

## **External Sources of Information for Innovation: the Brazilian and Italian Cases**

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## ABSTRACT

The purpose of this study is to understand how environmental factors influence the process of managing external sources of information for the innovation of industrial firms within different spheres of operation. The qualitative data were obtained through interviews designed to obtain information from countries with different industrial policies and structures, conducted with Brazilian and Italian firms. The research results suggests there is no strong influence of the environmental context of the country upon external innovation management practices among the analyzed countries. The managing external sources of information for innovation is not very formal in most of the firms examined.

Keywords: Management, external sources of information, innovation.

## 1 Introduction

This study sought to identify certain corporate practices connected with the process of managing external sources of information for innovation, in the light of environmental factors that condition the actions of industrial firms within different contexts. Despite the growth of innovation based on the use of external information sources, few organizations have a strategy for managing these sources. The activities conducted within this sphere are frequently performed unwittingly or in isolation and often conditioned by the environmental factors found in their region or country of operation.

The process of managing innovation sources not only helps the organization to combine the internal and external information sources to be considered, but also to expand its innovation activities. Firms are expanding alliances for using external innovation sources, but they still lack an explicit strategy for managing sources of information for innovation.

This research was conducted based on case studies of Brazilian industrial firms in the automotive and cosmetic sectors in the Greater São Paulo area and of Italian industrial firms in the automotive and printing sectors, in Turin and Milan, in northern Italy. The analysis of the management practices of top ranking firms within the Latin-American and European contexts helped us to identify and compare practices and is also the basis for the dissemination of this theme, which is not researched much within academic milieus. It is also a source of guidance for firms that seek to manage and integrate the many sources of information for innovation, with a view to maximizing their results.

## **2 The process of managing external sources of information for innovation**

Defining a firm's mix of internal and external sources of innovation is one of the critical aspects of its technological strategy, which must provide answers for certain basic issues related with the use of information consisting, fundamentally, of identifying the role of information sources (internal and external) and how they are to be integrated, observes Toledo, 1993.

In analyzing the success characteristics of innovative firms, Rothwell (1992) identified certain common factors, of which the following stand out: establishing a suitable internal and external communication system, effective articulation with external sources of scientific and technological know-how, and willingness to receive external ideas.

Identifying an innovation strategy includes defining objectives, desirable domains and products. To this end, one must outline the internal and external sources that are to be controlled and the key source-management principles that will guide decisions, to ensure that the objectives will indeed be met (Linder, Jarvenpaa and Davenport, 2003b). Only holistic management of the innovation process can guarantee the organization's success and

competitiveness, transforming ideas into new product categories and guaranteeing new market niches and new business models.

In this sense, Chatterji (1996) developed a conceptual model outlining the main elements that configure the process of managing external sources of information for innovation, as shown below in the figure 1.

**FIGURE 1**

**Generic process for managing external sources of information for innovation**

Stages	
I	Defining the needs of the business in relation to external sources of technology;
II	Organizing the internal infrastructure and the required resources – structure, processes, information and people for managing innovation opportunities.
III	Identifying and coordinating innovation opportunities through formal and informal networks, within the firm and outside it;
IV	Evaluating the technical and commercial merit of the opportunities identified for making decisions about purchasing technology or not;
V	Negotiating technical, commercial and legal aspects with the team and the partners. Integrating the acquired technology is the desired outcome in this stage of the process;
VI	Observing the failures and successes at each stage and incorporating the lessons in a process of learning and continuous improvement.

Source: Adapted from Chatterji, 1996.

Interest in absorbing external technology has been rising substantially among the R&D management community. Firms are increasingly exploring means of establishing business relations with external technology sources. The greatest difficulty lies in recognizing the strategic aspects of managing external sources of information for innovation.

Several studies have been carried out to try to identify sources of information and their relationship with organizational innovation. Hartman, Tower and Sehora (1994) state that the importance and frequency of use of idea sources among firms is a subject of growing research interest. Managers are regular consumers of external information and of verbal exchanges with people in the marketing area. The sources most often used are the personal, the written and the informal ones.

In a study conducted with the telecom sector, Porto, Prado and Plonski (2003) state that the sources that firms use the most, according to research data, are headquarters' R&D departments, internal R&D departments, universities, research institutes and attendance at conferences, symposiums, fairs and exhibitions. Research institutes and universities, however, are used little and infrequently. This is also the case of conferences, symposiums, fairs and exhibitions, as well as of specialized publications. Suppliers, clients and consulting firms are also seldom used. As for the acquisition of patents, licenses and know how, other firm departments, firms within the group and competitors, these are sources that are not used by most of the researched firms.

Laursen and Salter (2004) analyzed the sources of information and knowledge for innovation among English manufacturing firms. Results indicated that internal sources are the ones used most often, followed by external market sources. The innovation activities of English firms are determined by their relations with suppliers and consumers and by the way in which they organize their internal innovation support activities. The sources of innovation ideas were also identified in the approach of Salter and Gann (2002) to an English firm. The study conducted with the firm's staff showed that the main idea sources used by firms are internal ideas and staff, and that they come from chatting to colleagues, projects and prior experiences. Similarly, the study of Linder, Jarvenpaa and Davenport (2003a) indicated that the use of external sources for innovation will tend to grow significantly in the next few years. Organizations have been switching their focus from internal to external sources of information for innovation through involvement with venture capital, alliances or technology acquisitions. Despite using information sources for external innovations, organizations lack a strategy for managing these sources.

Organizations can look to other organizations to innovate, but they often do it unwittingly or look for a single innovation source isolatedly. Few firms have an innovation

source management strategy designed to manage the many sources of innovation in such a way as to achieve better results. Innovative firms create and manage several sets of innovation channels that not only incorporate sets of sources, but that also establish interface management approaches. They develop multiple external sources and have a clear and explicit strategy for using innovation sources. (Linder, Jarvenpaa and Davenport, 2003a).

At the same time, as Beltramo, Mason and Paul (2004) highlight, a firm's capacity to expand its knowledge based on the use of external sources derives from combining several relationships that may be formal or informal – involving other firms, inter-firm collaboration (involving consumers and suppliers) and the dissemination of technology among firms involving university departments or laboratories from the public or private sectors, as well as the networking capabilities of R&D staff for building personal relationships with scientists and engineers from other firms and organizations. Few firms have a corporate innovation focus; they rarely have an innovation model as a target and the business innovation process tends to materialize during occasional reengineering initiatives. The authors highlight the following among the main advantages of using external sources: creating new opportunities, achieving faster and more effective results, cutting innovation costs, defining priorities more easily and encouraging internal innovation.

To establish innovation channels linked with the organizational process one must identify a place for managing sources, codify work practices, and implement performance metrics. Innovation sources involve certain subtle and problematic limitations, such as culture, pace, information flow and work processes. To overcome these problems and create effective innovation channels one must recognize barriers and limitations explicitly and be aware that the use of innovation sources calls for different approaches. (Linder, Jarvenpaa and Davenport, 2003a).

Thus, one can see how important the management of innovation sources is for the current context of organizations. In most of them, innovations occur in an unsystematic way. This highlights the strategic nature of managing sources of information for innovation and organizational competitiveness. Management of the innovation process should focus primarily on capturing value rather than on internal development. Furthermore, measuring performance is crucial, even if it is performed less than perfectly.

### **3 Methodology**

#### **3.1 Type of research**

The research consists of a qualitative study of multiple cases, with a view to acquiring an in-depth knowledge of a phenomenological nature of the processes under study. Yin (1990) defines the case study method as a research strategy for the study of complex social phenomena that enables one to retain the holistic and significant characteristics of the events within their real context.

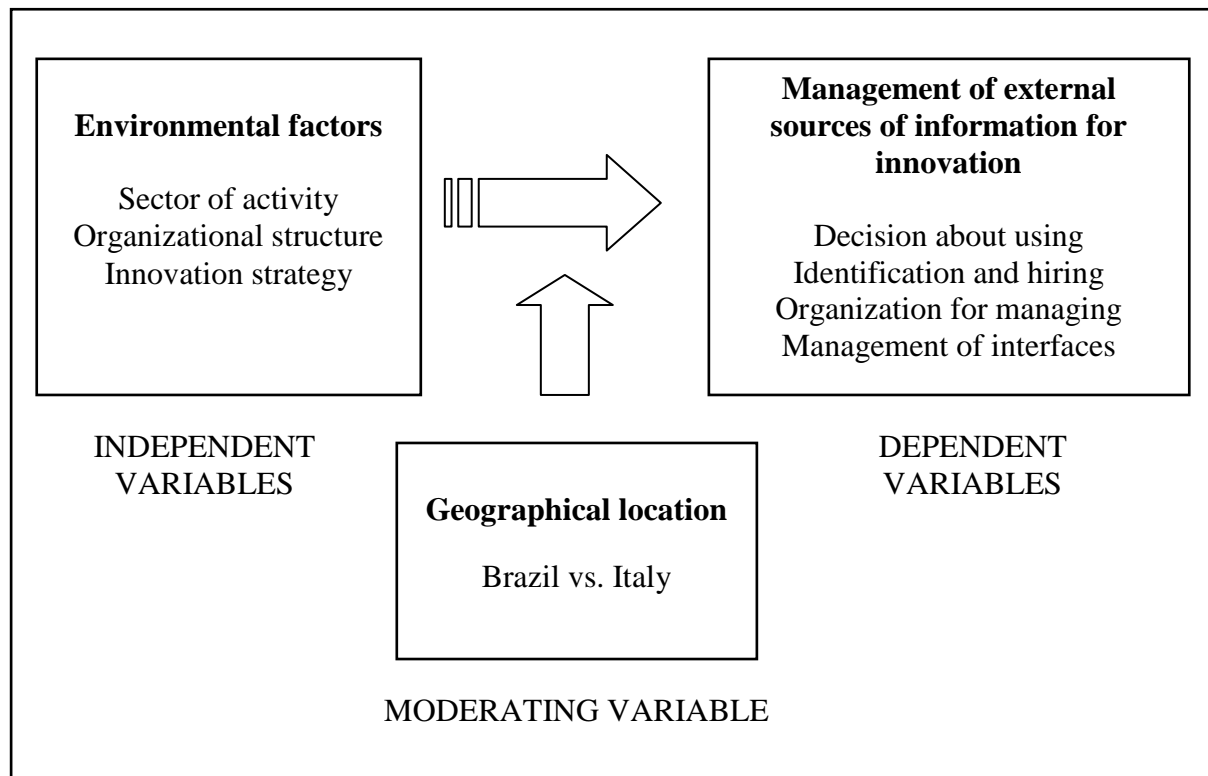
The data were obtained through semi-structured interviews with Brazilian and Italian industrial firms, in order to understand their management practices regarding external sources of information for innovation, as well as to identify the variabilities driven by the different environmental factors of the contexts of the countries involved.

#### **3.2 Conceptual research model**

Through this study, we tried to put into context the different economic and cultural aspects that differentiate corporate behavior and logic in each country, as well as the structural

and technological aspects and the adopted management practices. The conceptual model adopted is illustrated in figure 2.

**FIGURE 2**  
**Conceptual Model of the Research**



The preparation of the conceptual research model took into account a qualitative methodological approach, as recommended by Pettigrew (1985), who suggested a contextualist analysis of the process. Based on the study's objectives, we prepared the dimensions and variables required for carrying out the research, which included the dimensions of context and processes. The dimensions and variables of the conceptual model developed are shown in figure 3.



**FIGURE 3****Research dimensions and variables**

<b>Dimensions</b>	<b>Variables</b>
<b>Context</b> - Description and analysis of the variability of the contexts within which the processes take place	<b>Environmental factors</b> - Economic characteristics - Characteristics of the sector of operation - Organizational structure - Technological management strategy
<b>Process</b> - Description and analysis of the process under investigation, its variability or constancy.	<b>Managing external sources of information for innovation</b> - Decision about using external sources of information - Identification and hiring of external sources of information - Organization for the management of external sources of information - Critical aspects of the management of external sources of information

Source: Based on the conceptual and methodological approach of Andrew Pettigrew (1985).

### 3.3 Procedures for collecting and analyzing data

To achieve the research proposal we collected qualitative data from two outstanding industrial firms from the automotive and cosmetic sectors in the São Paulo metropolitan area, in Brazil's southeast, as well as from two industrial firms from the automotive and printing sectors in the metropolitan areas of Turin and Milan, in northern Italy. The firms were identified and selected according to their size, activity, degree of innovation and market positioning.

The criteria used allowed us to outline the firms' profile as follows: large, innovative, market-leading industrial firms with a technological base. Furthermore, easy access to information was another determining factor. Access to the Brazilian firms was facilitated by the cooperation activities of the Program for Technological Innovation and Project Management (PGT) of Fundação Instituto de Administração de São Paulo. For the field

research in Italy, the researchers relied on the support of the School of Management of Bocconi University, which received the researchers and associated itself with them to develop the methodological formulations and conduct the research, the results of which will be shared with the said institution – considered one of the best in Italy and in Europe - for subsequent publishing purposes.

The primary data, of a qualitative nature, were collected from semi-structured interviews with the people in charge of the technological innovation areas of the firms in both countries. Furthermore, secondary data from leaflets and manuals that were made available were also analyzed, as well as the information from the firms' Web home page. The analysis of primary and secondary data was conducted descriptively based on content analysis.

The organizations were investigated as to the main characteristics of their process for managing external sources of information for innovation according to country of origin. Then a comparative analysis of the characteristics found was conducted between the two countries, enabling us to evaluate the relative significance of the practices identified.

The analysis of international comparisons takes into account that the industrial structures of European countries are profoundly different from Brazil's, conditioning the results obtained, as Viotti, Baessa and Koeller (2005) noted. One of the greatest challenges faced by firms from developing countries is to accelerate the speed of organizational and technological learning in order to make it easier to enter and remain within globalized markets, as Fleury, M. T. and Fleury, A. (1997) state. On the other hand, from the point of view of developing countries, an understanding of these themes is crucial for developing corporate structures capable of fostering local competitiveness. Thus, the comparison between the Brazilian case and developed countries enriches the analysis in that the characteristics and practices found may spur the growth of Brazilian competitiveness.

## **4 Results Analysis**

### **4.1 Economic context of Brazilian and Italian industrial firms**

An analysis of the economic context of the countries of the investigated firms is fundamental, due to the differences between these environments, resulting from their different characteristics, especially with regard to their policies, industrial structures and types of investment in technological activity. To contextualize the environment in which the Brazilian and Italian firms are inserted, we present certain characteristics of the technological innovation activity that were considered relevant for understanding the theme in question.

Concerning the characteristics of Brazilian industry, one sees that its investment norm, based on attracting multinationals, caused it to be characterized by foreign capital, even though it remained very closed, playing only a minor role internationally. The opening of Brazil's economy in the 80s and 90s had direct and indirect effects on Brazilian industrial activity. As from when public policies and quality programs were adopted, industry sought to rationalize production processes, putting on a backburner its R&D activity, which, however, is crucial for product innovation and differentiation. Thus, Brazilian industry lacks a significant growth of its technological innovation activities and participation in international trade (De Negri, Salerno and Castro, 2005).

On the other hand, Italian industries, characterized by a predominance of small and medium-sized firms, base themselves on developing latest-generation technology (technological information, telecommunications, biotechnology and advanced instrumentation). Universities and research centers with a substantial tradition in the field of application of experimental research are active institutions that function as drivers for the generation of new knowledge and advanced training. High-tech firms near these institutions

facilitate the process of recruiting researchers and qualified technicians and enable the development of local scientific research, as well as cooperating and maintaining relations with other universities and research centers offering high technology and service. The main aspect that affects the creation and survival of a new firm is the establishment of networks of firms, universities and other institutions in an advanced technological stage. The capacity to “talk the same language” is an essential condition for transferring knowledge from institutions more directly connected with scientific research to those involved with the production process (Cardini and Fumagalli, 1997).

The comparison of the two countries also shows that there are significant differences in their technological innovation activity. In Brazil, one sees that the office equipment and IT sector is the one with the greatest degree of innovation among the researched firms and that the greatest rate of innovation is found among large firms. The most important innovative activities are connected with acquiring machinery and equipment. The acquisition of R&D and other knowledge external to the firm are activities that are still incipient in Brazil’s industry. Similarly, one must highlight the small degree of cooperation between firms and research institutes for the development of innovative activities (Ibge, 2000). For most firms, the main information sources are their clients, suppliers, competitors and R&D department. Firms ascribe little importance to universities and innovation institutions as sources of information, which reflects how very limited is the interaction between the public and private institutions of the innovation system (Fundação Seade, 1996). Moreover, it is important to stress that according to data presented by Viotti, Baessa and Koeller (2005), only 20% of the Brazilian innovative firms engage only in product innovation. Most of them engage in process innovation, particularly based on the purchase of machinery and equipment, which is a low ratio vs. that of European countries.

In Italy, the highest percentages of innovative firms are found in the sectors that manufacture office equipment, precision instruments, radio and TV sets, telecommunication devices, plastic products, chemicals and, in particular, pharmaceuticals. The sources of information that help technological innovation in industrial firms are in-house sources, information from other firms of the same group, suppliers, clients and information obtained at trade shows and fairs. The informative contribution from other sources, such as seminars and conferences, technical journals and information networks (including the Internet) is considered secondary. Large firms rely mainly on their in-house sources, suppliers, clients and other firms in the same group (Eurostat, 2004).

The technological activity characteristics presented highlight certain key differences in the profile of industry and of technological activity when one compares the two countries, as follows:

In Brazil, industrial activity is mainly characterized by the large firms, which invest primarily in process innovations. Brazilian industry lacks technological advances and a strengthening of the collaborative and partnership relations between the public and the private sectors, between firms, universities and research institutes. It is also lacking in competitiveness and insertion in the international scene.

In Italy, what characterizes industry is the predominance of small and medium-sized firms, as well as latest generation technology. Technological activity focuses on product innovation; corporate priority is product innovation and firms have a long-standing tradition of establishing cooperative networks with universities and research centers. In general, Italian industry has a high degree of competitiveness and insertion in the international scene, in line with the behavior of European Union countries.

## 4.2 Case study of Brazilian firms

The data were obtained from two industrial firms from the automotive and cosmetic sectors. The categories of analysis studied are presented below.

### 4.2.1 Organizational characteristics of the Brazilian firms

The profile of the researched firms is defined through an outline of aspects connected with their industry, the source of their capital, location, main products and main clients. The profile is presented in the table 1.

**TABLE 1**

**Profile of the Brazilian industries researched**

Firm A	Firm B
Industry. Automotive Source of capital. National. Location. Headquartered in the city of São Paulo. Plants in Brazil, Argentina, Germany, Austria and Hungary; branches in the US and Australia. Technical-commercial offices in Italy and England. Main products. Retainers, joints and hoses for sealing and for the conduction of gases and fluids. Main clients. Multinational automakers - Volkswagen, Ford, General Motors, Renault, Mercedes Benz – Brazil, South America, North American, Europe, Africa and Asia.	Industry. Cosmetics and personal care and perfumery products. Source of capital. National. Location. Headquartered in the city of São Paulo. Operating in Brazil, Argentina, Chile, Peru and France. Main products. Products for: facial and body skin treatment, hair care and treatment, baths, sun protection and oral hygiene; makeup; perfumes; and children's lines. Main clients. Direct sales to consumers.

The profile of the Brazilian firms that were researched, in economic and technological terms, has certain differences and similarities. The main differences, besides their products, are that they belong to different sectors and function in different positions along the industrial chain. Firm A operates in an intermediate position in the automotive sector, supplying parts for automakers. Innovation needs and opportunities can appear at any point of a broad and

complex network of participants. Firm B makes cosmetics and personal care products and sells them directly to consumers. Its main management strategies are to create an external network of alliances with other firms, suppliers, universities and research centers and to coordinate expertise from international partners and strategic alliances for the development of high technology. What they have in common is their size and leadership in their respective sectors, as well as high rates of innovation, external relationships, competitiveness and international insertion.

#### **4.2.2 Managing external sources of information for innovation**

The main elements of the process for managing external sources of information for innovation are the identification and hiring of external sources, the organization for managing external sources and the critical aspects of the process of managing external sources of information for innovation. The practices of the Brazilian firms researched are presented in the summary exhibit below in the table 2.

TABLE 2

**Management practices regarding external sources of information among the Brazilian firms researched**

	<b>Firm A</b>	<b>Firm B</b>
<b>Decision to use external sources</b>	The main criteria used are cost and opportunity.	The main criterion used is speed of information.
<b>Identification and hiring of external sources</b>	<p><i>Technology acquisition.</i> Licensing and company acquisition activities.</p> <p><i>Investments in technology.</i> Strategic alliances.</p> <p><i>Development of technology in partnership with others (co-sourcing).</i> Competitors, suppliers, universities and educational institutions.</p> <p><i>Acquisition of external resources.</i> Hiring of outside professionals and of expert consulting firms.</p> <p><i>Other sources.</i> Scientific and professional gatherings, fairs and exhibitions, technical and scientific publications, visits to other firms in the group and other firms or licensors, interactions within networks and adoption of the technological standards of the automotive sector (health, safety and environment-related).</p>	<p><i>Technology acquisition.</i> Suppliers, clients, licensing activities, subcontracting and outsourcing, and the acquisition of firms.</p> <p><i>Investments in technology.</i> Strategic alliances with suppliers. Development of technology in partnership with others (co-sourcing). Suppliers and communities of indigenous populations, universities and educational institutions, governmental research organizations, other public and private institutes and private research institutes.</p> <p><i>Acquisition of external resources.</i> Hiring of outside professionals and of expert consulting firms.</p> <p><i>Other sources.</i> Scientific and professional conferences, corporate and professional associations, fairs and exhibitions, reading technical and scientific publications, visits to other firms or licensors, networking with scientists and engineers from other firms and organizations and the adoption of the technological standards of the cosmetic sector regarding health, safety and the environment.</p>
<b>Organization for managing external sources</b>	Matrix structure by projects and cells. There is no sector responsible for managing external sources of information for innovation.	Processes structure. There is a specific sector for managing technology processes.
<b>Critical aspects of the process of managing external sources of information for innovation.</b>	<i>Secret Agreements and/or New Disclosure Agreements.</i> Confidentiality and security issues determine the use of external sources and the partnership relations that are established.	Bureaucracy and legal aspects of formalizing partnerships, especially in the relations between universities and the firm.



#### **4.2.3 Analysis of the characteristics of and practices for managing external sources of information for innovation of Brazilian firms**

Based on the analysis of the characteristics of and practices for managing external sources of information for innovation among the firms studied, certain aspects merit highlighting. The structure of firm A is organized in cells, but there is no specific sector in its organizational structure in charge of managing the external sources of information for innovation. Information sources for innovation are sought according to the needs of each project under development and of the clients. The firm tries to obtain and develop technology through several sources such as acquiring technology, investing in technology, developing technology within a partnership (co-sourcing) and others. Among the partnerships, those with universities, technological institutes, clients and, in some cases, competitors, stand out. The process of managing external sources is not very formal, although one can identify certain practices that are more institutionalized when one broadly considers the process of managing innovation. There is considerable room for improvement that can enable the company to be more effective in managing its external sources of information for innovation.

Regarding firm B, one observes that the criteria guiding the choice of external sources of information for innovation are established based on the technological strategy and the needs of the strategic areas involved. The process of managing external sources is currently undergoing consolidation as a result of the recent creation of a specific position in charge of managing the administrative processes related with external sources of information for innovation. The new function is also responsible for managing the interfaces between the company's technology development areas, involving technological partners and sources of innovation. The existence of a technology committee in charge of developing the technological management strategy is a major facilitator of the process of managing external

sources of information for innovation, which is considered a fundamental function for achievement of the firm's technological strategy.

### 4.3 Case study of Italian industrial firms

The data were obtained from two industrial firms in the automotive and printing sectors. Below, we list the researched analysis categories.

#### 4.3.1 Organizational characteristics of the Italian firms

The profile of the Italian industrial firms researched is defined through an outline of aspects connected with their industry, the source of their capital, location, main products and main clients. The profile is presented in the summary exhibit below in the table 3.

**TABLE 3**

**Profile of the Italian firms researched**

Firm A	Firm B
Industry. Automotive. Source of capital. National. Location. Headquartered in Turin, Italy, with several plants located in the five continents. Main products. The firm operates in the automotive industry, designing, building and selling automobiles, trucks, tractors, agricultural machinery, earth-moving machinery, engines, auto parts and means of transportation, as well as means and systems of production. Main clients. The firm's clients are the dealerships in the global FIAT network.	Industry. Printing. Capital. National. Location. The MF Group is comprised of Publicenter and Card Imaging Master and operates in the markets of Europe, the USA, Asia, the Middle East and Africa. It has two production headquarters in Riveggio and Vedano Olana in northern Italy. Main products. The firm is one of the world's largest producers of plastic cards and related systems for personalization. Main clients. Visa and Mastercard credit cards as well as TIM phone cards.

The profile of the Italian firms researched has both differences and similarities. Firm A belongs to the automotive sector and supplies vehicles for a vast range of customers and

resellers. Operating in a dynamic and technologically mature sector, its innovation activities are motivated by the production of bold components and by a quest for alternative sources of energy and materials. Firm B manufactures and sells products and services directly to consumers, within an environment that is considered dynamic and subject to frequent technological changes. What guides its innovation activities is the quest for technological solutions in a market with great growth and development potential. The main differences concern the manufacturing and production of products and belonging to different sectors. What the two firms have in common is their size, sector leadership and a high degree of innovation, external relationships, competitiveness and international insertion.

#### **4.3.2 Managing external sources of information for innovation**

The main elements of the managing external sources of information for innovation are those connected with the decision on whether to use them or not, finding and hiring these external sources, the organization for managing them and the critical aspects of the process. The practices of the Italian firms researched are shown in the summary exhibit below in the table 4.

TABLE 4

**Management practices regarding external sources of information among the Italian firms researched**

	<b>Firm A</b>	<b>Firm B</b>
<b>Decision to use external sources</b>	The main criteria adopted are the possibility of internal development (know-how) and the convenience of purchasing technology externally.	The main criteria are the cost of internally developing the technology and the opportunity to acquire it externally.
<b>Identification and hiring of external sources</b>	<i>Technology acquisition.</i> Competitors (pre-competitive stage) and suppliers. <i>Development of technology in partnership with others (co-sourcing).</i> Universities and technology centers (Harvard and the Massachusetts Institute of Technology -MIT). <i>Acquisition of external resources.</i> Suppliers. <i>Other sources.</i> Networking with scientists and engineers from other organizations (benchmarking).	<i>Technology acquisition.</i> Suppliers, licensing and acquiring firms. <i>Investments in technology.</i> Strategic alliances. Development of technology in partnership with others (co-sourcing). Competitors and suppliers. <i>Acquisition of external resources.</i> Hiring outside talent. <i>Other sources.</i> Scientific and professional conferences, fairs and exhibitions, visits to other firms in the group and to other firms or licensors, adoption of technological standards (health, safety and the environment) relative to consumers and suppliers.
<b>Organization for managing external sources</b>	Structure by unit of products. There is no sector responsible for managing external sources of information for innovation. The function is diluted between the platform executive offices during the project and product development stage, and the innovation executive office, during the project execution stage.	Structure by projects. There is no specific sector for managing technology processes. The function is the responsibility of the business development area.
<b>Critical aspects of the process of managing external sources of information for innovation.</b>	<i>Secret Agreements and/or New Disclosure Agreements.</i> There is a distinction between the pre-competitive and the competitive stages during the process of collaboration, obtainment of government financing, balance between internal know-how and partner know-how. Confidentiality and security issues determine the use of external sources of information and the partnership relations established.	Contractual and legal aspects and secret agreements. The differences in the size and technological level of the firms make legal and contractual agreements difficult, as well as project diversity with multiple sources and collaboration partners.

#### **4.3.3 Analysis of the practices for managing external sources of information for innovation of Italian firms**

That data obtained in relation to the first case analyzed (the automotive firm) show that it is operating in a technologically dynamic and mature sector. Innovation activities are motivated by the production of bold components and the search for alternative sources of energy and materials. The organizational structure consists of autonomous production units that are centers of results. Responsibility for managing external sources of information is diluted between the platform executive offices and the innovation executive office, depending on the product development stage. The firm uses several external sources of information related with the acquisition of and investment in technology, as well as development of technology in partnership, the acquisition of outside resources and several other sources, among which partnership and cooperation activities with competitors, suppliers, universities and research centers stand out. Thus, one sees that although the firm has a fairly well developed R&D area, it nevertheless has a strong tendency to strengthen its strategy of managing external sources of information for innovation as a way of ensuring innovation and competitiveness in an environment that is susceptible to technological changes. To this end, it adopts many external sources of information and various types of cooperation, depending on the stage of the production process.

The data obtained in connection with the second case under analysis, the printing sector firm, show the presence of a dynamic environment subject to frequent technological changes. The firm's innovation activities focus on a quest for technological solutions within a market with great growth and development potential. Its matrix organizational structure is formed by production and project cells. The function of managing external sources of information for innovation is under the responsibility of the business development sector, an

interface body between the firm and its partners. The firm uses several external sources of information related with the acquisition of and investment in technology, development of technology in partnership, the acquisition of external resources and several other sources, among which licensing and the adoption of technological standards vis-à-vis consumers and suppliers stand out. The firm manages external sources of information according to the specificities of each project developed, trying to ensure, based on the establishment of high-quality partnerships with high technological standards, a competitive advantage within an environment underscored by evolution and technological obsolescence, with high growth and development potential.

#### **4.4 Comparative analysis of case studies in Brazilian and Italian firms**

Although operating within different economic and cultural contexts, the Brazilian and Italian firms have similar organizational and innovation profiles. The firms researched are located in the most developed areas of both the countries, which may explain the similarities found in their organizational profile and practices for managing external sources. Although they work in different industries and in different positions within the production chain, all the researched firms are leaders in their sectors and engage in a high level of innovation, competitiveness and insertion in the market.

The following, in the table 5, is exhibit summarizes the main practices related with the process of managing external sources of information among the investigated industrial firms, according to country of origin.

TABLE 5

**Management practices regarding external sources of information, among the Brazilian and Italian firms researched**

	<b>Brazilian Firms</b>	<b>Italian Firms</b>
<b>Decision to use external sources</b>	Main criteria adopted: cost, opportunity and speed of information.	Main criteria adopted: cost, the possibility of internal development (know-how), the opportunity and convenience of acquiring technology externally.
<b>Identification and hiring of external sources</b>	<p><i>Technology acquisition.</i> Licensing activities, acquiring firms, suppliers, clients, subcontracting or outsourcing.</p> <p><i>Investments in technology.</i> Strategic alliances (suppliers).</p> <p><i>Development of technology in partnership with others (co-sourcing).</i> Competitors, suppliers, universities and educational institutions, communities of indigenous populations, governmental research organizations, other public and private institutes and private research institutes.</p> <p><i>Acquisition of external resources.</i> Hiring of outside professionals and of expert consulting firms.</p> <p><i>Other sources.</i> Scientific and professional gatherings, scientific, corporate and professional associations, fairs and exhibitions, technical and scientific publications, visits to other firms in the group and other firms or licensors, interactions within networks and adoption of the technological standards of the automotive sector (health, safety and environment-related).</p>	<p><i>Technology acquisition.</i> Competitors, suppliers, licensing and acquiring firms.</p> <p><i>Investments in technology.</i> Strategic alliances.</p> <p><i>Development of technology in partnership with others (co-sourcing).</i> Universities and technology centers, competitors and suppliers.</p> <p><i>Acquisition of external resources.</i> Suppliers, hiring of outside talent.</p> <p><i>Other sources.</i> Networking with scientists and engineers from other organizations (<i>benchmarking</i>). Scientific and professional conferences, fairs and exhibitions, visits to other firms in the group and to other firms or licensors. Adoption of technological standards (health, safety and the environment) relative to consumers and suppliers.</p>
<b>Organization for managing external sources</b>	Matrix structure by projects, cells and processes. Only one of the companies has a sector responsible for managing external sources of information for innovation.	Structure by product units and by projects. Both companies lack a sector responsible for managing external sources of information for innovation.
<b>Critical aspects of the process of managing external sources of information for innovation.</b>	<i>Secret Agreements and/or New Disclosure Agreements.</i> Confidentiality and security issues, bureaucracy and legal aspects of the formalization of partnerships, especially in the relations between universities and the firms.	<i>Secret Agreements and/or New Disclosure Agreements.</i> distinction between the pre-competitive and competitive stages during the process of collaboration, obtainment of government financing, balance between internal know-how and partner know-how, contractual and legal aspects, legal and contractual difficulties, diversity of projects with multiple collaboration sources and partners.

The comparative analysis of the practices of the Brazilian and Italian industrial firms researched shows both similar and dissimilar behaviors.

**Decision about using external sources.** The criteria used for making decisions about using external sources of information are similar in all the firms researched. The choice of external sources of information for innovation is conditioned initially by their internal development capabilities (know-how). Then, an evaluation of issues connected with cost and opportunity follows.

**Identification and hiring of external sources.** Concerning the external sources identified and hired, the behavior observed is also fairly similar. Generally, the firms are characterized by a broad network of partnerships and external relationship. Many external sources are used, starting with the acquisition of technology, investment in technology, development of technology in partnership (co-sourcing), acquisition of external resources and other sources.

**Organization for managing external sources.** The organizational structures identified are modern and bold. Generally, they consist of variations of a matrix structure, depending on the projects and the products. Only the Brazilian cosmetics and personal care products company has a specific area for managing external sources of information for innovation.

**Critical aspects of the process of managing external sources of information.** The main difficulties in the process of managing external sources of information are also similar. Bureaucracy, confidentiality and the level of know-how between the partners are common aspects among the firms investigated.

The behavioral similarities found among the researched firms can be explained by their organizational characteristics and innovation profile. Although belonging to different countries and sectors, the firms are located in the most developed regions of their respective



countries and enjoy a similar size, degree of innovation, relationship, competitiveness and international insertion.

The cases analyzed allow us to conclude that the local and organizational characteristics and the innovation profile of firms influence the process of managing external sources of information for innovation more strongly than the macroeconomic aspects of the context of their respective countries.

## **5 Conclusions**

The analysis of the practices adopted by Brazilian and Italian industrial firms in relation to the process of managing external sources of information for innovation and the environmental factors that condition their application indicate that in general the management process is still in a structuring and development stage in the firms analyzed. However, one can see the importance attributed to the subject and the firms' efforts to enhance their potential for obtaining information by using external sources of information.

Depending on the needs and the specific requirements of each firm analyzed, the degree of structuring for managing external sources varies. The Brazilian and the Italian automotive sector firms have a very linear behavior. Because of the characteristics of their sector, these firms traditionally and prioritarily invest in internal R&D, due to confidentiality and trade restraint issues, though they have a very broad and active network of external collaboration and partnerships, among which their relationships with universities and with both public and private technological research institutes stand out. Current market conditions, however, caused them to understand that changes in this orientation are necessary. Cost and opportunity issues are increasingly taken into account. The Brazilian cosmetics and personal care products firm operates within a sector that is highly dependent on basic research, due to

the sector's large number of enterprises, products with a very short life-cycle and the need for continuous innovation. This firm stands out for having a management process that is better structured, formalized and integrated with corporate technological innovation strategy, thanks a specific area for managing the interfaces of the process, which is uncommon. In the other firms, the function is diluted between the technology area and the business development area. Though the firms investigated did not reflect much difference where the diversity of sources of information used is concerned, the way in which they manage the process of searching for and exploring external sources is different. In some firms, this process is more complex due to the large number of external sources of information used and because of the network of partnerships that have been established. Among these, one can mention the Brazilian cosmetic and personal care products firm and the Italian firm in the printing area. Whereas in the firms in the automotive and printing sectors the process of managing external sources of information for innovation takes place in a relatively non-deliberate and isolated way, depending on the specific requirements of each product, in the Brazilian cosmetic and personal care products firm the very same process is conducted quite consciously and intentionally.

These research conclusions corroborate the analyses of Linder, Jarvenpaa and Davenport (2003a), when they state that despite the rising importance and dissemination of the exploration of external sources for innovation, only some firms have an explicit strategy for managing the said sources. The lack of such a strategy makes the management of the process less efficient and reduces the possibilities of more effective exploration of sources of information. Managing these sources, although it is recognized as a critical element for the competitiveness of firms, is something that is still in an incipient stage in almost all firms.

The thoughts above lead one to realize that despite innovative characteristics and the practices employed for managing external sources of information, we were unable to identify

an explicit strategy for managing the said sources for innovation in the cases analyzed. We can only state that there is a strong orientation toward acquiring and developing technology externally, because of characteristics related with know-how, cost and opportunity found in the product development process.

The aspects highlighted above allow us to conclude that it was impossible to identify significant differences in the behavior of the firms as a function of differences in the context of their countries of origin. There is some evidence of the influence of environmental factors upon firms, such as the region in which they operate, their size and their degree of innovation, external relationships, competitiveness and international insertion. In sum, one can say that the local and organizational environmental characteristics and the innovation profile of the firms influence the process of managing external sources of information for innovation more heavily than the macroeconomic context of the firm's country.

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