

ABSTRACT NUMBER: 015 – 0785

Technology and Precocious Internationalization in Brazilian Industry

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POMS 21st ANNUAL CONFERENCE

VANCOUVER, CANADA

MAY 7 TO MAY 10, 2010

Abstract

This study analyses the internationalization process of companies dedicated to the production of higher technological density goods that present different motivations for internationalization besides commercial advantages. In economic scenery marked by the intensification of competition, companies started to consider internationalization as a strategy for broadening their competitive advantages and expansion. Based on case studies, the research considered three Brazilian companies that become internationalized precociously, that is, shortly after the beginning of their activities. They recognize technology as the main element for the growth and expansion of their activities and invest continuously in development and research activities. This fact has contributed to the application for patents and global product development, which can be adapted according to the necessities of their national and international clients. It has been concluded that the precocious internationalization of the studied companies has been the result of continuous investments in technology.

Keywords: globalization of business, technological innovation, Brazilian companies, industrial organization.

1. Introduction

Classical theories that deal with the internationalization of companies were developed mostly based on the analysis of large American and European multinationals that already had a strong presence in domestic markets before starting the internationalization of their activities. Brazilian literature is mostly directed to the analysis of the internationalization of companies that has also reached competitive advantages in domestic market before starting to

invest abroad. These investments were performed in Latin America countries, mainly due to exports. The internationalization of Brazilian companies is considered late, that is, large firms started to adopt internationalization processes after being present in the domestic market for some years. The initial focus for this category of companies was the performance in the domestic market. Figure 1 is the subject of research considered in this study:

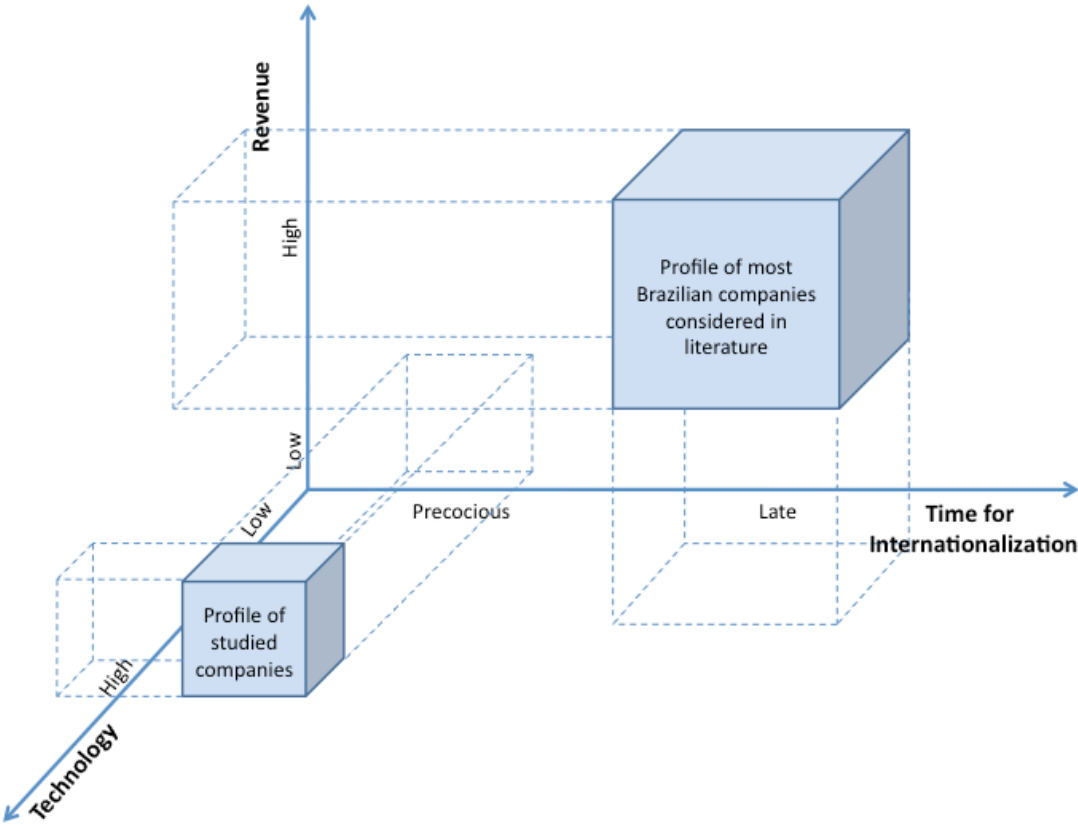


Figure 1 – Main Characteristics of Studied Companies
Source: Organized by Authors

This study considers a category of companies that do not follow the main characteristics shown in Figure 1. They are companies that have considered global performance since they started to operate. In general, the studied companies were founded between 80’s and 90’s and in a few years started the commercial internationalization based on exports to developed countries.

These companies present an important characteristic that is to consider the

development of new technology and applications as the focus of their activities and the main element for growth and expansion. Yet, they have developed global products that can be adapted according to the needs and regulation requirements of each country and the internationalization process does not present only commercial focus since it has also contributed to the development of new technologies.

The contribution of this study is to fill a gap in the literature that deals with the internationalization of Brazilian companies. It considers the importance of developing products and services derived from intensive efforts to create new technologies and applications. These aspects are strongly related to the trajectories of internationalization developed by the studied companies.

2. Methodological Aspects

This study aims to evaluate the processes of internationalization of Brazilian companies dedicated to the production of high-density technology goods and services (or technological assets). The trajectory will be analyzed considering four dimensions of internationalization as proposed by CHESNAIS (1996): commercial, productive, technological and financial.

The sample considered three Brazilian companies: Opto Electronica, Bematech and Lupatech. The selection of these organizations considered the following criteria: (1) they are Brazilian companies or founded with national capital, (2) all of them were founded between the 80's and 90's, (3) these companies has always considered global operations and the development of technologies as the main ways to expansion and growth, (4) they began the internationalization process still young, that is, after few years from foundation, (5) these companies have created and registered national and international patents, (6) their investments

in Research and Development (R&D) are higher than the national average, (7) the maintenance of foreign subsidiaries does not present only the commercial purpose.

Data collection was done through semi-structured interviews in the selected companies with the founders and current presidents of companies. Besides this, the study also considered the analysis of secondary information. The research method considered is Case Study and, for this reason, the results should not be generalized.

3. Internationalization of Brazilian Companies

Brazilian debate about the internationalization of national companies has been intensified in recent years. Authors analyze the aspects involved from several perspectives and Brazilian companies have been studied with divergent viewpoints in some cases. The adoption of international strategies by Brazilian companies is considered as a late event, especially when compared to other emerging countries. Between 60's and 70's, internationalization activities were concentrated in exports, while in the late 70's and early 80's a small number of Brazilian companies had made foreign direct investments (BARRETO and ROCHA, 2003; ROCHA *et al*, 2007).

About this late process, RICUPERO and BARRETO (2007) points out that the internationalization process of domestic firms was initiated in an economic environment marked by low growth, especially during the 80's. For this reason, the decision of making foreign direct investment initiated in the 90's can be recognized as a way to sustain the growth achieved internally in previous periods.

According to SILVA (2003), the category of internationalization adopted by most Brazilian companies was essentially commercial until the 70's. After this decade, a small number of Brazilian companies started to produce abroad, through the establishment of

production units in other countries, in order to reach markets in which the company already had developed a strong presence through exports. RICUPERO and BARRETO (2007) also detach the existence of a close correlation between the establishment of trade relations and the realization of foreign direct investment by domestic firms.

ARBIX *et al* (2005) points out that, in general, the establishment of subsidiaries abroad can positively influence the export performance of firms, since they contribute to the access to distribution channels, for the adaptation of products in specific markets and promote the access to financial resources and to the appropriation of technologies. Most Brazilian companies are moving towards production activities abroad by holding foreign direct investment (FDI) only recently, since 1990 (ROCHA *et al*, 2007; LAPLANE and SARTI, 1999).

Analyzing the types of foreign investments made by Brazilian companies, SILVA (2003) points out that the establishment of production units, sales offices and technical support services has characterized them. Whatever the form, the author notes that these investments are made in order to ensure or increase exports. SILVA (2003) also considers that the location is also explained by the commercial internationalization, where companies decide to invest in countries that have been important markets for their exports. ROCHA *et al* (2007) point out that many of these investments are located in Latin American countries.

ROCHA *et al* (2007) argue that the development of investments abroad by Brazilian companies is still limited. One of the limitations considered is the low involvement of Brazilian companies in research and development.

Although most of the Brazilian companies tend to adopt the commercial dimension of the internationalization process, COUTINHO *et al* (2008) consider that the formalization of foreign direct investment should be recognized as intrinsic and possibly critical to the development of the economy over the next few years. The internationalization of production

activities contributes positively to competitiveness of Brazilian companies, which can become global players through the relationship with suppliers, customers and international competitors.

The motivations for the adoption of internationalization processes considered by Brazilian companies are not exhausted and are not exclusive. RICUPERO and BARRETO (2007) point out that the adoption of internationalization as a way to overcoming trade barriers is one of main reasons considered by large manufacturing companies in Europe and North America. This was also the motivation for the establishment of companies in Brazil and other Latin American countries in the nineteenth century. It is also important to note that, according to COUTINHO *et al* (2008), despite the identification and classification of the main motivations for internationalization, it is important to consider that the motivations for internationalization can interact simultaneously.

4. Case Studies

Opto Electronics was established in 1986 and is headquartered in São Carlos, in the state of Sao Paulo. The company produces optical components and lasers for industrial and medical applications. The development of laser technologies allows the company to act in the medical field, especially ophthalmology, in the production of optical components for aerospace and also in the development of optical filter for odontology applications. The continuous investments in technology and applications led the company to be first in some markets in Brazil, as optical filters for odontoly, cold light mirrors, lasers projectors, non-contact laser meters and anti reflection lens for glasses.

Opto Eletronica has already established business units in Brazil and others countries. Opto Latin America is located in the city of Sao Paulo and is dedicated to the development of

distributors and support activities for Ophthalmic Medical Division products in Latin America. The company has commercial subsidiaries in the United States (Opto USA), Australia (Opto Global) and Austria (Opto Components). These subsidiaries are dedicated to the monitoring of trends in the sector in which the company operates, to the development of partnerships in research and to the establishment and strengthening of commercial activities in national and international markets.

Bematech S/A was established in 1990 in Curitiba, Brazil. It has business units in Brazil (Bematech Latinoamerica Brazil, Sao Paulo) and subsidiaries in the United States, Germany, Taiwan and Argentina. The company is dedicated to the automation business by offering hardware and software. Since 2006, the company has maintained its growth through acquisitions of other companies, especially developers and service providers, in order to complete its portfolio.

Lupatech was founded in 1980 in Rio Grande do Sul, Brazil. It has invested in research and development since its establishment. Between 2003 and 2006, the company invested about \$ 5 million in research and development. During this period, in 2005, it was established the Center for Research and Development Lupatech (CPDL), in Rio Grande do Sul, dedicated to the development of products and processes derived from technological innovations.

The activities developed by the company can be classified in three segments: Energy Products, Flow Control and Metallurgy. In the first segment, Energy Products, it is concentrated operational activities and services related to infrastructure of oil and gas industry, such as deepwater platform, anchoring ropes, valves, natural gas compressors, sensors and services. The company started to operate in this segment in 2006.

In the Flow Control Segment, Lupatech produces and sells industrial valves for chemical, petrochemical, pharmaceutical, pulp and paper and construction industries. In the

Metallurgy Segment, the company is recognized as one of the international leaders in the development of parts and sub-assemblies to the global auto industry, mainly.

Since foundation, the company has acquired Brazilian and international companies in order to strengthen and consolidate its position in each segment. Lupatech has many units in Brazil and subsidiaries in Argentina, the United States and Mexico.

5. Results

5.1. Research and Development Activities

The development of R&D activities has an important influence in the internationalization trajectory of the studied companies. They are present and operate in markets and segments marked by continuous renovation. Besides this, their products and services require scientific and technological knowledge.

A comparative analysis of information allows the identification of the following common aspects among them:

- (1). The companies have developed, since foundation or even earlier, research and development activities, which are performed in laboratories concentrated mainly in Brazil. These activities have always been considered essential for growth and business development.
- (2). Analyzing the percentage of incomes devoted to R&D activities, the company that invests the highest percentage is the Opto Electronica (10%), followed by Bematech (6,5%) and, Lupatech (1,5%). It is important to notice that, in Brazil, companies that invest between 0,96% and 2,72% of sales income in R&D activities are considered high technology companies, according to national statistics. These percentages are explained by the characteristics of products and services developed by each company, and are above average

for most of Brazilian companies.

(3). Companies rely on the support of financial resources by government agencies for the development of R & D activities.

(4). These companies operate in markets where the renewal of the products is accelerated. Then, the continued investment in R&D activities and monitoring of trends are central to the continuity of their activities.

Opto Electronica recognizes that the market in which it operates is marked by strong dynamism. The average lifetime regarded for their products is about three years and the strong international presence reinforces the need for constant renewal.

Similarly, Bematech points out that in its sector the technological transition is very fast so the company must be able to absorb new trends quickly as a way to maintain its markets and competitiveness. Therefore, overseas subsidiaries located especially in Asia and Europe has a fundamental purpose of monitoring major trends.

In Lupatech, in general, each product has a purpose according to customer's needs, so products can be adjusted in accordance with the use. The R&D area is concentrated in Brazil and has to be able to develop products and services dedicated to the needs of each client, what shortens the life cycle of each product.

(5). Companies develop partnerships in research and development abroad. These partnerships have contributed to technological advances by enabling the development of new technologies and applications in new products and processes.

To Opto Eletronica, these partnerships are established with universities, governments and overseas subsidiaries and are considered essential to the growth of the company in the overseas market. To Bematech, the subsidiaries in other countries also play an important role in the R&D area. They allow the monitoring of trends developed in different countries and relating to the company.

Lupatech has kept the R&D structures and laboratories that had already been created by acquired international companies. The company recognizes that, particularly in the Energy Segment, international companies acquired contribute to the technological advances by enabling access to product lines and complementary services.

(6). The studied companies have formal requests for patent registration. Opto Electronica has made 17 requests for registration and the first was formalized in about two months after its foundation. Bematech has 10 patents registered in Brazil. These registrations began in 1994, four years after the establishment of the company. Lupatech has 17 requests for registration in Brazil and the first was formalized in 1998. Both Bematech as Lupatech present patents registered abroad, obtained from the acquisition of international companies.

Finally, it is possible to conclude that these companies have important characteristics that distinguish them from traditional companies in Brazil. All companies employ a significant percentage of their income on research and development activities. The main reason is that the leaders recognize that the company's growth is dependent on the ability to develop new technologies and new applications for products and services.

The R&D area plays a key role in internationalization strategies of the companies. According to the presidents of the three companies, international performance is resulting of efforts in research and development of new technologies. To achieve this, companies have established partnerships with universities in Brazil and abroad, which facilitates the monitoring of trends in sectors where they operate, marked by profound dynamism. This relationship between internationalization and R&D activities is explored in the next section.

5.2. The Role of Technology in the Early Internationalization

The analysis of the studied companies allows the identification of an important

common aspect: the three cases considered the creation of new technologies and applications as critical to their development.

Officially inaugurated in 1986, Opto Electronica started to operate in the Physics Laboratory at the University of Sao Paulo in Sao Carlos. Likewise, the foundation of Bematech is related to academic work. The company was established in 1990, but its founders were already occupying a room in the Technology Incubator of Curitiba since 1989.

Even having been founded far from the universities, Lupatech is connected to a rich industrial system, with companies offering products and processes dense in technology. The company emerged in a region recognized as a major pole for the metal-mechanic in the country.

The founders of the studied companies considered the presence and performance in international markets as essential to the development of the enterprises. The consideration of performance in global markets since the beginning of the activities is referenced in the literature as one of the characteristics of a "Born Global" company. (KNIGHT and CAVUSGIL, 2004; MADSEN and SERVAIS, 1997).

The global aspect of performance is at variance with the considerations of the Uppsala Model proposed by JOHANSON and VAHLNE (1977), which considers that firms develop the internationalization as a process of incremental adjustments.

According to the Market Power Theory, proposed by HYMER (1960), one of the barriers to entry into other countries is discrimination and the difficulties in developing products in accordance with the laws of the country. This difficulty is not present among the studied companies because they develop, since they were founded, global goods and services that can be adjusted in accordance with the markets.

The studied companies began the commercial internationalization process after nine years after foundation, on average. Therefore, when compared with most large Brazilian firms

considered in the literature, these companies have developed internationalization activities in a short period of time from the date they were founded.

This is an important aspect which shows that the companies studied did not start the internationalization process lately as the majority of Brazilian companies considered in the literature (BARRETO and ROCHA, 2003; ROCHA *et al* 2007). The early internationalization is also considered in the "Born Globals" Theory and is also present among the companies studied (KNIGHT and CAVUSGIL, 2004; MADSEN and SERVAIS, 1997).

Analyzing the first international markets conquered by these companies, it is important to consider that Opto Eletronica exported to Italy, Bematech to the United States and Lupatech to Germany. Therefore, the three companies did not start the commercial internationalization in Latin American countries. This aspect differs from the Brazilian debate for most companies as well as the assumptions presented in the Uppsala Model developed by JOHANSON and VAHLNE (1977).

Today, the companies export to most of the countries. For Bematech, about 7% of the total income comes from exports, for Opto and Lupatech, about 20%. However, participation in international market through exports is seen as one dimension of internationalization.

Regarding to the establishment of commercial subsidiaries abroad, it is important to emphasize that the studied companies established their first trade subsidies in developed countries: Opto Eletronica and Bematech in the United States and Lupatech in Germany.

As considered before, Opto Eletronica started to export to Italy in 1993. Only nine years after its first export, the company established a commercial subsidiary in the United States and then, in 2003, the company developed commercial subsidiaries in Australia and Austria.

Bematech had the United States as the first international market in 2001. The company established the first foreign sales subsidiary in 2002, also in the United States.

Lupatech established its first sales subsidiary in Germany, which was also the destination of its first export in 1988.

The establishment of business units in developed countries in a short period after the first exports is also divergent with the aspects considered in the Uppsala Model. In addition, to the companies studied, the role of commercial subsidiaries is not only the strengthening of trade as it contributes to the technological advances achieved and the development of operations.

Production internationalization processes present different reasons and intentions among the studied companies. For Bematech, the main motivation for internationalization is the access to inputs. In this context, to expand its production activities abroad, the company considers the acquisition of international companies that produce hardware and software and also develop research activities. The aim is to complement the equipments and services supply and the access to suppliers.

For Lupatech, the motivations for international expansion, based on the acquisition of international companies, vary according to the segment. In Metallurgy and Flow segments, which the company has been operating since its foundation, the main motivation is the access to the market already developed by the acquired company. This happens because Lupatech already dominates the technologies involved in these segments and thus has an interest in acquiring the market developed by the company considered. In cases involving the acquisition of companies operating in the production of goods and services to the oil and gas, the main motivation is the access to existing technologies developed by the companies concerned.

Despite Opto Electronica does not develop production activities abroad, the internationalization of production is already considered as a strategy for future business growth and international expansion. Thus, the main motivations for international production are to access researches and to strengthen the brand abroad.

It is possibly to conclude that, among these companies, the establishment of business units and production abroad (only for Bematech and Opto Eletronica) cannot be explained only by trade or commercial reasons. This is a divergent point of the theory proposed by HYMER (1960).

In addition, they can be considered as companies that develop the internationalization focused on technological innovation as defined by ARBIX *et al* (2005) as well as the technological dimension of the internationalization proposed by CHESNAIS (1996).

HYMER (1960) considers innovation as an activity that must be constantly held by firms, which should involve the extension of the life cycle of products. VERNON (1966, 1979) also examines the relationship between innovation and internationalization in the Product Cycle Theory. The author considers that the innovations developed by the firm are initially aimed at assisting the domestic market. In this sense, the companies studied present divergent aspects when compared to classical theories. They develop global products that present constant renewal.

The studied companies can also be analyzed considering the internationalization process as one of the dimensions of diversification. Figure 2 shows the three forms of diversification as defined by PENROSE (2006). The firm can enter new markets, including international, with the same product and same technology base, which is represented in the figure if the firm moves from point A to point D. The firm can expand its activities through the development of new products for the same market using the same technology base, what is represented by the passage from point C to D. Finally, the firm can choose to diversify through new technological bases designed for the same markets and selling the same products, which is represented in the figure by the passage of the point B to D.

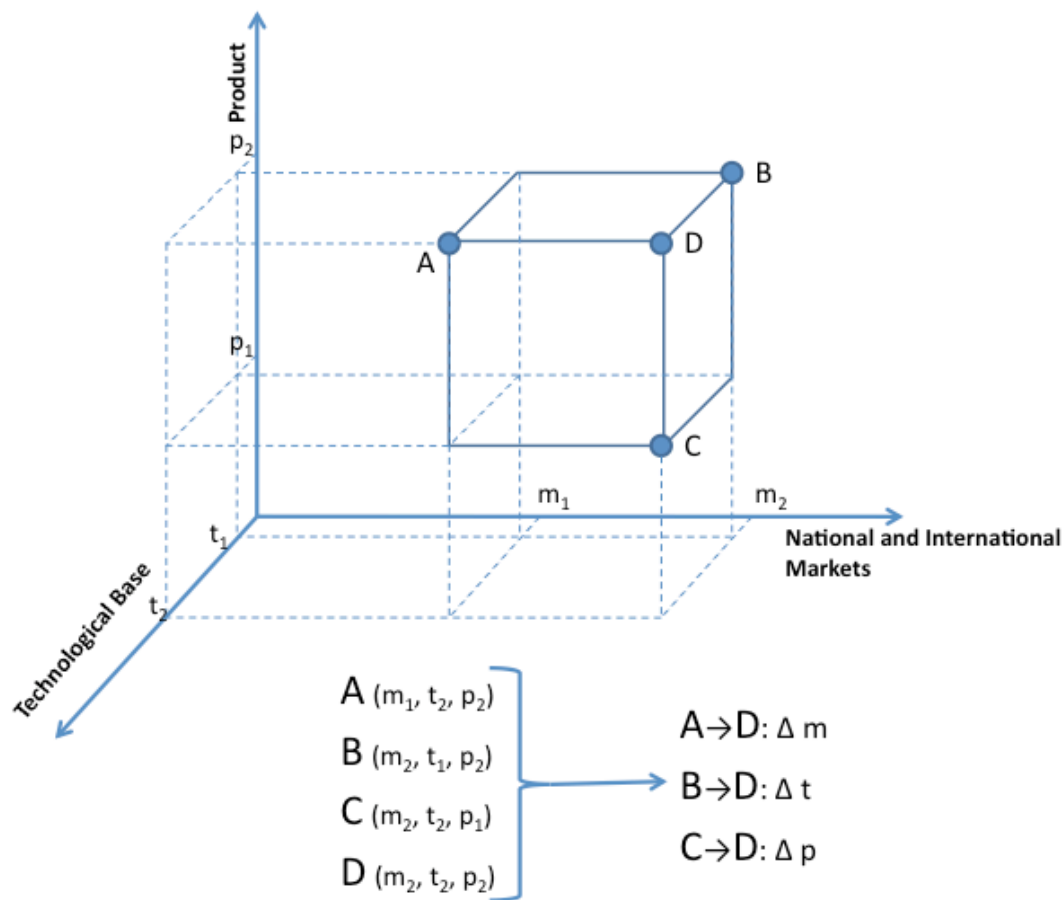


Figure 2 - Internationalization and Diversification.
Source: Organized by Authors. Based on PENROSE, 2006

Opto Electronica has developed global products using the same technological base, the laser. Thus, the company has the ability to develop various applications for the laser in its different divisions: medical, dental, optical, aerospace and industrial. The products developed from the same technological base are exported to many countries, which leads to diversification of geographic markets.

Bematech also uses the technology originally created for the production of telex printers and has developed new applications for business automation. The acquisition of companies in Brazil and abroad has contributed to the development of new skills and

applications even for international markets. As a result, the company has been able to provide a complete supply for clients, which can be understood as a way to protect from local and international competitors.

Lupatech has achieved the diversification of products and services through the acquisition of companies in Brazil and abroad. Especially in the Energy Segment, new technologies acquired contribute to the development of products and services, which are easily adaptable according to the geographic market. Diversification through acquisition of companies can also be understood as a way to protect from competitors.

6. Conclusion

This study seeks to fill a gap in literature related to the analysis of different trajectories in the internationalization processes among Brazilian companies. Analyzing data obtained in field research, we conclude that the studied companies initiated the commercial internationalization early. Therefore, when compared with most big companies studied in literature, these companies became internationalized few years after foundation, unlike large companies that can be classified as late internationalization. The three companies have considered the creation of new technologies and applications as central elements to the expansion and development since the beginning of activities. Leaders interviewed also consider global performance as critical to the development of the companies.

The first commercial subsidiaries abroad were established in developed countries: Opto Eletronica and Bematech in the United States and Lupatech in Germany. This is another aspect that differs from most of Brazilian companies. The commercial subsidiaries established abroad also contributes to advances in technology and the studied companies did not start the commercial internationalization in South America countries.

The studied companies have developed products and operated in global markets in which the renewal of the products is accelerated. In this scenario, the continued investment in R&D activities and monitoring of trends are central elements to the continuity of their activities. These activities are concentrated in Brazilian laboratories and have always been considered essential for growth and business development.

Therefore, it is important to consider that the analysis of the internationalization trajectories and processes of Opto Electronica, Bematech and Lupatech shows that they do not follow the common trend of internationalization presented by most of the Brazilian companies. Yet, this divergence can be explained by the continuous efforts on the development of new technologies and applications. This is the main element that distinguishes the studied companies from most Brazilian companies. This way, the production of goods and services of high technological density has important impacts on the path of internationalization for these companies.

Finally, this study tried to implement all necessary procedures for the preparation of an academic research, selecting companies that have common characteristics, interviewing people able to provide consistent information for the analysis of the cases and analyzing the information collected with reference to a conceptual framework obtained from the literature review. However, we realize that many points could be improved and other contributions could be incorporated into the text.

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