

# Innovation Management in Subsidiaries of Multinational Corporations in the Brazilian Electro-Electronic Industry

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## Abstract

With the increasing pressure for innovation in the last decades, multinational companies have started to increase the decentralization of their activities, in order to reach the affiliate's contribution to the generation of knowledge and innovation. The subsidiaries, on the other hand, seek for more responsibilities, especially in activities with intense technological content, in order to guarantee their competitiveness. In this way, this research analyzed the relationship between responsibilities of a subsidiary with its innovation management practices. To support that, an exploratory case study of five subsidiaries of the electro-electronic industry installed in Brazil is proposed. The chosen theoretical framework is that which considers the innovation management as a process, and adopts the subsidiary perspective to explain its evolution. Three sets of determinants are studied in order to explain the evolution of the responsibilities of a subsidiary: headquarters, subsidiary and local environment determinants. The results make it evident a positive relationship between subsidiaries responsibilities and their practices of technological innovation management, and also explain how this relationship works. Yet, the research findings suggest significant differences between the subsidiaries studied, and that they have focused their innovation management on the market, with little efforts to longer-term technology research practices.

## 1. Introduction

In the last decade firms have been facing growing challenges coming from the high level of exigency and sophistication of customers and from fast technological shifts. In this context, firms must satisfy customers and exceed competitors through the innovation in structures, business models, processes, and/or products.

In this way, the multinational corporations (MNC) have increased their efforts to integrate their subsidiaries into research and development (R&D) and innovation activities. Those corporations have increased the decentralization of innovation activities, in such a way each subsidiary contributes to generate knowledge and innovation for the benefit of the corporation [1,2].

Therefore, MNC's headquarters (HQ) have been carefully analyzing the subsidiaries' capabilities in order to decide which one will receive more innovation responsibilities. At the same time, subsidiaries contribute to the process of decentralization of activities by seeking more complex responsibilities in order to assure their competitiveness and survival.

In that way, with time, a subsidiary can alter its role inside the multinational corporation by gaining or losing responsibilities and through the development or atrophy of

capabilities. Today, several authors suggest different typologies and responsibilities to the subsidiaries, which imply the existence of distinct evolutionary patterns [3-7].

Regarding the research in developing countries, there are some studies demonstrating the existence and growth of R&D responsibilities undertaken by subsidiaries located in Brazil [8, 9].

According to Birkinshaw and Hood [10], the evolution of subsidiaries of multinational corporations depends on the configuration between three sets of factors: headquarters, subsidiary and local environment determinants.

Based on the plausible assumption that there is a direct correlation between the complexity of the innovation management practices and the magnitude and complexity of responsibilities, we raised the following questions: How does this correlation manifest itself in the electro-electronic industry in Brazil? How different subsidiaries installed in Brazil organize their innovation management practices in accordance with the responsibilities that they have?

With these questions in mind, the main objective of this paper is to investigate the interaction between the scale and complexity of responsibilities and the degree of technological innovation (process and tools) in five subsidiaries of the electro-electronic industry installed in Brazil. This industry was chosen because of its economic importance and high rates of technological change.

Due to resources limitations, this paper focuses on three sectors: Generation, Transmission and Distribution of Electrical Power; Industrial Automation and Control; and Telecommunications. In order to have an interesting contrast among subsidiaries, we also included two sectors traditionally less innovative in the country [11, 12]: Medical Solutions and Railroad Systems.

The study and results presented in this paper especially relevant because there have been few studies devoted to either observe the evolution of the relationship responsibilities-innovation management practices, or to compare the technological innovation management between subsidiaries, particularly in developing countries. Therefore, a research about subsidiary practices of innovation management is an important contribution to the literature of this area.

This paper presents the answers for some of the main questions brought up in a previous paper from the authors, presented at Picmet 2007 [13].

## 2. Theoretical Framework

We conducted an exploratory research in the literature to identify key contributions to consolidate concepts and to validate the results presented in the Section 4.

In this study, the term multinational corporation will be

used generically to designate any firm with business activity out of its original country. The term “subsidiary”, in turn, designates a half-autonomous unit capable to make its own decisions, which are restricted by conditions imposed by the corporative command (headquarter-HQ) and the characteristics of the local environment [14].

Each subsidiary fulfills (and establishes) specific functions in the multinational network, which are expressed in responsibilities (business areas, products lines, etc.); i.e., the subsidiary is only capable to performing the activities that are under its responsibility because it possesses (or has developed) a certain level of capabilities for those functions.

Several authors present classifications for subsidiaries using diverse frameworks and criteria [7, 14-20]. Cantwell and Mudambi [1], for example, divide the mandate of subsidiaries into competence-exploiting (limited to sales and service, assembly, or manufacturing), and competence-creating (capability of developing new product and technologies is present).

Birkinshaw and Hood [10] argue that the subsidiary evolution is the result of the intensification or atrophy of its capabilities over time and the gain or loss of responsibilities. Consequently, the role of the subsidiary in the MNC is manifested through its responsibilities.

The same authors provide a debate on the evolution of the subsidiary, emphasizing three perspectives: attribution of the central command, choice of the subsidiary, and determinism of the local environment. It is important to recognize, however, that these factors are not deterministic or static; they have dynamic feedback effects and can influence each other.

In terms of innovation management, we adopted the theoretical stream that considers that the innovation is a managerial process. This is in line with Tidd et al. [21], who argue that although innovation have an uncertain and often random nature, it is possible to identify underlying change patterns. To them, successful innovation management is primarily about building and improving effective routines.

The research focused only in the technological product and process innovations, which, according to the Oslo Manual [22], comprise products and/or processes that are either technologically new or have significant technological improvements.

In order to study the innovation management process of the subsidiaries, we divided the process into eight dynamic and interactive groups of activities related to the processes of innovation suggested by [21, 23-27].

The eight groups are: 1) Provide innovative environment: context features that promote innovation, such as culture, process, strategy, etc. 2) Scan for signals: scan for routines aiming the identification of market and technological opportunities and risks. 3) Determine innovating strategy: a strategy is selected from potential signals; the challenge lies in selecting the signals that offer the best chance of developing a competitive advantage. 4) Allocate resources: organizations need to allocate resources to exploit an opportunity; technical resources can be either generated by R&D, or acquired through technology transfer. 5) Manage external linkages: manage external sources of knowledge, alliances and collaborations. 6) Develop and manage projects: new products/processes development, which includes efficiency

and effectiveness factors. 7) Implement the innovation: routines to make possible to implement the innovation. 8) Evaluate and learn: evaluation of innovation results in order to learn how to proper manage the process, and to capture relevant knowledge from the experience. More details about those groups can be found in [13]

We investigated which of those routines were used by each subsidiary. The emphasis on each group will vary according organization and situation. Several tools and techniques [13, 21, 23] can support those eight groups and, for each one of the sets, we associated innovating routines (formal and informal) that people can carry out.

In short, we chose the theoretical framework that admits innovation as a managerial process (in line with authors as Joe Tidd and Mark Dodgson) and that adopts the perspective of the subsidiary to explain their evolution (in line with authors as John Cantwell, and Julian Birkinshaw).

In the following section we describe the methodology adopted in this work.

### **3. Methodology**

This paper presents the results of an exploratory empirical study that used documental and in-depth case study researches methods. These methods are justified by the need for a better understanding about the intricate phenomenon of the subsidiary evolution.

The objects of this study were five MNC subsidiaries installed in five different sectors of the Brazilian electro-electronic industry: automation and control (Acontrol subsidiary); information and communication (Icom); medical solutions and technologies (Med); power generation, transmission and distribution (GTDE); and railroad transportation systems (Transp). For reasons of confidentiality we omitted the names of the subsidiaries and any information that could indicate their identities.

During the research we gathered information from the companies' internal reports, cases, tools, etc. in order to determine the present and past capabilities and responsibilities. Also, 22 semi-structured, in-depth interviews were carried out between May of 2005 and August of 2006 with employees directly related to the technological innovation management in those subsidiaries. At the same time, we carried out direct observation activities inside all five subsidiaries (100 days each). The objective was to understand the social interactions between employees and between the subsidiary and HQ, as well as to observe the internal environment, management style and activities. During this phase we tried to reduce, as much as possible, the interference caused by our presence.

It is important to note that all subsidiaries studied are consolidated, being in Brazil for at least 70 years.

### **4. MNC and Subsidiaries Characteristics**

This section aims to analyze the subsidiaries, their responsibilities and capabilities, and their relationship with the HQ. The objective is to determine their characteristics and understand how they shape the innovative performance of the subsidiaries.

All studied MNCs are global technological leaders in their sectors, have a high percentage of revenue from products up to five years old (in average 75% of all products), have high investments in R&D, and innovation is a key competitive advantage.

Table 1 – Financial results of the studied headquarters and subsidiaries.

Indicator	New orders (mil. US\$ dollars)			Net Income (mil. US\$ dollars)		
	2004	2005	2006	2004	2005	2006
<b>Acontrol MNC</b>	23,715.02	28,497.71	34,899.97	19,692.97	23,620.71	29,165.73
<b>Acontrol Brazil</b>	313.91	366.83	545.17	281.50	362.22	565.55
<b>Responsibility</b>	<b>1.32%</b>	<b>1.29%</b>	<b>1.56%</b>	<b>1.43%</b>	<b>1.53%</b>	<b>1.94%</b>
<b>GTDE MNC</b>	15,944.65	20,661.45	25,294.11	13,135.54	15,224.89	19,798.55
<b>GTDE Brazil</b>	272.05	423.27	594.73	261.39	310.48	491.78
<b>Responsibility</b>	<b>1.71%</b>	<b>2.05%</b>	<b>2.35%</b>	<b>1.99%</b>	<b>2.04%</b>	<b>2.48%</b>
<b>Icom MNC</b>	15,853.41	17,552.12	2,864.35	27,679.89	22,349.00	22,436.22
<b>Icom Brazil</b>	1,150.99	1,580.21	842.53	1,125.98	1,500.63	885.21
<b>Responsibility</b>	<b>7.26%</b>	<b>9.00%</b>	<b>3.68%</b>	<b>4.07%</b>	<b>6.71%</b>	<b>3.94%</b>
<b>Med MNC</b>	9,882.37	10,988.83	11,494.30	8,478.43	9,635.73	10,042.60
<b>Med Brazil</b>	62.78	112.87	99.12	60.32	77.62	98.36
<b>Responsibility</b>	<b>0.64%</b>	<b>1.03%</b>	<b>0.86%</b>	<b>0.71%</b>	<b>0.81%</b>	<b>0.98%</b>
<b>Transp MNC</b>	5,256.89	18,294.80	19,914.19	16,145.39	17,469.46	17,761.24
<b>Transp Brazil</b>	209.27	253.96	272.58	201.07	232.86	295.07
<b>Responsibility</b>	<b>3.98%</b>	<b>1.39%</b>	<b>1.37%</b>	<b>1.25%</b>	<b>1.33%</b>	<b>1.66%</b>

Source: Documental research.

The Brazilian subsidiaries are very different among them; some are very large and others small, in accordance with the MNCs strategies for them.

Table 1 presents the main financial results of headquarters and subsidiaries. This table shows the differences in size and volume between the businesses, as well as the participation of the Brazilian subsidiary on the MNC results. As can be seen, in terms of new orders and net incomes, Acontrol is the largest, followed by Icom, GTDE, Transp and Med. In Brazil, Icom and Acontrol subsidiaries change positions. Icom-Brazil also has the biggest participation in revenues with respect to the MNC.

To analyze the subsidiary responsibilities we created a typology based on the types of responsibility that the subsidiaries might have:

- Local production and nationalization: subsidiary does not change the global product.
- Customization and traditional engineering: subsidiary adds product value through customized services and projects.
- Development with transfer of technology and knowledge of parent or partner: subsidiary creates a new product adapted from the original (from MNC, supplier, etc.).
- Self-directed Development: it develops an entirely new product or product line.
- Applied Research: there is research that stimulates creation of new products or processes.
- Basic research: cutting-edge research is present, having as primary goal to change the fundamental knowledge of the field under study, without a particular application in view.

All the MNC studied made substantial R&D investments between 2004 and 2006. However, most of them go to the HQ and to subsidiaries in developed countries. With exception of the Icom, the HQs of the MNCs studied do not have strong internationalization strategies. In general, the role of their subsidiaries is limited to a competence-exploiting mandate

and to the adaptation and development of products according to the characteristics of the local market.

Comparing the subsidiaries' R&D investments (Fig. 1), it is clear the Icom-Brazil is by far the most active in R&D. Icom-Brazil carries out a large part of its R&D activities in collaboration with external partners, mainly universities and research institutes. The number of employees involved in those projects doubles when considering the external partners' human resources.

The smallest in investments is Med-Brazil, with 0.09% of the total invested by Icom-Brazil. Transp-Brazil did not separate the R&D investments from product customizations, thus the values are inflated. The analysis of subsidiaries responsibilities and innovation practices took this fact into consideration.

The collaboration of Icom, Med and Transp Brazilian subsidiaries with clients, suppliers and Universities/Research Institutes is very important to their innovation responsibilities. These subsidiaries have invested and encouraged this kind of relationship.

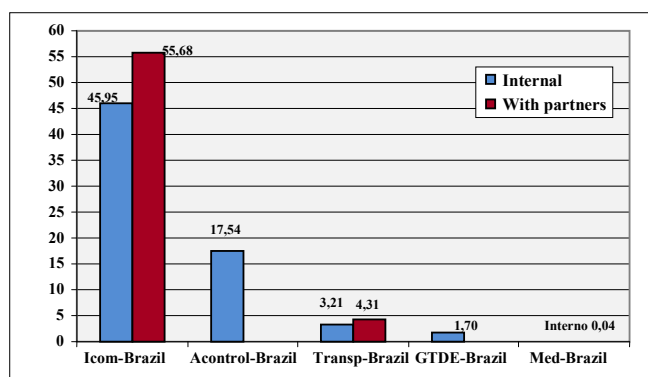


Fig. 1 – Subsidiaries R&D Investments - 2005 (US\$ Millions).

Source: Documental research.

The close relationship of Med-Brazil with its suppliers is important because, having no factory and insufficient R&D expertise, the subsidiary contracts the capacity of its suppliers to develop and manufacture its products.

Transp-Brazil works like a project-based company and, usually, the process starts with a public call for new products or services. They sell mostly to the public sector. Sometimes Transp needs to constitute partnerships with automation and power distribution companies in order to put together a solution that fulfills a public call.

The degree of external collaboration seem to directly relate to the presence of public incentives for collaboration, to the subsidiary inclination to trust partners, to the local market pressures for innovation and differentiation, and to the degree of technological change in the industry. The last point relates to the pressure for innovation within the industry.

The differences in R&D investments between subsidiaries seem to relate to the size (in net sales and employees) of these companies. Therefore, one can better assess the R&D efforts using an indicator of intensity of R&D investments (Fig. 2), measured by the volume of R&D investment as percentage of net sales [28,29].

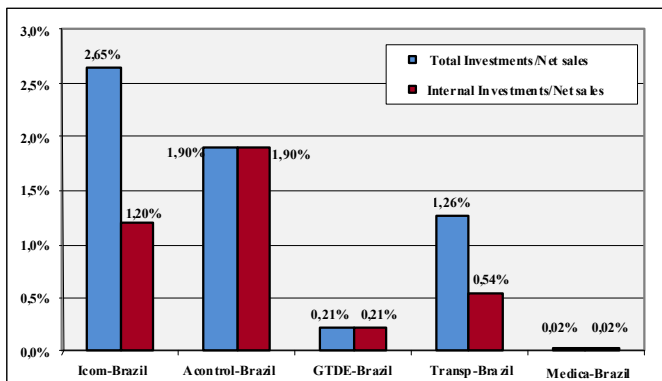


Fig. 2 - R&D/net income ratios - 2005.  
Source: Documental research.

As can be seen, there are some differences between Figs. 1 and 2, like the reduced difference between Icom and the other subsidiaries.

More important, the values shown in Figure 2 are significantly smaller than those of the MNCs (not shown here due to space constraints), revealing the low responsibility level of Brazilian subsidiaries. Still, in general, the subsidiaries present intensities larger than national corporations of the same industry.

Another important factor to take into consideration is the participation of the subsidiaries over the total R&D investments made by the MNC (Fig. 3). The data reveal that the subsidiary with more responsibilities is Icom, followed by Acontrol, Transp, GTDE and Med. This order seems to confirm the influence of the rate of technological/market change and the technological complexity over the subsidiary innovation activities [30].

The research also revealed that, regarding innovation responsibilities, the more centralized multinationals are GTDE, Med and Transp. However, even in the less

centralized MNCs, Acontrol and Icom, the decentralized projects are those with lower risk and investments involved.

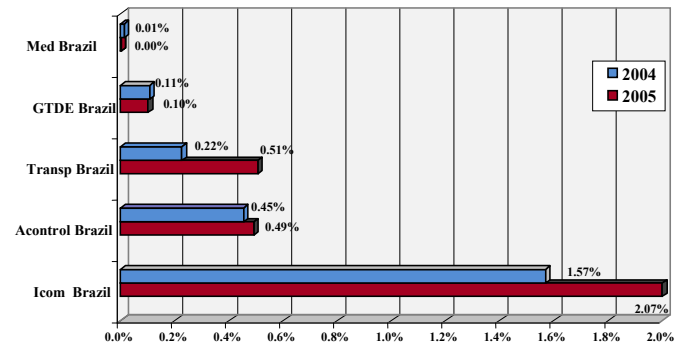


Fig. 3 - Evolution of the subsidiaries participation in the MNC R&D.

Source: Documental research.

According to the interviewed managers, those centralization conditions are common to most subsidiaries, especially those installed in developing countries. They also revealed that there are some factors that influence the migration of responsibilities: size and sophistication of the local market; local incentives and policies; and the costs and capacity of the subsidiary to manage innovation projects.

Table 2 summarizes the differences between the subsidiaries.

As can be seen, there is a big difference in scale and scope of the subsidiaries' responsibilities, and many of those differences are related to particular factors such as governmental incentives, market size, dependency of public sector calls, etc.

Icom and Acontrol have gained more complex responsibilities, including regional and global responsibilities for development of products and services.

The relationship of Icom, Med and Transp with partners is very important, and these subsidiaries have been trying to grow and improve those partnerships. Icom has a strong relationship with universities and research centers, Med with suppliers, and Transp with clients.

According to the results we can divide the subsidiaries into two groups: innovators and followers (Table 3). In the innovators group are those subsidiaries or subdivisions that develop new or significantly improved products or processes; and in the followers group are those that only adapt, customize and/or just manufacture and sell products and processes.

We found few systematic and formal innovation practices in the "follower" subsidiaries; they make little effort to search for technological opportunities.

Fig. 5 shows innovation management routines used by the subsidiaries during their empirical research. The darker the cell, the more complex and formal the innovation management practices. The figure shows an evolutionary line (diagonal) of innovation practices from the simpler and more intuitive practices to the more complex and structured ones.

Table 2 – Main Characteristics of the Subsidiaries.

<b>Subsidiary</b>	<b>Responsibilities</b>	<b>Characteristics</b>
<b>Transp</b>	<ul style="list-style-type: none"> <li>• Selling, assembling and maintaining products and services developed and offered by the HQ.</li> </ul>	<ul style="list-style-type: none"> <li>• Depends on public calls for contracts of construction or maintenance of infra-structure, or purchase and maintenance of rolling stocks.</li> </ul>
<b>Med</b>	<ul style="list-style-type: none"> <li>• Products are adapted and developed in cooperation with the suppliers and with the basic technology and/or concept imported from the HQ or another subsidiary.</li> <li>• It lost and gained responsibilities and capabilities during the last two decades. The biggest loss occurred 10 years ago when the Brazilian factory was closed.</li> </ul>	<ul style="list-style-type: none"> <li>• Changes in responsibilities relate to changes in demography and to public and private spend on health care.</li> <li>• In Brazil, the market for the most expensive and modern equipments is very small.</li> <li>• Dependence of partners capabilities.</li> </ul>
<b>Gtde</b>	<ul style="list-style-type: none"> <li>• The main activities are to sell products and services from the HQ or other subsidiaries.</li> <li>• Some efforts to develop low risk products and processes.</li> </ul>	<ul style="list-style-type: none"> <li>• GTDE-brazil has a great variety of products and services to manage.</li> <li>• It participated in global innovation teams leaded by the HQ.</li> <li>• Important role in acquiring other companies.</li> </ul>
<b>Acontrol</b>	<ul style="list-style-type: none"> <li>• Most of the responsibilities are concentrated in the adaptation of HQ products and services, and customization of products and services to the local market. Few projects of adaptation and development of products.</li> </ul>	<ul style="list-style-type: none"> <li>• It has to deal with a vast variety of products. Each business unit has its own market, features, particularities and degree of innovative activities.</li> <li>• Two acquisitions during the year of 2000 brought important innovation responsibilities and capabilities.</li> </ul>
<b>Icom</b>	<ul style="list-style-type: none"> <li>• Several development projects, including applied research, some of them global.</li> <li>• Global Development Center of mobile handsets, networks and corporative communication networks.</li> <li>• Global Product Responsibilities: new generation network; user-handset interface and; small and medium sizes PABX.</li> <li>• Regional Development Center of 15 products lines, including analogical telephones, LTG modules, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Most of the Icom-Brazil innovative capabilities came from many years of local development and adaptation that began with the State Company Telebrás purchase policy in the 1970s and with the Market Reservation Policy.</li> <li>• Brazilian Telecom sector has the incentive of the “Informatics Law”, which motivated R&amp;D activities in Icom.</li> <li>• Strong partnership capabilities.</li> </ul>

Table 3 - Subsidiaries and units according to their innovation responsibilities.

<b>Innovators</b>	<b>Followers</b>
<ul style="list-style-type: none"> <li>▪ Icom</li> <li>▪ Acontrol: residential outlets and switches; sensors; information systems to process industry, automation systems.</li> <li>▪ GTDE: electric transformers, medium voltage panels, industrial steam turbine.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Acontrol – all the other units</li> <li>▪ GTDE – all the other units</li> <li>▪ Med</li> <li>▪ Transp</li> </ul>

As can be seen, Icom has more formal, systemic and complex innovation management practices, while in Transp those practices are informal and sporadic.

A horizontal reading shows the diffusion of innovation management practices in the subsidiaries. The most common practices are those closer to the market, market research, feasibility analysis, and management of product development. There is almost no presence of practices close to technological or radical innovation, such as technological research and development, basic or applied research, and management of intellectual property.

In sum, despite being in the same industry, the subsidiaries have very different sizes, daily operation processes, external partnerships, and responsibilities. Consequently, their

innovation routines vary from few informal and sporadic routines to formal, systematic, self-created routines.

## 5. Discussion

The multinational corporations considered here are parts of the electro-electronic industry, a highly competitive market of about US\$ 2 trillion. To survive, those MNC have been inventing heavily to build an innovative and profitable portfolio.

With the competitiveness pressures for innovations and low costs, the MNCs began to decentralize factories, centers of R&D and activities throughout their subsidiaries (offshoring). As a consequence, now the subsidiaries have to compete among them to gain responsibilities, specially regional and global mandates.

RESPONSIBILITIES						
Development of a new product/ process or line of products					Formal evaluation of results and management of intellectual property	
					Systematic and formal project management	
Development with technology and knowledge transfer				Formal evaluation of results, but with low feedback	Strategic alliances	
			Formal evaluation of results focused in the performance of innovation	Systematic and formal project management	Portfolio management	
Customization and traditional engineering		Project Management: informal and conducted by suppliers.	Punctual project management	Systematic resources	Systematic resources	
Local production and nationalization	Punctual viability studies	Punctual viability studies	Formal viability studies	Formal viability studies	Formal viability studies	
Representation and product selling	Punctual marketing prospection	Punctual marketing prospection	Punctual marketing and technology prospection	Systematic marketing prospection and punctual technology prospection	Systematic Marketing and Technology Prospection	
	TRANSP	MEDICA	GTDE	ACONTROL	ICOM	

Figure 5 – Relationship between responsibilities and innovation management routines in the studied subsidiaries.

Nevertheless, the diffusion of Research Centers is mainly concentrated in developed countries, and large part of the research is still conducted at the HQ.

When in need, the HQ puts together an international team to develop a global product or process. Experts from several subsidiaries contribute to develop products or processes that fit the expectations of different costumers in different countries. The HQ generally settles those teams in its installations. Acontrol, Icom and GTDE Brazilian subsidiaries have been part of this kind of international teams.

The significant differences in responsibilities and evolution trajectories between subsidiaries seem to relate to product complexity and risk of development, subsidiary capabilities, market, and local incentives.

The MNCs facing higher intensity of technological change and smaller product life cycle (Acontrol and Icom) depend more on their subsidiaries to generate and obtain knowledge and innovation, to reduce costs of development and, especially, to manage the needs of local customers.

Our research allows us to say that the Brazilian subsidiaries have limited innovation activities. In the most innovative subsidiaries, Icom and Acontrol, they mostly tackle projects of customization and adaptation of products to the local market using technology transferred from headquarters. Few projects are devoted to the development of new technologies.

Still, the studied MNCs typically decentralize the most labor intense activities (competence-exploiting[1]) to the subsidiaries in developing countries. The basic and applied research and technological development are still highly concentrated in the HQ.

Because innovation activities are so sporadic, the adoption of structured practices is also very uncommon. During the interviews, some factors were pointed out as the main barriers for the Brazilian subsidiaries to acquire and adequately manage innovation responsibilities. The most evident one is the lack of financial and human resources. If each subsidiary had predetermined resources exclusively for innovation, it would facilitate the technological and strategically activities and improve the project management.

In the same way, short-term investments prevail, since the MNC usually establishes restrict financial and marketing annual goals. Those goals make it difficult to carry out long-term projects, as those projects take more time to generate positive results and are more risky.

The subsidiaries can overcome these financial problems using governmental support, but they still have to provide human resources and additional effort from employees and managers.

A strong leadership is also paramount to the innovation success. The ability of the top management to motivate and coordinate people and projects under their responsibility is fundamental. Not surprisingly, the lack of motivation and support from the top managers was mentioned in almost all interviews as one of the main barriers to innovate. It seems that managers also lack the skills to negotiate projects with the headquarters and to obtain governmental support.

The second most common barrier is the subsidiary autonomy. We observed that, in general, the HQ first defines (without the aid of the subsidiary) the subsidiaries portfolio, and only after that, communicate it to the subsidiary. One of the interviewees from Icom cited that their worst innovation

barrier was the HQ, which often blocks projects and slows the decision making process.

Another interviewee said that “The ‘thinking’ part is still in the HQ, (...) all the rule is there! The HQ even manages the global innovation team despite its lack of technical and market knowledge needed to execute the project.”

Some few managers tried to overcome those barriers, but those problems seem to come from intrinsic features and strategies of the modern MNC, such as the pressure for short-term financial results and the lack of top management incentives and motivations to have innovation projects.

The Brazilian government can also help by creating a more supportive environment through effective financial incentives, reliable system of intellectual property, and higher investments in education and training.

Therefore, the empirical research allows us to conclude that the difference between the level of formality and complexity of the innovation management practices directly relates to the level of the subsidiary’s responsibilities. That is, the subsidiaries with more complex mandates have increasingly complex and formal innovation management processes and tools (Figure 5). In turn, the responsibilities relate, mainly, to the importance of the local market (demand-pull) and the speed of the industry technological change.

## 6. Conclusions

There is a large difference in technological innovation activities between the subsidiaries. Those seem to be highly related to the domestic market importance (demand-pull). Technology/science push activities rarely came out during the research. Generally, the market is the departure point for product development in the affiliate.

We found a direct relationship between innovation responsibilities and its management practices. In this way, we found few formal and systematic innovation routines. Moreover, even in the innovators units, those practices were usually close to the local market and project management, and comprised shorter term/lower risks projects.

Another important observation regards the relationship between subsidiary and HQ. We observed that the HQ still directs or obstructs many innovation activities of the subsidiaries. Some projects come from the headquarters strategy to decentralize its activities, and the subsidiaries compete for the projects. In general, the differences between subsidiaries rely in factors such as negotiation, costs, reputation, etc. Sometimes the HQ allows development due to a change in the local demand or competition.

The subsidiaries abilities to communicate their capabilities and competences, and to negotiate and sell projects, are also important causes to responsibilities gain. Those activities have particular importance in gaining global and regional projects. However, the negotiation power is closely linked to the importance and support of the domestic market.

A strategy that might help to increase responsibilities in subsidiaries is to place employees in constant contact with innovating activities. This kind of activity must be in the position description, in training programs, and in strategic plans. According to an interviewee, “people that have contact with innovating activities are more likely to support and join this kind of activity”.

Another suggestion is that managers must think in global terms and become more supportive and able to negotiate projects and resources with the HQ. At the same time, they must have competence to request a better local environment to innovation, and establish links with the local environment.

The Brazilian government, in its turn, should provide a supportive environment with incentives, infrastructure, skilled workers, etc., for all companies (subsidiary and local) to innovate. In this way, the country can help national and MNC companies to be more efficient and innovative and generate high level income and jobs.

We hope that this work provide a starting point to future researches in innovation management, especially surveys about innovation in the electro-electronic industry. Also, we hope that our findings give support to policy makers and managers to improve Brazil’s innovation activities and resources.

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