinants of the location of a representative R&D foreign affiliate in the region are agglomeration economies and proximity to research centers of excellence. Moreover, it appears that, over the analyzed period, regional characteristics such as human capital and infrastructures had an effect on the attractiveness of regions to R&D foreign investment.

Our evidence also suggests that regional policy had a significant effect in fostering attractiveness to R&D foreign investment. Evidence suggests that the various types of R&D establishments follow distinct location patterns and are attracted by the presence of excellent universities; conversely, knowledge-exploitation R&D activities (i.e., development centers) are dispersed over a much wider area. As a result, R&D establishments are located close to universities and to government research laboratories, whereas knowledge-exploitation establishments are primarily located close to markets or manufacturing facilities. Development work is usually located near customers, manufacturing facilities, and suppliers in order to take advantage of local market knowledge and to meet standards or satisfy regulatory requirements. Both the presence of scientific institutions and government support seem to have a positive effect on the presence of R&D MNE subsidiaries.

Moreover, the nature of research means that it often relies on the close interaction of practitioners and specialized experts. For this reason, it tends to cluster around universities and other centers of academic excellence. In addition, research facilities are frequently close to central headquarters. Part of this arrangement appears to be historical (or path-dependent), but our results show a clear desire by managers to locate research projects and teams in close proximity to each other since this offers opportunities for collaboration and cooperation. In fact, some managers described internationalization as a restraint on collaboration.

Our interviews suggest that these organizational changes enable firms to reduce the costs of R&D by providing closer coordination, better

management as well as increased possibilities to exploit its results. Such improvements will tend to reduce business and market risk and could lead to higher levels of investment in research (Mihai, 2012). The research clearly shows that MNE incorporate structures aiming to be more flat and flexible. The increase of mobility, not just in terms of capital but also of human resources, widened the geographical spaces setting the companies on a comprehensive plan. It also facilitated the information revolution that over-turned all the physical constraints of the various processes in different divisions/countries. For this reason, the MNE analyzed are trying to avoid the risk of inactivity, or simply the lack of response to external environment changes. In fact, in order to survive in the aforementioned economic environment, organizations must be able to use various tool types to become more profitable and competitive.

In recent decades many factors have stimulated the internationalization of business R&D and the beginning of the globalization of innovation. Many researchers investigated the main drivers behind the decision of a MNE to choose a specific location for its R&D centers. Thanks to the sample analyzed, this article, in accordance with the literature, found confirmation of these drivers, but at the same time goes further by providing evidence of the satisfaction of MNE with those drivers. Therefore, data reveals a generally positive evaluation confirmed by a 76% rate of a continued presence on the territory three years on from the initial settlement. Nevertheless, the research shows some critical points which should be taken into consideration by those in charge of FDI regional policy.

Despite the efforts of Piedmont to implement the “Piano Pluriennale Competitivita” (multi-year competitiveness plan), there are still areas that could be improved. Utilities, bureaucracy and some infrastructures need to be strengthened through regional support. In this way the territory could be more attractive, increasing the number of companies in the area and attracting a larger number of foreign MNE. Our research results suggest a number of policy implications. First, policies aiming to increase the national R&D intensity of a region are likely to foster the attractiveness of that region to foreign R&D investment. Second, positive externalities from clustering of R&D foreign affiliates outweigh competition effects. Third, given the hetero-geneous behavior of foreign investors, differentiated policy depending on target partner countries can increase the success of such policies.

Meanwhile, as Italy is struggling with competitiveness and growth capacity (it is last in the European Union in terms of attractiveness and ranked 48th by the World Economic Forum), Piedmont has to try to play its cards right to attract new investments. Our results confirm that that policy has to continue and that the strategy started a few years ago should be reinforced. Four of the involved companies (the Belgian AR Metallizing, the Latvian Aenergo, the Italian A-27 and Maneux), for example, joined the settlement agreement that the region launched in 2011. The companies will devote €60

million within two years to promote the attraction and the development of foreign investments in Piedmont and the reinvestment of companies that re-locate abroad. So, policy has to focus on company attraction policies, such as a fiscal bonus for the ones setting up and administrative simplification, also enabling enterprises to obtain payments from local governments quickly. It thus appears that the 2011 choice to launch the competitiveness plan “From the emergency to the strategy” with the investment of 500 million euro within three years to be spent on research, young and “smart and clean” innovation was correct.

In conclusion, our interviews suggest that Piedmont is still an attractive location for research activities. This remains the case even while countries such as China and India are becoming low-cost destinations for relatively routine development work in the wake of the manufacturing activities that have shifted to those countries.

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