



## **FDI in R&D: What the MNC's subsidiaries are doing in Brazil?**

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### **1. Introduction**

Foreign Direct Investment (FDI) keeps increasing worldwide and Brazil is now one of the most attractive economies for multinational companies (MNC). Inflows to Brazil rose by 25% in 2006 compared to the year before (UNCTAD, WIR, 2007). In terms of preferred regions for FDI location, the country is in the fifth position, after China, India, USA and Russia (UNCTAD, 2007b). According to the same study, most of FDI inflows to Brazil are mainly in manufacturing and in resource based activities.

Considering this context, the aim of this paper is to present a characterization of the R&D activities carried out by the Brazilian subsidiaries of foreign MNC, both in general and in sector perspective, based on face-to-face interviews carried out with 54 MNC subsidiaries located in Brazil.

In order to characterize the technologies activities carry out by MNC affiliates, we have structured a R&D typology based on what was observed about this issue in the Brazilian case. We intend, with this initiative, to present an aggregated analyzes regards to the activities accomplished by the 54 interviewed companies, offering a broad scenario about these activities in the sense of hierarchizing the companies by the kind of R&D performed in Brazil. The typology is divided into five categories defined by the kind of activities performed (or not) by the companies, searching to identify who accomplishes only development activities in Brazil and who does also research activities (beside development) in continuous or sporadic way. This typology was developed in order to aggregate and, in certain way, to simplify the classification of Brazilian subsidiaries R&D activities, once they are very varied and any of the typologies previously presented in the literature of subsidiaries roles – we will discuss some of them at section 3 of this paper – can not be used to represent the Brazilian reality.

The growing share of multinationals in the productive structure of the Brazilian manufacturing industry and the fact that MNCs respond for almost half of private R&D

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expenditures in the country give ground to the proposed analyses. The literature stresses the deepening of the internationalization of the productive structure in the 1990s. Of the 500 largest global companies, 405 were operating in Brazil in 2000. Among the 500 largest private companies in Brazil, the evolution of the share of multinationals is impressive: in 1992, only 39% were foreign firms and in 2000 the share rises to 46% (Matesco and Hasenclever, 2000). The evolution also reflects on the share of MNCs in total sales of the 500 largest enterprises – while the group's sales as a whole increased 7,7% between 1989 and 1997, MNCs sales grew 10,3%, totaling 50% of all domestic sales (Laplane *et al.*, 2000).

This article is part of a broad research project whose aim is to contribute for the understanding of the general context of MNCs' activities in Brazil and to contribute for the formulation of public policies that could be effective to foster MNC technological investments in the country, especially in R&D. The project "Policies to Develop Technological Activities in Brazilian MNC Subsidiaries" was sponsored by FAPESP – the Foundation for Research Support of the State of São Paulo and was carried on between March 2005 and August 2007. It has been continuing under the FINEP – Sponsored of Studies and Projects<sup>4</sup> – sponsoring with a broader objective that includes FDI prospection of multinational companies abroad. It will conclude in December 2008.

The paper is organized on four sections, including this introduction. The second presents the methodology, focusing on interview work and sample definition, considering that has been developing several other research activities in the project scope. The third approaches some aspects of R&D internationalization based on literature, outstanding those contribute to understand the type of activities that are carried on by MNCs subsidiaries and bringing elements to support the our classification. The fourth section concentrates the typology description and the as well as analysis and results for each group of Brazilian subsidiary: Type 1, 2, 3, 4 and 5.

## 2. Methodology

This study was based on extensive in-depth face-to-face interviews carried out with R&D directors and/or CEO of 54 MNC subsidiary located in Brazil. The interviews were conducted in two phases: in the first one we interviewed 46 MNC subsidiaries between February and July of 2007. After that, we analyzed these interview and reformulated some questions to deep aspects of the R&D internationalization and came back to apply more 8 interviews, between January and March 2008.

Three criteria were used to assure a representative sample of the MNCs' universe located in Brazil: (1) the largest R&D investors (MNCs) in according to the R&D Scoreboard (2005) and that also invest in R&D in Brazil according to Valor Econômico 2005, one of the most important Brazilian business newspaper; 2) MNCs that invest more than 100 million pounds in R&D according to R&D Scoreboard (2005) and that are located in Brazil; and (3) suggestion of our research group members, considering the following: MNCs that are installed in Brazil for a long term; MNCs benefited with government incentives related to R&D; MNCs that acquired Brazilian companies with developed R&D activities in Brazil; among others.

In terms of capital origin, the sample includes MNCs from 11 different countries (USA, Canada, Austria, Holland, France, Germany, Switzerland, Italy, United Kingdom, Japan and India). Approximately 51% of the companies are from USA North; 41% are from

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<sup>4</sup> Financing's Agency of Brazilian Ministry of Science and Technology.

Europe; and 8% are from Asian. The operation time of the subsidiaries' sample in Brazil diverse: around 63% of them have more than 40 years in Brazil and present a productive structure quite consolidated at the country; the remaining of the sample came to Brazil after 1970's, and only 1 company arrived after 2000's. Consequently, the most of the interviewed MNCs accumulate several years of operation in the Brazilian territory.

The sample of Brazilian subsidiaries interviewed encompasses 13 different sectors: Vehicles and Parts; Information and Communication Technology (ICT) and Semiconductors; Chemistry; Pharmaceutical; Foods; Machines and Equipments; Metallurgy; Electric Energy; Cosmetic; Electro-electronic; Electronics and Telecommunications; Paper and Cellulose; and Other Sections that include companies not classified at the previous one. Although the numbers of companies and of the sectors are relevant, it is not possible to outline tendencies by sector due to the small number of MNCs by each one. Therefore, such expressive number of MNCs interviewed authorized us to draw a broad overview and tendencies about the R&D activities developed in Brazil. It should be noted that the results reflect the Brazilian subsidiaries' opinion. Furthermore, it is necessary to mention we have a formal commitment with interviewed companies which obligate us to keep their names in secrecy. So, our analyses could not reveal what company we are talking about.

Finally, it worth to point out we have divided the questionnaire that oriented the interviews in three blocks of questions. In the Block I we do a characterization of the company and investigate the R&D activities that the MNCs affiliates do in Brazil. The Block II tries to identify the most important factors for the expansion of R&D activities in Brazil as well as the main barriers for the development of such activities in Brazil. Finally, the Block III gathers a group of questions about the Brazilian financing and incentives to R&D development. The present paper is mainly structured around the questions of Block I, although all the questions were important to emphasize ours arguments.

### **3. Internationalization of R&D activities: some aspects approached by literature**

#### **3.1. Aspects of global R&D**

The literature in internationalization of R&D deals with different nature of works. Some of them are related to the strategies adopted by multinational companies to globalize R&D considering local advantages of countries (Ronstadt, 1977; Terpstra, 1977; Hakanson, 1990; Bartlett e Ghoshal, 1989). Influencing such strategies, the literature also deals with the driven forces which orient investments to specific countries / regions (Cantwell 1992; Reddy, 2000; Gerybadze e Reger, 1999; Patel e Vega, 1999). Also considering strategies for internationalization of R&D, there are authors whose work are focused on marketing analyses, especially on the needs of each market or on patterns for global products, influencing the centralization or decentralization of R&D (Hult et. al., 2000).

Another research line considered by literature refers to management of R&D global centers (De Meyer, 1989; Chiesa, 2000; Zedtwitz, Gassmann, 2002),, mainly directed to data/information exchange between global units (ex. type, costs, infra-structure for communication, etc.) and to organization of work on teams spread globally (ex. organizational structures, leadership, team formalization, etc.). Thus, many researches evaluate the role that the subsidiaries of MNC play in relation to R&D in each country (RONSTADT, 1977; Chiesa, 2000), what will be deeply discussed in next section of this paper.

There are still some researches that use quantitative indicators, both to assess the benefits obtained with the decentralization of the draft product (Mallick and Mukhopadhyay,

2001) or to analyze the ways of interaction between technological development teams distributed worldwide (Guellec and Potterie, 2001). But, whatever the focus of these works mentioned before, they all start from the assumption that the roles of subsidiaries of multinational companies (MNCs) outside the headquarters countries are not restricted only to the care of the local market, they are arranged in integrated networks in order to have necessary skills or knowledge to operate in each country not only for production but also for development of technology (Cantwell and Santangelo, 1999). Multinational firms locate their activities where there is comparative advantage. "These activities are not only related to production, but also to distribution, advertising and R&D" (Reddy, 2000, p. 10). The MNCs are the central agents of the productive globalization and therefore of the internationalization of R&D (Gerybadze and Reger, 1999).

Companies, in order to be more competitive, structure their R&D activities globally (Ghoshal and Bartlett, 1988; Reddy, 2000); several studies show that investments in R&D by multinational companies are increasingly oriented to subsidiaries located in outside of original corporation country (UNCTAD, 2005; Doz et al., 2006). The TNCs recognize that different parts of the company may develop R&D activities and each one has different skills. The exposure of a global company to a variety of environmental stimulus is a great advantage over a national company.

Thus, there are several arguments pro internationalization of product development, not only to support local production, but also to create interfaces with local innovation systems (Ohmae, 1990). Among them, outstanding: opportunity of being in contact with new knowledge and technologies; flexibility and agility to adapt products, enabling better customer service; decrease in the cost of development; obtaining of tax incentives in some countries / regions; local demands; and others.

Terpstra (1977) cites the most frequent reasons for which the resources for R&D are directed to other countries than the home country: technology transfer from headquarters to foreign subsidiaries, in response to pressure from countries where its subsidiaries are located; to improve international relations; to gain access to foreign talent and resources; to reduce costs of development with cheaper workforce; to take advantage of local ideas and products; to accelerate the development time through parallel efforts of several laboratories working simultaneously; to continue the development activities already undertaken on a company acquired abroad; to obtain advantages of some public local incentives.

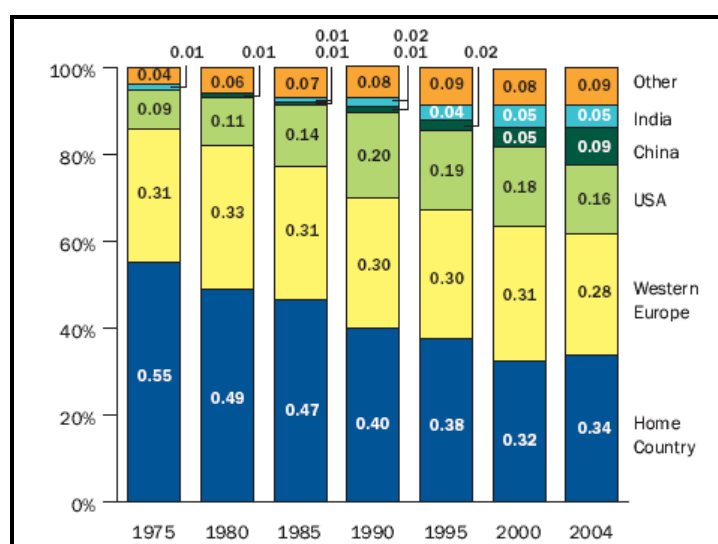
In general, the literature brings two main strands to align the reasons for the internationalization of R&D (Chiesa, 1995): marketing factors (needs for accessing to markets, responding to local needs and increasing proximity with customers) and the technological factors (recruitment of qualified staff, access to foreign talent, access to differentiated technologies). Chiesa (1995) states that factors related to demand and technology are the two main reasons for the internationalization of R&D. The unfolding of the reasons for internationalizing R&D is classified into one of these two segments (market or technology). There are also other factors, for instance the ones related to financial aspects, such as reductions of workforce costs, the ones related to political and regulatory environment, such as the policies of incentives and local demands, and some more subjective factors such as relationship between headquarters and subsidiary, such as the personal relations between the executives from their countries.

However, it worth to emphasize that no matter what reasons lead the process of R&D internationalization, "the home country of the TNC is usually the most important place for the technological development of the corporation" (Cantwell, 1995, p. 172), despite strong indications of that the spending on R&D in foreign subsidiaries are growing strongly, for

instance, according UNCTAD (2005) it is rising of 10% to 16% of all investment in R&D between 1993 and 2002. The same study shows that spending on R&D is geographically concentrated, for example, in 2002, the ten economies that invested more in R & D represent 86% of the world total, being eight of them located in developed countries (China and Korea are the exception).

Data from the survey by Booz Allen Hamilton / INSEAD (2006) on the distribution of global R&D corroborate to support the perception of this trend of decentralization of R&D, and also show that only a few emerging countries is actively participating on this process. As can be seen in the Graphic 1, United States participation has been gradually reduced since 1990, when they held 20% of R&D in the world, while in 2004 this participation is reduced to 16% of the total. On the other hand, India and China have grown their participation global R&D in the last decade: they had about 3% of the world total in 1990, and, in 2004, these counties held together about 14% of R&D in the world, with 9% of China and 5% in India. Brazil is included in the 'other'.

**GRAPHIC 1 - Changes in the distribution of R&D installations - 1975-2004 (%)**



Source: Booz Allen Hamilton/INSEAD (2006).

According to the study of UNCTAD (2005), the type of R&D conducted abroad also varies depending on the region, where: Asia prevails with the most innovative R&D (especially China, India and Korea); some new members of the European Community have attracted activities of technological innovation; Latin America and the Caribbean have little direct investment in intensive activities in technological development and focus on adaptation, technology or products to the regional market; some countries of Africa (especially South Africa and Morocco) attract limited investments in R&D. There is therefore a competition between countries that are normally considered to receive investments in R&D, among which the BRICs (Brazil, Russia, India and China) and some smaller countries of Asia and Eastern Europe.

Most studies on localization of R&D by foreign companies in Brazil (Dias et. al., 2004, Galina, et.al. 2005; Consoni, et.al., 2006) show that the activities of R&D carried out in the country by local subsidiaries are focused mainly on adaptation of products or processes. However, some studies point out that Brazil has been a country considered by multinational companies for guidance on investment in R&D. The Brazilian industries of telecommunications equipment (Galina et al 2005; Gomes, 2006), mechanical equipment,

electric and electric motors (Strachman and Avellar, 2008) and automotive (Dias, et. al. 2004; Consoni, et.al., 2006) are noticed examples, both for (re)defining the mandate of the subsidiary within the corporate network, or for the introduction / extension of technological activities by these subsidiaries (Gomes, Consoni e Galina, 2007).

### **3.2. Types of R&D Activities in foreign subsidiaries**

The discussion about this competition for investments between countries, mentioned in the end of the previous section of this paper, also approach the type or “quality” of R&D activities that is attracted to each region or subsidiary. In general, countries - and subsidiaries located in them – intend to attract investments for higher value-added activities, which could possibly make the global corporation more dependent on the local subsidiary, and therefore on the country where it is located. For innovative Research & Development, it means that the subsidiaries try to attract activities from the initial stages of the R&D process, which are, in general, those that receive substantial investments, that allow local units to take more risks and that make possible stronger relations of cooperation between the company and other players from National Systems of Innovation (ie. firms, universities, research institutes, governmental agencies). Besides, these activities may also let subsidiaries to develop pioneer innovation for the whole company. The general goal of the subsidiary is, of course, to improve its financial income and to have its importance recognized by the MNC.

There are some studies focused on the differences of roles for R&D foreign subsidiaries in multinational firms (RONSTADT, 1977; FROST, et al., 2002; HEGDE, HICKS, 2008). Ronstadt (1977) classified different types of R&D activities carried out abroad by MNCs:

- Technology Transfer Units (TTUs) - to facilitate the transfer of corporate parent’s technology to subsidiary, and to provide local technical services;
- Indigenous Technology Units (ITUs) – to develop new products for the local market, drawing on local technology;
- Global Technology Units (GTUs) - to develop new products and processes for major world markets;
- Corporate Technology Units (CTUs) - to generate basic technology of a long term or exploratory nature for use by the corporate parent.

This typology also brings an idea of differences on importance or of hierarchy between each unit, from TTU to CTU, in this order, the relevance of subsidiary role increases. Hegde and Hicks (2008), attempting to capture broad trends in the phenomenon of global R&D based on the related literature over the last five decades, created a structure for subsidiaries R&D function. Table 1 organizes their findings, it presents the evolution of foreign subsidiary according to its R&D activities over the last decades (column 1) and the factors and driven forces that stimulated these changes (column 2).

The first type (“Market customization”) is related to units whose R&D functions are to understand and to support foreign markets customizing. “Listening post” is a R&D unit whose existence reflects strategy and need for firms to absorb foreign know-how. In both models, Market customization and Listening post, overseas R&D sites were auxiliary outposts, subservient to home R&D laboratories. In subsidiaries which functions are “Sources of innovation”, particularly emerged since the 1990’s, we see “three categories of increasing sophistication - incremental innovation, multi-technology product innovation and use-inspired basic research” (HEGDE and HICKS, 2008, P. 393).

When classified in the first category - incremental innovation - subsidiaries are focused on small technical changes and increasing of products or processes development that continuously advance the process of change. For the second category - multi-product innovation – R&D functions involve experimental development applying different technologies already available, it does not focus on the creation of new technological paths, but on the development of new technology. Finally, when a R&D unit is classified on the third type – frontier innovation – it is expected from it to be involved on new discoveries and researches. Applied researches – and in few cases, basic researches – are a regular practice on this kind of affiliates.

We see on this classification some relations to the ‘classical’ definitions of R&D and its activities, thus, it is worth to mention this. Definitions by Frascati Manual (OCDE, 2002, p. 30): “Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view. Applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective. Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed”.

**Table 1 – Evolution of Global R&D and of foreign subsidiaries roles\***

<b>Subsidiary R&amp;D function</b>	<b>Facilitating factors and driver forces</b>
Market customization	Learning to operate abroad Consumer Demand
Listening post activities	Decreased communication costs Industrial and technological strength specially in developed countries
Sources of innovation - Incremental innovation - Multi-product innovation - Frontier innovation	Increased variety in means of communication Proximity to manufacturing and to industrial customers Presence of S&T human capital in host country

\*Based on Hegde and Hicks, 2008

Another important discussion related to the role of foreign subsidiaries is about Centers of Excellence, once some authors (Holm & Pedersen, 2000, Birkinshaw et. al. 1998) consider them as a form of high value-added subsidiary, allowing this to have a strategic role in the corporation. Thus, we return to the initial considerations presented in the beginning of this section: subsidiaries try to attract value-added investments (including R&D activities) that will make difference in their role’s evolution as a member unit of the MNC.

FROST et al. (2002) advanced the definition of centers of excellence adding the idea that they represent a superior set of capabilities within the firm, including both tangible (ex. equipment, licenses, and patents) and intangible resources (ex. knowledge and experience). They also include in their definition that a center of excellence is explicitly recognized or declared as such by the global corporation and that the subsidiary where they are allocated have intention to derive value from that unit’s capabilities for the broader organization. For their work, these authors distinguish three types of centers of excellence – manufacturing, research and development centers. They concluded that investment by the parent firm stands

out with all three types of centers (compared to non-excellence centers), but particularly research and development centers. Another outstanding of the same research is related to the performance impact of centers of excellence, that also indicated superior performance (compared to non-centers) for these two types of centers. For instance, in development centers, the unit's impact on profitability and new product introductions was rated at a significantly higher level than non-centers.

FROST et al. (2002) also highlighted the conditions under which the centers are likely to be created in MNC. This is concerned with the recognition of capabilities that provide a source of value beyond the boundaries of the originating unit. Their argument is based on the premise that the centers of excellence "can be viewed as the outcome of a combination of external and internal factors, the most important of which appear to be parent firm investment and linkages to sources of competence both within and outside the boundaries of the firm" (FROST, et al., 2002, p. 1016).

The same authors showed that the relative importance of these factors varies across the three different types of centers. They conclude that for manufacturing centers, internal actors (from inside MNC) appear to play a more important role in the development of strong capabilities than do actors outside the boundaries of the firm. The pattern is reversed for research center and also for development centers, where external customers are given more credit as important sources of competence development (for research centers it is even more important than for development center).

## **4. Analysis and Results**

### **4.1. Characterization of the technology activities carried out by Brazilian MNC affiliates**

In order to characterize the technological activities carried out by MNC affiliates, the purpose of this paper, we have structured a R&D typology based on what was observed about this issue in the Brazilian case. We intend, with this initiative, to present an aggregated analyzes regards to the activities accomplished by the studied companies, offering a broad scenario about these activities in the sense of hierarchizing the subsidiaries by the kind of R&D performed in Brazil.

The typology is divided into five categories defined by the kind of activities performed (or not) by the companies, as it follows:

- Type 1 – It does not carry out R&D activity;
- Type 2 - There are sporadic development, but research is not accomplished;
- Type 3 - There are continuous efforts for development, but research is not accomplished;
- Type 4 - There are continuous efforts for development, but research is carried out at sporadic way;
- Type 5 – Besides the continuous development efforts, there are important researches for the global corporation

This typology was developed in order to aggregate and, in certain way, to simplify the classification of Brazilian subsidiaries R&D activities, once they are very varied and any of the typologies previously presented in the literature of subsidiaries roles, discussed at section 3, can not be used to represent the Brazilian reality. We intended, with this five types, to identify the kind of Research ("R") and of Development ("D") that is carried out by local

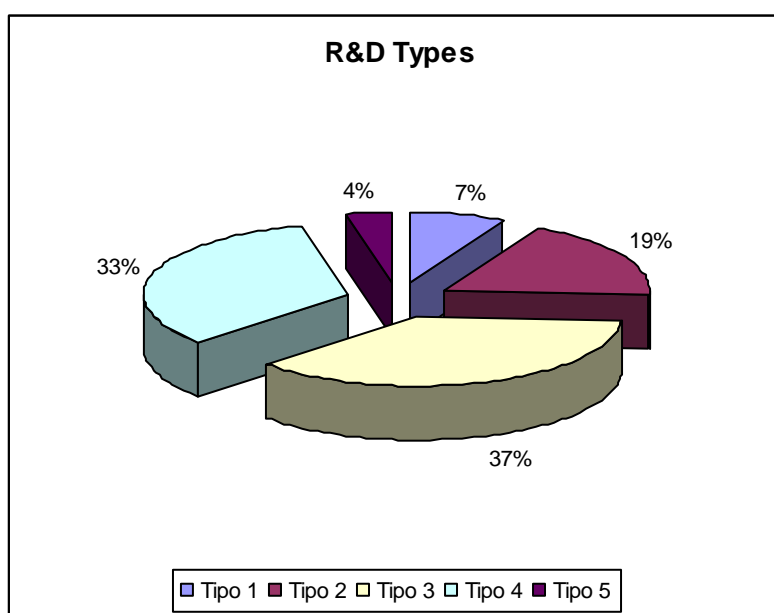


subsidiaries. Thus, the proposed typology is based on the definitions of Frascati Manual (OCDE, 2002).

Considering the literature presented in section 3.2 of this paper, it is possible to observe that types 1 to 5 have some “inspiration” of both classifications by Ronstadt (1977) and by Hedge and Hicks (2008), but do not reflect entirely the classes considered on these models once the activities of Brazilian studied subsidiaries could not be fitted on these previously created classifications.

Specifically considering the evolution of foreign subsidiaries roles by Hegde and Hicks (2008), we may see a closer relation between our proposed types 2 to 5 and the function “Sources of innovation”, with its three classes: incremental innovation, multi-product innovation and frontier innovation, considered by the authors. We may say that types 2 and 3 reflects the function “incremental innovation”, because we considered these types of subsidiaries are focused on incremental technical changes and increasing of products or processes development, but in a sporadic (type 2) or continuous way (type 3). Type 4 is related to the “multi-product innovation” class once its R&D functions involve application of available technologies, but does not focus on the creation of new technological paths. And type 5 is similar to “frontier innovation” class because it is also composed of applied research.

**Graphic 2 – Percentage of interviewed companies by activities type**



According to Graphic 2 we can observe that 26% of our sample does not carry out relevant R&D activities in Brazil. From this total, there are companies that do not have anything related to R&D activities in Brazil (7% of the sample's companies). A little larger share (18% of the sample's companies) declares to accomplish development activities at sporadic way, that is, when there is local demand for doing it. Those sporadic developments reflect the necessity of adaptation of products for the local and regional markets. On the other hand, 70% of companies affirm to undertake systematic and continue efforts on development activities (Type 3 and Type 4). The Type 3 concentrates the larger amount of sample's companies (approximately 37%), indicating that a considerable share of them focus merely on the development activities. In Type 4, 33% of the companies are classified. They assert to do research, besides development activities, even though in sporadic situations. Finally, only 4% of companies declare to carry out relevant research for corporation in a global context. The

two Type 5 companies are part of global R&D networks performing in specific technologies and areas as we will see below.

### **TYPE 1 – *There are not R&D activities***

From the interviewed companies, there are four or 7% of our sample that do not carry on any kind of R&D activities in Brazil. Two of them are from ICT sector, one from petroleum sector and the other from chemical sector (fertilizers segment).

One of the ICT companies, which is one of the biggest semiconductors' company in the world, does not have manufacture plant in Brazil. It has only a representative office and sales team. According to interview, Brazil is out of the innovation and the productive global map for the headquarters. Consequently, the country has received only a small amount of investment in relation to the other affiliates of the MNC group. It is important to note that the semiconductor industry in Brazil is starting to develop (in a slow pace).

The other ICT firm produces equipments for telecommunications. Years ago, especially during the boom of telecommunications' market in Brazil (1999-2001 years), the company employed around 180 people in R&D activities. – annual investments in Brazilian R&D were around 15 and 20 million of dollars in that period. Recently, the company has decided to fell out of the R&D activities accomplished in Brazil due to the decrease of the local market of telecom equipment. The Brazilian Informatic's Law helps to understand such decision<sup>5</sup>. This Law determines that all the ICT/ Telecommunication companies that have manufacture activities in Brazil should invest, annually, at least 4% (or 4,5% depending on the region that company is installed into the country) of their revenue in the R&D activities (Brazilian Science and Technological Minister, 2008). To better explain, as larger the internal sales of the company, as larger the volume of resources and investments in R&D activities. It is clear that such MNCs subsidiaries only invested in R&D activities in Brazil as a consequence of the Brazilian Informatic's Law, making clear that such kind of investments does not sustain without the incentives from the Law.

The oil company, on the other hand, declared to have plans for investing in R&D activities in Brazil. The company has been operating in Brazil since 1913, mostly on the fuels distribution segment. After the Law of Petroleum (Law 9.478) – settled in 1997, year that broke the monopoly of the Brazilian state-owned company, Petrobrás, in the oil exploration and production – the Brazilian subsidiary started to work in such segment. In 2003, it became the first private capital company to produce petrol in commercial scale in Brazil. It is worth to mention that the concession's contract for exploration and distribution of petrol signed by the company with the Brazilian National Agency of the Petroleum (ANP) determines that it must invest at least 1% of the its total revenue in R&D activities in Brazil. Such obligation was regulated in 2005 by ANP and until the date of the interview (March of 2007) the company had not started to spend the resources accumulated in 2005 and 2006.

However, due to the expansion of the exploration and production of petroleum in Brazil, the subsidiary considers that investment in R&D in Brazil will be a natural tendency. The specificities of petroleum production in Brazil characterized by exploration in deep waters justify such position. Petrobras, the Brazilian oil company, has accumulated decades of R&D investments and nowadays is a global leader in technology of deep water exploration.

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<sup>5</sup> According to the 11.077/04 Law, the incentives will be maintained up to 2019 but will started to be gradually reduced after 2014. More information can be accessed in: <http://www.mct.gov.br/index.php/content/view/2932.html>

Finally, the fourth Brazilian subsidiary without any internal structure of R&D is an European company, from Chemical sector, fertilizers manufacturer specifically, that has been in Brazil since 1989. The firm has limited resources destined to R&D that use to contract services from Brazilian universities. Since 2005, the board of the company has been discussing the implementation of a R&D center in Brazil. The main motivations for that are the size and the growth of agricultural defensive's Brazilian market. Besides that, the company recognizes that the Brazilian climate and soil's specificities demand local research and development activities. However, there is not a definition if such R&D center will be created in Brazil in less than two years.

From the analyzes of Type 1 firms, we should emphasize two aspects: (i) firstly, the most of them are not inclined to implement a R&D structure in Brazil in a short term; maybe the petrol company might do it, but only due to requires of sector regulations; (ii) secondly, besides they have not any internal R&D activity – not even a minimal structure, formal or informal, to support it – three of the company have been contracted technological services from universities, research institutes or specialized companies when it is necessary. The external services are related to local adaptation of product and process and some specific development according to specifics demands of the market. Nevertheless, such interaction with Brazilian research institutes could not be classified as university-companies cooperation. It has been a strictly commercial relationship since there is not R&D internal structure inside the companies that make possible to do research jointly.

## **TYPE 2 – *Sporadic Development***

As Type 2 we classified 18% of sample or 10 companies: five from ICT; two from electric sector; one from capital good; one from vehicle and parts; and one form electro-electronic.

The activities of almost all the ICT companies classified as Type 2 are focused mainly in the improvement and customization or adaptation of the systems (softwares) to the customers' needs<sup>6</sup>, in a sporadically way. The Indian company, for instance, that started the operation in Brazil in 2002, emphasized that the development of tools, an important part of R&D of the company, does not follow a regular and constant planning in Brazil. Sometimes, there is a global event promoted by the headquarters to motivate and mobilize the subsidiaries' employees to compete with new projects and Brazil unity participates of that.

From all the ICTs companies classified as Type 2, only two of them are included in Informatic's Law that, as discussed above, give incentives for companies investing in R&D in Brazil. One of the conditions for the firms to be included in such Law is to have manufacture activities in Brazil. In fact, one American firm, located in Brazil since 1913, has received the incentive indirectly. The products of the company are manufactured in Brazil, but it is completely outsourced to a partner. So, it receives the incentives but contract other firm to produce the hardware. Furthermore, the incentives received from Informatic's Law are not totally applied in R&D activities: a share of them is applied on workforce's training - the Law opens such possibility although training activities can not be classified as a relevant R&D activity.

The other situation refers to a telecommunication equipments manufacture – a joint venture between two former traditional telecom companies, that has abandoned manufacture activities in Brazil due to the crisis of the Brazilian telecommunications market. As

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<sup>6</sup> The exception includes one telecommunication equipments company that affirms to develop hardware.

consequence, the company has lost the incentives to R&D development from Informatic's Law and has decreased drastically their R&D team in Brazil. The one of the companies, that in 2000 had almost 100 employees only in R&D activities, reduced the number to 12 people in 2003 (Galina, 2003). At that time, the company developed small telecom's centrals whose technology was acquired by the MNC during the acquisition process of two Brazilian companies at the end of the 1990's. All these R&D activities were interrupted and nowadays the joint-venture develops in Brazil only specific hardware and software projects. According to the interviewed executives, there is a negative perspective of the R&D activities' future in the Brazilian subsidiary; the sporadic activities conducted in the country might be reduced still more due to problems related to the joint venture agreement. The previous case discussed here, about the TYPE 1 ICT company, is very similar: due to the crises of the telecommunications market in Brazil, some MNCs subsidiaries has reduced the hardware activities (manufacture and R&D) in the country, lost the incentives from Informatic's Law and abandoned the R&D activities in Brazil.

At the same way, the electronic company also has reduced the R&D activities in Brazil, but because of other motivations. Brazil was a development center for tubes TV until the 90's years when the company transferred the R&D activities to Singapore due to benefits offered, as subsidized labor, agreements with universities, and others. Years after, the center was transferred again, from Singapore to India. In that case, it is evident that the local unit did not have any specific competence since the R&D center was easily transferred to another country. Nowadays, there is no more formal structure of R&D in Brazil; there is just a receiving team in one of its Brazilian productive units. The company employs outsourced workforce when there is demand for some specific development or contract local universities to do this kind of activities. However, such linkage does not configure a research partnership in fact; it is only a way of company accessing a R&D team.

The case of the both electrical companies is very similar to the others analyzed above. The Brazilian National Agency of Electricity (ANEEL) is responsible to manage a Research and Technological Development Program from Electric Sector which obligates that a percentage of company revenue be invested in R&D<sup>7</sup>. Although both interviewed companies have to comply with this program, we noticed that its R&D investments are very small and above of the resources defined by the Program. It's worth to mention that the R&D Program of ANEEL determines investments in more experimental areas as alternative energies, for instance. Nevertheless, usually the resources have been applying in development to supply local market demands or local client demands but not in R&D.

The R&D activities conducted by the vehicle and parts company classified at Type 2 are limited and follow strictly the headquarters instructions. There is small autonomy and flexibility to promote local development. The technological activities are accomplished in Brazil with the support of the corporation's technical team and are strictly oriented to product and process adaptation to Brazilian and South American conditions. Those comprehend the followed issues: the use of alternative fuels (ethanol) or variations of gasoline composition; the nationalization of some components and search for cheaper or more adequate materials. The company, although has been installed in Brazil since 1970, only recently (in 2004) structured the R&D area in Brazil. The size and the dynamism of the motorcycle's Brazilian market have been the main factors behind the corporation decision to implement a small R&D

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<sup>7</sup> The 10.848 Law determines that a small percentage of the net operational revenue (1% ROL) from the electrical companies must be shared between R&D Programs and the CT-Energ Funding. The part of the resources of R&D Programs must be applied in internal R&D activities of the electric concessionaries, according to ANEEL Resolution number 271/00.

structure in Brazil. The R&D of the corporation is very centralized on the headquarter (Japan) with a small number of R&D activities carried on in Taiwan. For instance, even the researches in fuel cells based on sugar cane ethanol, one technology in which Brazil has been outstanding, are under the command of the head office.

Finally, there is the case of the capital goods company. Although the company had affirmed that does not realize any kind of R&D activities in Brazil, we identified an engineering team with more than 200 engineers working in adaptation of process and product. Their main functions have been: projects adaptation, including software programming for robot, and studies to identify the customer's technical requirements to electric and automation. However, the same team has developed global level projects although in sporadic time. Such characteristics justify classifying the company as Type 2.

To conclude the Type 2 observations, we should emphasize at least two similarities among the companies to justify the above classification. Firstly, although the Type 2 subsidiaries are from different economics sectors, no one of them have continues and formalized R&D activities; most of Type 2 interviewed companies does not have in Brazil a formal and structured R&D department. When the companies need to develop locally some more sophisticated and knowledge intensive developments, they have outsourced employees from other companies or contract such activities from Brazilian universities. Secondly, their R&D activities evolve only local capability for adapting projects or process to specific requirements of the local market or production. All these activities are irrelevant for the global technology development or for the context of the corporation R&D network. According to our conceptual framework detailed in 3.2 section, the subsidiaries classified as Type 2 could be compared with a Technology Transfer Unit, since the main function has been the market customization.

### **TYPE 3 – *Continuous development***

The Type 3 concentrates the larger amount of sample's companies (approximately 39%), indicating that a considerable share of them focus merely on the development activities. Among the companies classified as Type 3, we can find: two from Cosmetic and Hygiene, two from Capital Goods, one from Metallurgic, one from Aluminum and Metals, one from Paper and Cellulose, one from Construction, one from Chemical, one from Food, one from Electronics and Telecom, one from Others and eight companies from the Pharmaceutical Sector.

So, all the eight interviewed companies from pharmaceutical industry stand out in the Type 3. The research activities of this industry have a peculiar dynamic. In order to facilitate the understanding about the type of activity that these companies make in Brazil and the reason for their classification, it is important to remember that the creation process of a new medicine is divided between four big successive stages: (i) discovery of a new molecule; (ii) pre-clinical tests; (iii) clinical tests. It could be hazardous to affirm this, remembering that the stages are interconnected, but we could say that the search for molecules with therapeutically intentions is considered 'research' (R) and the clinical tests necessary to verify the security, reliability, etc, are considered "development" (D). A larger percentage of the resources is applied in the first two stages that are highly concentrated in the companies' home countries. The clinical tests, stage in which the human tests start, also consume a considerable volume of resources – about 40% of the total R&D. Added to the production, the clinical tests are the most internationalized and distributed activities of the pharmaceutical industry (Radaelli, 2006).

Brazil follows this trend. The clinical tests are divided in four phases: (1) evaluation of the tolerance or security of the medication based in a restricted number of health volunteers; once the satisfactory results are obtained in this first stage, the second one starts (2), in which the medication is tested also in a restricted number of volunteers with the disease, to evaluate the therapeutical efficiency; in the third phase (3), the tests are applied in a bigger number of people with the pathology to verify the benefits and the risks of the new medicine; the last phase (4) corresponds to the accompaniment of the product already commercialized through additional tests (Quental & Salles Filho, 2006). All of the pharmaceutical companies that were interviewed make the Phases 2, 3. About phase 1, only two pharmaceutical companies that were interviewed affirmed that they make this stage of the research in the country, although in a limited and sporadic way. One of them, a Swiss company, carries on this kind of test in the country only when it comes to medication destined to fight regional diseases, which only exist in Brazil, as *leishmaniose*, for instance.

The clinical tests development usually involves three main types of activities that demand specific competences: research protocol drawing and analyses of the results, management of the process and execution of the tests (Quental & Salles Filho, 2006). The protocol, which defines the lines of direction that the tests should follow, is brought from other countries, except for the cases of development of the Phase 1, according to the interviewed companies. The clinical tests are developed with hospitals tied or not to universities, as it is usual when it comes to this kind of activity. The intern R&D team of the companies is usually responsible only for the project management, executing activities as: definition of the partner center for the tests development; translation of the medicine protocol; presentation of the protocol and researchers training; support to the institutional research committee of the partner hospital, among others.

According to all of the interviewed companies, Brazil is among the highest quality pattern countries when it comes to the research centers, research teams, severity in the fulfillment of handbooks and deadlines. Furthermore, the country is characterized by ethnic diversity and population available for tests participation. Those companies also cited many Brazilian centers of medical research that are world reference in this type of activity. According to the companies, the country has all the conditions to advance to phase 1, but one of the main impediments is that the Brazilian legislation determines that this kind of study should be made with health people that are volunteer – in other countries, the people usually receive money for that.

However, this reference occurs only for the clinical tests that, as we mentioned before, can be associated to the ‘development’ activities. Once this type of activity is highly internationalized, with many of the subsidiaries participating actively of this stage, Brazil is not well ranked in the context of the world corporate.

The situation is the same in the other companies classified as Type 3 that are not pharmaceutical. The development activities of these subsidiaries, although continuum, are essentially focused in the local market demands, and none of them demonstrated accumulation of specific competences which might detach them inside the corporation. In general, they start from formulations or products existent in the corporation, and develop new versions to attend the local market, and in some cases, also regional (Latin America); they do experimental development, but also adaptation of products, processes and raw material, in a higher or lower degree, depending on the company. In all of the companies of this group, it was evident that the development activities are based on the market’s demands, especially the local demand and sometimes the regional ones, to keep the competitiveness or to raise their participation in an expansion scenario, depending on the sector.

In the type 3 group there is only one capital goods' company whose activities also aim to attend the world market's demands due to the production scale – the national market does not hold it; the company exports 50% of its revenues. However, even in this case the activities of the Brazilian subsidiary are restricted to the observation of the markets' tendencies and demands, and to incorporate them to their products and processes. The R&D center was created in 2000 in function the necessity to maintain itself competitive: the products should be sold in a shorter time, by a lower price and with the same quality. It does not represent, thus, a case of a subsidiary which has accumulated specific local competences that made it relevant in the corporate world context; it has its importance as productive unit, but not as a development center.

There are also situations in which the development activities are more focused in the process for the fabrication of pre-defined products by headquarters or the incorporation of the local raw materials. This is the case of the company of the cellulose and paper sector: the Brazilian subsidiary is the only one in the world to use eucalyptus in the paper production – the other use pine. The most relevant R&D activities developed in Brazil are related to the genetic improvement of the species to raise the raw materials' productivity. The food sector French company, dairy producer, is also focused in the development of new processes to adapt the manufacturing to the products developed by the headquarters, as well as for the incorporation of Brazilian raw materials. In the construction sector's company, which operates mainly with glass products, the development of products for improvement of the use of resins is, basically, its main activity.

It is important to mention that the Type 3 companies count on a formal internal structure of R&D and fixed personnel to do these activities. The number of personnel in R&D by company varies but, in general, it is 20 or 30 people. The people are, mostly, graduated, and there are also some people with master degree and PhD – usually there are 2 post graduated in each company.

There is the specific case of a chemical company, in which the number of people in R&D is 54 – 3 with master degree and 3 PhDs. However, the essence of the R&D activities of this North American company is not different from the other Type 3 firms. The experimental developments occur in specific products for the Brazilian markets or for the ones that have a bigger demand in the local market as, for instance, products for sugar cane fermentation and for tiles application. There is a great emphasis in the clients' support in Brazil and in Latin America, which also explains the number of people in R&D.

The Type 3 subsidiaries also 'contract' services from universities and research institutes. Usually they reach these institutions when there is demand for some activity more sophisticated than the ones that do regularly. In this case, many companies declared that it is cheaper to pay the university to do a punctual development activity than to make investments in the internal R&D structure. One of the North American companies of the Hygiene and Cosmetic sector, which intends to launch a product in the Brazilian market with a national formulation in four years, motivated by the local market's growth, was searching – when interviewed – a local university to 'order' the research. The company offers financial resources to the university and demands, as a counterpart, the exclusivity in the results reached. The subsidiary, which has 23 graduated people working in this activity, does not intend to expand its R&D structure in the country because of this new strategy of creating 'national' products. They allege that the research activities should still be very concentrated in the United States. The Brazilian unit might still be a 'support' R&D laboratory, following the tendencies suggested by the marketing department of the company.

#### **TYPE 4 – *Sporadic research***

As TYPE 4 were classified 33% of the sample or eighteen multinational Brazilian subsidiaries: eight from vehicles and parts, three from chemical sector, two from TIC sector, two from food sector, two from metallurgic sector, one from others.

As well as the Type 3 companies, the R&D activities of Type 4 have focus at local and regional market demands – they are also ‘pushed’ by the market, including the sporadic research activities. However, we may say that the Type 4 companies have demonstrated more technology maturity than Type 3 companies. We observe that the most of the Type 4 subsidiaries has accumulated specific competences in same fields that outstanding them inside the world corporation. Moreover, some of them have mentioned products developed locally that were incorporated in the portfolio of corporation.

These competences are strongly linked to the product’s development for emergent markets. This situation is so evident in the case of Vehicles and Parts companies. The automobile assemblers as well as the auto part producers have mentioned the competences accumulation elapsed through adaptation and development of more appropriated products for Brazilian market - small and low cost cars - and for Brazilian roads, as more resistant suspension systems and developments related to the use of alternative fuels (the ethanol, in this case). The adaptation activities have been requiring the development of new materials, products and process, making the local R&D activities more complex.

In this sense, it should be noted that these companies are nowadays experimenting an expressive market expansion of vehicle sector in Brazil and consolidation of R&D the activities (development, specifically) carried on in the country. There are some reasons for that: the size and increasing tendencies of the local market; specificities and characteristics of this market; operation’s time of these companies in the country, with installed plants for several decades; and consolidate local competences related to the automotive culture. Ones are factors, that joined, have been contributed to enforce and, in some of the interviewed subsidiaries, to broaden the R&D investment locally.

In one of the vehicle assembler interviewed (North-American that installed its first plant in Brazil in 1953), for instance, the number of engineers employed in the engineering product area leaped from 200 in 1997 to 1250 in 2007. Nowadays, the Brazilian subsidiary is considered one of the five bigger R&D centers (with focus in development) of the corporation and has capacity for developing a complete platform of one vehicle. The Brazilian subsidiary hold three main competences: the small car’s development of low cost of production and sale for emergent markets; alternative fuel engines and truck development – Brazilian is the only unit in the world that manufactures this kind of vehicle in the world. The Brazilian subsidiary participates of some global projects, but not at an expressive way. In this case, its activities are mostly limited to the development of some component or system for engines and consultancy about the development of some materials and fuels.

One other interviewed automobile assembler (also from USA; its first facility in Brazil dates from 1930) has demonstrated more active insertion in the global research network. Inside of current strategy’s corporation – that aims to establish a development process more sequential to avoid superposition among R&D activities – the Brazilian subsidiary was elected one of the five engineering global center; the others are located in USA, Germany, Australia and South Korea. As one of them, Brazilian subsidiary will be responsible for the automobile project since the beginning, in other words, since the concept of the product. The Brazilian unity will dominate all the stages of automobile development cycle – from concept to production. In May 2007 (time of interview), it employed 1.100 engineers in product development, approximately 50% more than four years ago, and there is a increasing



perspective. In terms of applied research, the firm is structuring an area for developing automobile components and systems without application commitment which is specialized in development for emergent countries.

The interviewed auto part companies also have the engineering area organized globally. In general, the studied subsidiaries are responsible for a share of the development activities related to same product. One of them, from Europe has declared that in the global hierarchy the Brazilian R&D management staff reports to the headquarter. In this case, the company has recognized competences in Brazil on piston-ring. One other auto part company, from USA, works on innovation times by projects and products family in collaboration with subsidiaries of other countries. This company has an excellence center for developing multimedia (radios) aims to emergent markets – it had to improve this kind of technology for that it could resist the vibrations and interferences caused by bad conditions of Brazilian roads. A third auto part company, also from USA, is responsible for soft transmission development in the global product engineering configuration of corporation, being reference in this kind of product.

When it comes to three chemical companies sector classified as Type 4, all of them have expressive R&D structure in Brazil, employing more than 100 people each in these activities. Such as the other Type 4 companies, the R&D activities are carried on in response to local and regional demands. Nevertheless, one of them, a tyre manufacturer from Italy, distinguishes itself among the other chemical companies, firms for indicating more active insertion in the global research network. This subsidiary, that employs 187 people in R&D, asserted to do join development with subsidiaries from other countries, including for products oriented to developed countries like USA and Japan. Its R&D center is specialized in solutions for truck, farm tractor and motorcycle tyre, but also make things for automobiles. As we had observed for the companies of automobile and part sector, this R&D center was created to answer the specific conditions of local market, starting to work on trucks and autobuses, which are concentrating the main competences of local subsidiary. More recently it has been outstanding also in motorcycle's tyre<sup>8</sup>.

On the other hand, the R&D activities of the other two chemical companies interviewed for this research have a strong regional feature. One of them, which have been operating in Brazil since 1919 in intermediary chemistry products, emphasized that the corporation R&D activities are configured in a way that each development center must provide the demands of its closer market - Latin America in the case of Brazilian subsidiary. Although it has a considerable P&D structure in Brazil, employing 150 people (27 are PhDs), the R&D efforts might be limited to regional market developments. However, the Brazilian subsidiary has developed some products that were incorporated into the portfolio's corporation. This company has interaction with universities to do some sporadic research – when it occurs, the university's researchers access the company's infrastructure and the projects' coordination are shared by the company and the research partner.

In the two ICT companies classified as Type 4 we have verified that both Brazilian subsidiaries are integrated to R&D global network. Notwithstanding, it was evident that this integration results not only of the accumulated competences by local companies but also because of the way that R&D corporation are organized. The Brazilian subsidiaries do parts of product development, of whose researches as well as the parameters that guide the local activities are carried on abroad. In one of the TIC companies, for instance, which operates in equipments and solutions for mobile phone, the R&D is distributed on 19 countries: Brazil is

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<sup>8</sup> It should be noted that this company has some patents registered in USPTO and EPO in name of the Brazilian subsidiary, what can corroborate the relevance of Brazil in terms of local development.

one of them with focus in development and was choose by the local competences. In both of ICT companies, the sporadic researches usually come from technical challenges faced in the development process that end to originate new products and technologies. Although they have to follow pre-defined parameters by headquarters, they can introduce improvements and innovations in the process.

In the case of the food companies classified as Type 4, we have found out that the relevance for the corporation is different because of the R&D organization: more or less centralized. One of them, from USA, which produces ingredients for several food products, do large share of development activities – close of 60% in according of interviewed executives, but this number might be pondered, considering this is a low technology intensity industry. The Brazilian subsidiary is reference in the corporation in ‘development of new ingredients’. In the other food company studied for our research, dairy producer, we have observed that although it has a background of successful experiences in raw material and new products that corporation is selling in other markets, the local company is not integrant of a R&D global network. The R&D activities are concentrated in the headquarter (Japan) and the activities carried on by Brazilian subsidiary resulted from its own initiatives to search for reducing costs and became more competitive in the local market.

The company of metallurgic sector (tubes manufacturer carry on in Brazil mainly non-destructive tests, experimental development and process and products improvement. The research é concentrated in Germany and France (headquarter). In the interview, Brazilian subsidiary emphasized that the main office has been demanding more investments in R&D activities in Brazil in face of its current diversification strategy. Nowadays, the companies of oil and vehicle industry are its main clients in Brazil, but these markets are decreasing and the subsidiary has been taking advantage of its competences in tubes to develop solutions for infrastructure companies like energy, construction and transport. For carrying on this new market strategy, the subsidiary has been interacting with some Brazilian universities to accomplish some applied research. The other metallurgic company was acquired by an Austrian Group in 1996 because of competences in a specific steel technology. After that, the activities related to this technology were maintained in Brazil. There are manufacturing activities of that specific steel in subsidiaries of other countries, but the R&D activities are concentrated in Brazil. The sporadic researches are carried-on jointly to Brazilian universities.

Finally, we have one company of ‘others’ which operates in several other segments like energy, information and communication, transports, medical equipment, etc. Seeing that the Brazilian subsidiary does not get information by business unity, we have analyzed the whole R&D activities to classify it in Type 4. As all other companies of this group, the research is sporadic and is accomplished just when there are local demands for specific products. In all segments of Brazilian subsidiary, the R&D focuses essentially on in the product and solution development. For instance, the company has been investing in the development of turbines to the sugar and alcohol market. Other example of development driven by local demands is the medical equipments: it was very sophisticated and expensive and the Brazilian subsidiary has been working on low cost products aiming to hit emergent markets.

#### **Type 5 – *Continuous and relevant research***

As Type 5 was classified 4% of the sample or just two companies: one from Hygiene and Cosmetics and one from electronics – that is in fact an appliance manufacturer – both from USA. These both companies distinguish themselves from the all sample’s companies for

the reason that they accomplish continuous research in Brazil – being this activity strategic for maintaining and increasing their competitiveness – as well as because they had developed products and technologies that are sold in world market (besides the local and regional market). In other words, they are close to the Global Technology Units in the Ronstadt (1977) classification and are also excellence centers in the concept of Frost *et al* (2002) presented in 3.2 section. These Type 5 Brazilian subsidiaries have a set of capabilities that makes them a research and development excellence center broadly recognized in the corporation. It should be noted that both has patents registered in the USPTO and EPO.

In the Hygiene and Cosmetics company, the patents' production locally has been one of the conditions for the Brazilian unity to make part of corporation competences' map. Brazilian unity has competences in four different areas: first aid dressing, female protection (napkin), body protection and oral hygiene. Inside these areas, there are products that was developed in Brazil and subsequently introduced in other markets like EUA and Asia. We have verified in this case that the local competences are concentrated on 'solid' products; the liquid products are developed abroad and the Brazilian subsidiary just adapts them to the local market, searching costs' reduction without change the original product's characteristics. The corporation's strategy is to create a balance among all R&D centers. So the Brazilian subsidiary must complement the activities developed by the whole group.

The appliance company is a Brazilian firm acquired in 2000 by a foreign group. Thus, investments' history in innovation, started before the acquisition process, has been fundamental for Brazil had reached the current outstand in the corporation. There are two technology centers in Brazil: one for washing machine of vertical axis - the local unity is leader in this kind of technology for the corporation; and other for refrigeration and cooking. These centers employed (at the time of the interview) 191 people, including 54 with master degree and 4 PhDs.

## 5. Final Considerations

In response to question employ as title for the article – '*What the MNC's subsidiaries are doing in Brazil?*' – we can conclude, from the presented analyses above, that the most of Brazilian MNC's subsidiaries carry on in Brazil development ('D') aims to local or regional market, being a great share of them products and processes adaptation. In some of these companies it is not even continuous. When it comes from research ('R'), these activities impose themselves sporadically in some companies also as a necessity to supply the local or regional markets. There is not research being accomplished in Brazil without application's intention. All of the companies' cases detailed previously support this assertion.

As saw before, the typology proposed helps us to draw a broad view and to achieve the answers for title-question, as well as embracing the specificities identified in R&D activities of Brazilian subsidiaries. For this aggregation, we have founded out that only two companies, from 54 interviewed, do research activities in Brazil at a continuous way and 66% do exclusively development activities, being that several of them (the most of Type 2) does not have a formal and structured R&D department in Brazil.

In some industries, especially ICT, R&D activities that were carried on by foreign MNC in Brazil in recent years have been reduced and, in some cases, are completely extinct. Companies from ICT sector, specially stimulated by Informatics Law requirements, used to have formal structures for R&D and cooperative agreement with universities and research institutes. However, most of these former investments did not lead local subsidiaries to relevant R&D activities which could make the corporation dependent of the subsidiaries'

technological improvements. In our study, most of the ICT companies were classified as type 1 or 2.

Finally, it should be noted that the analysis of each Type has not been restricted to justify the companies' classification, but also searched to observe if these companies have some relevance in the global corporation context, considering the accumulated competences locally, even so in development activities. In this manner, the analysis has also made possible to rescue the aspects approached by literature presented in the section 3. More specifically, it has also make possible to identify if the Brazilian subsidiary was in some way a source provider of value beyond the boundaries of the originating unit, in the sense approached by Frost et. al. (2002). We have observed that companies that present some of these conditions start to show up in a more frequently way in the Type 4, being a few of them responsible for part of the development of some product or system in the R&D network.

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