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**The influence of innovation management for sustainable development practices in the
internationalization process**

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ABSTRACT

To provide new inferences on the relation between the management of technology information, sustainable development and the innovative performance of firms, a survey was carried out among Brazilian industrial enterprises with innovative characteristics. The study sought to understand how technological innovation management practices that take social and environmental responsibility into account influence firms' internationalization process. The independent and dependent variables suggest that there is a connection between managing technology for sustainable development and innovative performance. We tried to identify the main technological management practices that reflect commitment to sustainable development. The results suggest that firms' international success and high degree of competitiveness are based on offering innovative technology solutions that show commitment to the environment. The study identifies important elements of an emerging area of knowledge in the field of management sciences.

Key words: innovation management, sustainable development, internationalization process

1 INTRODUCTION

The study described in this article is part of a broader research project that sought to understand the relation between certain elements of the management practices surrounding sustainable technological innovation and the internationalization process, on one hand, and corporate performance and competitiveness, on the other.

This article presents the main indicators and characteristics found in a survey conducted among Brazilian industrial enterprises with innovative characteristics. The analysis of management practices in top grade firms forms the basis for the dissemination of the theme, as yet relatively unexplored in the academic milieu. It also provides some guidance for firms that seek to manage and integrate the many sources of innovation committed to sustainable development in their internationalization processes, in order to maximize their results and expand their competitiveness.

One of the main challenges faced by firms from developing countries is how to accelerate organizational and technological learning, in order to facilitate their entry and permanence in globalized markets, note Fleury, M. T. and Fleury, A. (1997). From the viewpoint of developing countries, understanding these themes is essential for the development of corporate strategies capable of providing competitiveness.

As for the characteristics of Brazil's industry, one observes that a pattern of investment based on attracting multinationals caused the country's industry to be characterized by the strong presence of foreign capital, although this industry remained very closed and with little international involvement. The Brazilian economy's opening in the 1990s had both direct and indirect effects upon the country's industrial activity. With public policies and quality programs as its starting point, industry sought to rationalize its production processes, putting Research and Development (R&D) activities on a backburner, even though these were fundamental for production innovation and differentiation. Thus, Brazilian industry lacks any significant increase in its activities of innovation and participation in international trade (DE NEGRI and SALERNO, 2005). In general, industry from developed nations has a high degree of competitiveness and participation in the international market, underscored by a strong regulation system that influences and is influenced by technological

changes designed to meet the requirements that are of rising concern for sustainable development.

Starting from this assumptions, this study aims to understand how corporate management practices concerning innovation and social and environmental sustainability influence competitiveness and Brazilian firms' international participation. Thus, the study seeks to provide a theoretical and practical framework for the development of a process of sustainable technological innovation, as well as to offer input for the development of policies designed to increase the competitiveness and the degree of Brazilian firms' participation in the international market.

2 THEORETICAL BASIS

2.1 Corporate management that targets sustainable development

Concern about the environment is permanent in the so-called developed countries. The European Union studies the current and future impact of technology upon the environment by means of technological foresight activities. Based on this, environmental conservation guidelines are issued. Furthermore, the social dimension of sustainability is studied. This involves the social aspects and the drivers underlying social changes.

This debate was born out of the original Sustainable Development concept, as put forth by the World Commission on Environment and Development (The Brundtland Commission) in 1987. This commission considered it technically feasible to meet the minimal needs of a global population twice as large as it then was, in a sustainable way and with no ongoing degradation of global ecosystems, to "fulfill the needs of the present generation without jeopardizing the capability of future generations to meet their own needs" (AMARAL and ROVERE, 2003). Ever since, several studies and tools have been developed. They

determine the conduct of the organizations that wish to tread the path of sustainable development.

The stimulus to start an innovation process may come from different internal and external sectors of the organization. New ideas may arise from different sources, of which the following stand out: suppliers, clients, competitors, enterprises in other sectors, the firm's personnel, and work done by other institutions, such as universities or research centers. On the other hand, how firms come into contact with these sources and are stimulated to formulate new ideas can vary widely: the internal inspiration of one or several persons, contact with external organizations, offers from technology licensors, visits to trade fairs, enrolment in seminars and events, interchanges at business associations (or even social ones), and technical and market oriented publications (KRUGLIANSKAS, 1996).

The competitive strategy determines how a firm may compete more effectively in order to strengthen its market position (PORTER, 1998). Thus, a firm's technological strategy is the approach that it employs to develop and use technology, a key ingredient of its competitive strategy. It is designed to provide the firm with guidance for the acquisition, development and application of its technological capabilities in order to gain competitive advantage.

Several studies have tried to identify the sources of information and its relation with organizational innovation. Based on the results of their research, Hartman, Tower and Seborá (1994) concluded that the variety of internal and external sources is great. The importance and frequency of use of the sources of firms' ideas are of rising interest to research. The authors developed a model consisting of 12 sources of innovation: observation of clients' needs, problems with products, services and processes, competitors' problems, interaction with suppliers, with family and friends, with the organization's personnel and with trainees,

reading newspapers and magazines, publications, government, thinking about errors and personal imagination.

Innovation is critical for the sustained development and prosperity of organizations. A study by Linder, Jarvenpaa and Davenport (2003) showed that the use of external sources of innovation will tend to grow substantially in coming years. Organizations have been shifting their focus from internal innovation sources to external ones, such as consumers, corporate research, business partners and universities. There is a trend among industry to cut down on innovation drawn from internal sources. A new pace of growth will ensue from involvement with venture capital, alliances or technology acquisitions. The data presented in the study enabled one to conclude that despite resorting to external innovation sources, organizations lack a strategy for managing such sources.

At the same time, Beltramo, Mason and Paul (2004) stress that the capacity of a firm to expand its knowledge via external sources derives from a combination of several formal or informal relationships involving other firms, cross-firm collaboration (involving consumers and suppliers) and the dissemination of technology among firms, involving university departments or public sector laboratories. It is also derived from its R&D employees' networking capabilities to build individual relationships with scientists and engineers from other organizations.

Many competitive strategies have been developed based on sustainable development theories. However, only a few focus on project innovation, one of the most important implementation elements. Moreover, it is necessary to take into account the need to align competitive strategies with the three sustainable development dimensions: the economic, social and environmental aspects (INSTITUTO ETHOS, 2006).

Innovation, when committed to sustainable development, has a high degree of complexity, involving social and environmental dimensions, with an immediate impact for the

several stakeholders. Thus, overcoming the many barriers poses a challenge for firms' competitiveness and participation in globalized markets.

2. Socio-environmental responsibility, sustainable strategies and international participation

Corporate socio-environmental responsibility is a continuous and progressive process of involvement and development of the firm's citizenship competencies, with the discussion of social and environmental issues related to all the audiences with which the firm interacts: its personnel (internal audience), shareholders and partners, suppliers, clients and consumers, market and competitors, government powers, press, community and the environment itself. The origin of the concept dates back to the late 1960s, when social insurgence movements appeared and started putting pressure on large corporations, demanding that they be held accountable for the direct consequences of their activities. The two subsequent decades (1970s and 1980s) witnessed the birth and growth of several organized groups within society. During this time, the processes of transnationalization of many firms intensified, which affected and caused significant cultural conflicts in many countries. In the last few years, pressure to hold firms accountable for socio-environmental issues has been rising (GASPAR, 2006).

When they commented on the evolution of the environmental strategy, Polizelli, Petroni and Kruglianskas (2005) stressed the role of the OECD and of the European Union. These institutions designed a broad strategy for the development of socio-environmental management. First, guidance was provided for environmental policies that complemented economic development and the fostering of environmental businesses, changing firms' views of the legislation and acting as a stimulus for innovative technologies. Then, in the 1990s, emphasized was placed on technologies geared to sustainable development and on proposing

systemic innovation for the integration of R&D efforts, in order to reduce costs and increase the speed of innovation processes. The environment became an important market. At a later stage, environmental management started to be understood within a broader setting, which was connected with environmental policies. This period strengthened the integration of efforts among homes, firms and the government. Knowledge based on improving the business network became a fundamental issue. Finally, starting in 2001, the role of IT and of communication technologies was made explicit, with a view to fostering the efficient use of energy and to monitoring resources and costs in intra-firms cooperation networks in order to reduce environmental impact. Four new environmental paradigms appeared: command and control; market instruments; hybrid approaches; and knowledge management.

Socio-environmental certification arose out of the concern of environmental and social movements as well as of consumers in Europe and in the USA about the environmental and social impact of the production of products imported from tropical countries, in particular of wood products. In this context, socio-environmental certification aimed to differentiate products made through environmentally proper, socially fair and economically viable production processes. This type of certification assesses the performance of the audited operations in relation to minimum required standards, as opposed to the procedures and management certifications that predominate in the ISO certification systems (PINTO and PRADA, 1999).

The influence of stakeholders in the development of R&D projects evidences the interference of sustainable development principles with firms' actions (MILLER, 1995; TIPPING et al, 1995; COOMBS et al, 1998; VILHA and QUADROS, 2007). Thus, adopting sustainable strategies in corporate practice in order to face the challenges of the millennium has become fundamental.

Analyzing the sustainability issue and its influence on the competitiveness of organizations, from a microeconomic point of view, Porter and Van der Linde (1995) noted how product and process innovations may help to improve firms' environmental performance while also driving them to achieve benefits or advantages, such as lower costs, greater productivity or entry into new markets. These innovations provide them with competitive positions ahead of their competition. Based on a sector study, the authors state that when it comes to environmental issues, firms active in the international market are players in quite a competitive arena. Many of the firms that adapted to environmental legislation requirements ended up developing technological innovations, as they took advantage of the opportunities that arose as they reviewed their traditional products, processes and operating methods. These innovations, in turn, enhanced the competitiveness of such firms.

Several areas have been focusing on and showing concern about the issue. Analyzing various authors, it is evident that there are several approaches to the theme: ecological and environmental; human, social and citizenship-related; operations- and production-oriented, involving production processes and the development of technologies related to streamlined production (MANZINI; VEZZOLI, 2005); and works that link competitiveness with the economy, environment and society threesome, or with organizational strategies, innovation processes and learning (GLADWIN; KENNELLY; KRAUSE, 1995; BANERJEE, 2002; BAKER et al.,1997; PORTER, 1989), besides the sustainability indicators that are disseminated and that aim to quantitatively show organizations' commitment to sustainable development (CLARO, CLARO and AMANCIO, 2005; BOVESPA, 2006; KUHNDT, GEIBLER and ECKERMANN, 2002). Thus, one sees that the idea that sustainable development can be tied to organizational competitiveness actually has a logical basis.

The approaches can be analyzed in a complementary manner, according to Fleury and Fleury (2002). However, it is fitting to conduct a critical analysis of what global competitiveness consists of, since its conceptualization and its measuring are still vague and inadequate. Firms create competitive advantages through international strategy and the strengthening of their internal competitive advantages. To be competitive, a firm must make strategic plans involving a series of studies on how best to join international trade. This strategy may help it to maintain the competitive advantages that it has already acquired in the domestic market. Determining a firm's internationalization strategy involves two different dimensions: the configuration of its activities (localization of the value chain activities, and concentration or dispersion of its operations) and the coordination of these activities (similar or linked activities conducted at its various subsidiaries) (PORTER, 1986).

For a firm, the creation of global competitiveness, according to Prahalad and Doz (2000), consists of balancing the enterprise's strategic control, the strategic changes that are appropriate for its strategic capacity, and keeping its flexibility, given the dynamics of the macro-environment.

For Prahalad and Doz (2000), the three types of strategy are not mutually exclusive. The same firm can concurrently use various types of strategy in the same operation. It becomes necessary to employ several types of analytical tools and models to evaluate the strategic decision and to constantly monitor such matters and the prevalence of the management's analytical skills in this process. The management difficulties that may arise out of this process are the management of interdependencies among the various strategies; the identification of critical interdependencies; the qualitative differences among such interdependencies; conflicts among priorities; the time and the transfer price of the operations; and the variability of the possible visions of the business (autonomous units, interdependent businesses or portfolio of businesses).

Modern firms need to unfold their resources effectively, which implies in both the firms and their management having entrepreneurial characteristics, such as concern for the organization's quality, the capability to devise and implement complex strategies, learning about the environment on an ongoing basis, suitable development of the strategies, and the effective use of resources.

3 METHODOLOGY

This research was of a quantitative nature and involved a survey. According to Babbie (1999), surveys enable one to create descriptive statements about a given population. To this end, from August to December 2009, we applied a data collection tool to Brazilian firms to identify how managing external information sources about innovation influences the innovative development of the firms covered by our research.

The main purpose of the quantitative stage was to contribute to the inferences about the relation between corporate management practices regarding sustainable development and firms' competitiveness, based on quantitative data.

From the concepts and information obtained from the theoretical fundamentals, a conceptual model of the basic research was designed, whose key indicators and variables are presented in Figure 1.

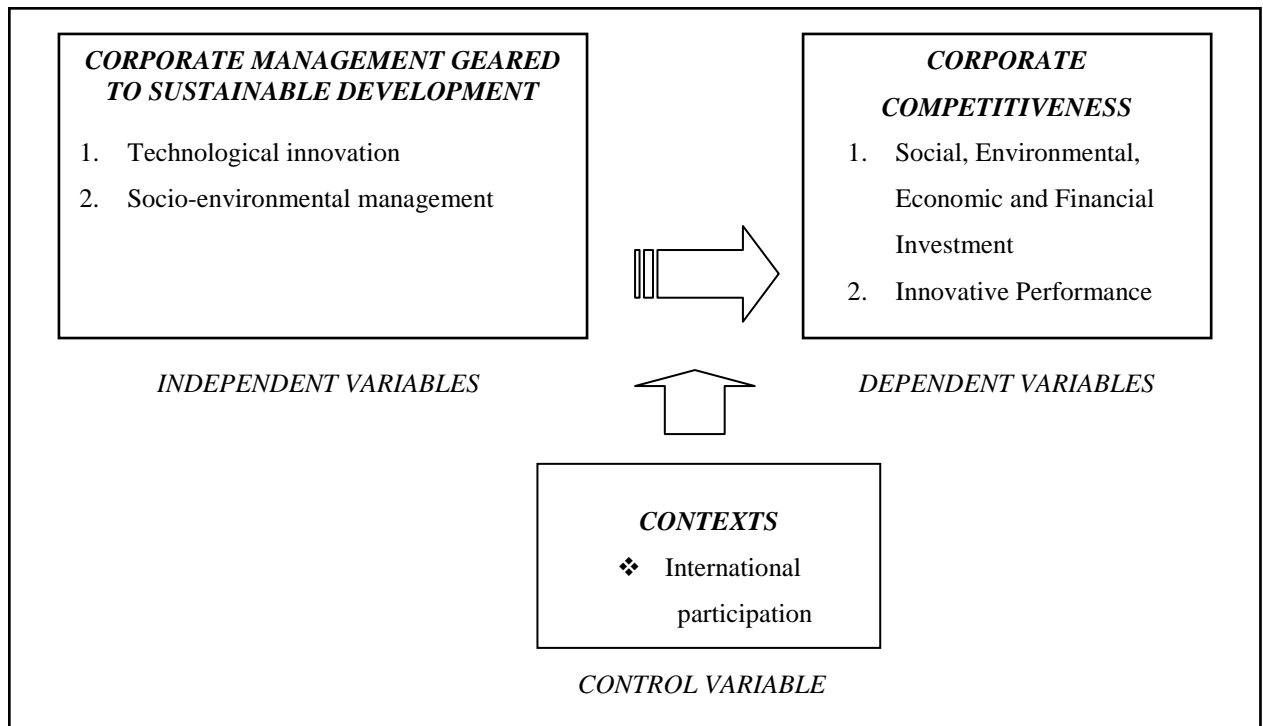


Figure 1 – Conceptual research model

3.1 Analyzed Dimensions and Variables

For the purposes of this study, corporate management geared to sustainable development involves the main management practices that condition the competitiveness of firms. These practices influence the capacity to innovate and to add value to products, as well as the proactive servicing of the market's social and environmental needs.

3.1.1 Corporate management geared to sustainable development

Corporate management geared to sustainable development is a complex process and some of its fundamental practices are highlighted. This dimension is comprised of two variables, technological innovation and socio-environmental management.

3.1.2 Competitiveness

To measure management efficacy as regards sustainable development within the firms, some of the main measures used by enterprises to evaluate competitiveness were identified in the literature. They concern market share, internationalization or export

performance, economic and financial performance, innovative performance, and technological leadership.

3.1.3 Contexts

The main control factors for the stratification of the sample pursuant to the study's aims are the firms' sector, size, capital and international participation. These variables are used in this study for control purposes (sample stratification), to enable broader analyses.

3.2 Sampling and data collection and analysis procedures

The research universe comprised Brazilian industrial firms with characteristics and other indications that pointed to an emphasis on innovation activities. This population was selected as the research target because it is in this type of firm that the management of external technological information sources and the ensuing concerns and effects upon competitiveness occur most strongly. The database of the firms that were invited to take part the survey was the list of members of ANPEI, the National Association of Research, Development and Engineering of Innovative Firms.

The ANPEI corporate database covers 95 Brazilian industrial firms and services firms involved with technological innovation. However, given the research objectives, the database used was cut down to 68 firms, so as to cover only those engaged in industrial or industrial processing activities. The enterprises that only provided consulting services in the fields of technological and legal support were excluded.

Therefore, one must stress that the sample was intentional and opportunistic. Thus, the results obtained cannot be generalized to firms other than those in the sample. This notwithstanding, as the studied firms showed a high level of interest in technological innovation, the results obtained may suggest what happens among Brazilian innovative firms in general.

3.3 Data collection and analysis procedures

The questionnaire targeted the people responsible for the technology area, directors or CEOs. It was sent through the Internet via e-mail and website access. Data collection was conducted during 75 days in October and November of 2009. During this time, besides e-mail contact, the firms were contacted by phone, with a view to getting the largest possible number of responses. The total number of firms that responded was high in relation to the database used. Out of 95 firms, 45 completed questionnaires were returned or about 47%. Most experts consider rates of response in excess of 25% high. One must also take into account the difficulty of extracting information from a group of firms that stands out in the technological innovation area, where secret agreements are fairly common. To this, one must add the implications and issues surrounding firms' performance, given that in highly competitive sectors such information is often confidential.

The data were analyzed using the Excel and SPSS software programs. The univariate analysis of the data obtained was conducted based on the verification of central tendency measures, which enables one to identify the main frequencies observed for a given variable.

4 RESULTS ANALYSIS

Based on the data obtained, we will now move on to its analysis, examining first those characteristics that form the profile of the firms in the sample. Below, we present the values of the variables regarding international activities, technological innovation management, socio-environmental management and performance, and corporate competitiveness.

4.1 Profile of sample

The predominant profile of the researched firms is shown in Table 1, below:

Table 1 – Profile of the firms

Sector of activity	Chemical, machinery and equipment, vehicles & auto parts, and pulp & paper
Number of employees	Large firms (more than 2,000 employees)
Gross operating revenue	Greater than R\$1.000,000,000
Origin of controlling capital	Domestic
Foreign capital stake	The foreign capital stake is greater than 50% among those firms that have foreign capital
Foreign capital nationality	USA, Europe and Asia
Share of exports in the firm's gross operating revenue	Most of the firms export; among these, the share of exports ranges from 10% to 70%
Share of international operations in the firm's gross operating revenue (2008)	On average, 16%
Type of innovation	Joint product and process innovation
Principal responsibility for innovation activity	The firm cooperates with other firms or with institutes and universities

Most firms are large (number of employees and revenue) and belong to sectors that are highly sophisticated technologically. The group of firms, therefore, has an attractive profile for the identification of the characteristics proposed in this study.

It is important to highlight the evolution of the share of exports as a percentage of gross operating revenue, when we compare data from this survey (10% to 70%) with data from a survey conducted with the same group of firms in 2006 (up to 10%), according to GOMES (2007). This information might indicate a significant progress in the internationalization of the researched group of firms.

4.2 Activities abroad

The firms' activities abroad were assessed by analyzing the following variables: the start-up of enterprise internationalization; the average number of employees abroad; the firm's main strategy in the international markets in which it is active; subsidiaries abroad and the countries in which the firm is active; reasons why the firm turned to foreign markets; and the scope of its foreign market goals.

4.2.1 Internationalization of the firm's business

The analysis of when the internationalization process began indicates that among those firms that have internationalized (roughly 50%), a percentage is already internationally mature, having engaged in doing business abroad for several decades (18%). The fact that a significant percentage of such firms started their internationalization process in the 1980s (18%) and as from 2001 (18%) is also noteworthy. This indicates an effective enhancement of Brazilian firms' internationalization in the last decade.

Table 2 shows the number of Brazilian and foreign employees of the Brazilian firms that are active in the international market.

Table 2 – Number of employees abroad

Number of employees	Brazilians		Foreigners	
Up to 10 employees	07	15.56	05	11.11
11 to 30 employees	04	8.89	02	4.45
100 to 200 employees	01	2.22	01	2.22
300 to 400 employees	-		03	6.67
More than 1,500 employees	-		01	2.22
Does not apply	33	73.33	33	73.33
Total	45	100.0	45	100.0

The number of Brazilian and foreign employees of Brazilian firms abroad was not very large: most had 10 to 400 employees. This is probably so because of the strategies employed in the foreign operations, with the firms exporting through intermediaries. Only a part of the firms chose strategies that required setting up foreign operations involving a greater volume of financial and human resources (Table 4).

Furthermore, one should highlight that resorting to partnership mechanisms to operate abroad, such as joint ventures, seems to be rare. The main system for maintaining activities abroad is for the firm to establish a subsidiary of which it is the sole owner (Table 3).

Table 3 – Firms’ stake in their foreign subsidiaries

Firms’ stake in their foreign subsidiaries	N	%
1. The firms is the subsidiary’s sole owner	17	37.8
2. The firm set up a joint venture and is the minority shareholder	01	2.2
3. The firm set up a joint venture and is the controlling shareholder	-	-
4. It depends on the country and the market (sole ownership in some, joint ventures in others)	03	6.7
5. Does not apply	24	53.3
Total	45	100.0

Among the researched firms with international operations, only 46% have subsidiaries abroad, mainly in the USA, Central and South America, Europe and Asia.

Firms’ main strategies to carry out their activities abroad are shown on Table 4.

Table 4 – Firms’ strategies

Firms’ strategies	N	%
1. Exporting through intermediaries in Brazil	03	6.7
2. Exporting through intermediaries abroad	06	13.3
3. Exporting through the firm’s own units in Brazil	05	11.1
4. Acquisition of total control of a firm abroad	04	8.9
5. Franchising	01	2.2
6. Licensing agreements	-	-
7. Strategic alliances	01	2.2
8. Production agreement concerning parts of a product		
9. Production agreement concerning an entire product		
10. Exporting through the firm’s own units abroad (office, sales branch or subsidiaries)	08	17.8
11. Acquiring a minority control in a firm abroad	-	-
12. Greenfield manufacturing plant abroad	-	-
13. Acquiring a manufacturing plant abroad	-	-
14. Joint venture	-	-
15. Does not apply	17	37.8
Total	45	100.0

Table 3 data confirm firms’ preference for less risky, more conventional strategies in their foreign operations, such as exporting with or without intermediation.

The main factors that lead firms to turn to foreign markets as well as the targets that they plan to achieve are highlighted in Table 5.

Table 5 - Reasons for and target of operations abroad

Reasons for and target of foreign operations	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
1. Domestic market saturation or retraction	40.0	15.6	4.4	11.1	17.8	11.1	100
2. The fact that Brazilian competitors have ventured abroad	48.9	31.1	11.1	8.9	-	-	100
3. Risk diversification	40.0	4.4	8.9	20.0	17.8	8.9	100
4. Government incentives	51.1	31.1	6.7	6.7	4.4	-	100
5. Technological innovations	46.6	4.4	15.6	15.6	13.3	4.4	100
External market targets	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
1. Market share growth	42.3	-	8.9	11.1	28.9	8.9	100
2. Market position	37.7	2.2	6.7	15.6	28.9	8.9	100
3. Sales growth	40.0	-	-	17.8	24.4	17.8	100

Opportunities in new markets, business diversification and technological innovations are the main elements influencing the decision to operate in international markets. Market share growth and positioning are the principal targets that explain firms' activities abroad.

4.3 Management of external sources of technological information

The management of external sources of technological information is characterized through an assessment of the intensity of use of different types of sources of technological information; the relationship with the partners in the management of projects; and the benefits of partnering/collaboration in the innovation activity.

The researched firms' behavior regarding the types of technological information sources used is presented in Table 6.

Table 6 – Types of technological information sources

Information sources	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
R&D department	8.9	-	2.2	6.7	24.4	57.8	100
Other departments	11.1	4.4	6.7	26.7	40.0	11.1	100
Clients	13.3	11.1	8.9	24.4	28.9	13.3	100
Trade fairs and exhibitions	8.9	11.1	11.1	28.9	26.7	13.3	100
Technical and scientific publications	6.7	8.9	15.6	26.7	24.4	17.8	100
Network	8.9	13.3	13.3	31.1	20.0	13.3	100
Suppliers	13.3	15.6	17.8	31.1	20.0	2.2	100
Universities and colleges	8.9	11.1	22.2	22.2	20.0	15.6	100
Competitors	17.8	11.1	22.2	31.1	15.6	2.2	100
Research institutions	6.7	17.8	15.6	28.9	17.8	13.3	100
Scientific/professional conferences	6.7	11.1	13.3	28.9	22.2	17.8	100
Visits to the group's other firms	20.0	17.8	15.6	26.7	13.3	6.7	100
Testing, assay and certification institutions	15.6	13.3	24.4	26.7	15.6	4.4	100
Communities of practice	22.2	35.6	24.4	8.9	4.4	4.4	100
Hiring of external talent	13.3	24.4	17.8	22.2	13.3	8.9	100
Visits to other firms / licensing	13.3	22.2	24.4	20.0	15.6	4.4	100
Consumers	26.7	15.6	11.1	20.0	15.6	11.1	100
Scientific/professional associations	13.3	15.6	22.2	15.6	22.2	11.1	100
Information networks (on-line databases)	13.3	20.0	22.2	17.8	13.3	13.3	100
Consulting firms	6.7	22.2	24.4	11.1	22.2	13.3	100
Hired/contract firms	13.3	26.7	24.4	17.8	8.9	8.9	100
Other firms' R&D	8.9	42.2	17.8	22.2	6.7	2.2	100
Other firms in the group	28.9	13.3	8.9	24.4	11.1	13.3	100
Lic. acquis., patents, know-how	17.8	37.8	24.4	6.7	11.1	2.2	100
Leading users	24.4	17.8	20.0	22.2	11.1	4.4	100
Community networks	20.0	42.2	26.7	8.9	-	2.2	100

Among the internal sources of information that firms use most often, R&D departments stands out, followed by the other departments. After those, the following stand out in order of intensity of use: clients, trade fairs and exhibitions, technical and scientific publications, networks, suppliers and universities/colleges.

The data obtained corroborate the conclusions of several researchers, who have stated that the technological information sources that firms use the most are internal, although there is a tendency to expand the use of external sources of information.

The sources derived from relationships with the external community include competitors; research institutes; scientific and professional conferences; visits to the group's

other firms; testing, assay and certification institutes; communities of practice; hiring of external talent; visits to other firms and licensors; consumers; scientific and professional associations; and information networks (online databases). This illustrated the relatively great importance that firms ascribe to attending events of a technical and scientific nature, joining associations, resorting to research in scientific publications and making technical visits. These results are in line with the research conclusions of those authors who state that publications and technical visits are among the chief sources of information used by Brazilian firms.

Other firms' R&D, hired or contract firms, other firms in the group and the acquisition of licenses, patents and knowhow are sources of information that the firms seldom use. These data are also in line with the conclusions of many studies, which indicate that firms ascribe little importance to technology obtained from contract institutions.

Moreover, the information suggests that the firms have little experience of acquiring technology and information via licenses and patents, due to the difficulties and risks inherent to such practices. Leading users and community networks are fairly specific sources that are still little known and untried by most firms.

The results of this study confirm that the researched firms are inclined to use internal sources, while also showing a tendency toward expanding the use of external sources of technological information.

Data on the main aspects that facilitate or complicate the relationship with the partners in the management of projects are presented in Table 7.

Table 7 – Relationship with partners in the management of projects

Relationship with partners	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
<i>Aspects that facilitate relationship</i>							
Information exchange among the partners	6.7	2.2	4.4	35.6	33.3	17.8	100
Partners with similar technological level	8.9	-	4.4	44.4	33.3	8.9	100
Prior relationship among the partners	8.9	4.4	2.2	20.0	42.2	22.2	100
Partners' expertise	4.4	2.2	4.4	13.3	40.0	35.6	100
Control of partnering arrangement performance	4.4	2.2	17.8	35.6	26.7	13.3	100
Geographical proximity	6.7	20.0	6.7	28.9	31.1	6.7	100
<i>Aspects that complicate relationship</i>							
Partners with different work pace	6.7	6.7	11.1	24.4	33.3	17.8	100
Lack of qualified personnel to carry out activities	11.1	11.1	15.6	13.3	31.1	17.8	100
Lack of coordination of activities	8.9	8.9	20.0	24.4	26.7	11.1	100
Inflexible organizational structure	6.7	13.3	13.3	26.7	26.7	13.3	100
Transfer of business culture elements	6.6	11.1	20.0	37.8	15.6	8.9	100
Fear of knowledge loss	4.4	15.6	28.9	24.4	22.2	4.4	100

As for the factors that facilitate the partners' relationships, all the aspects evaluated are considered important to manage the relationship with the partners. Information exchange and a similar technological level are key for successful partnering because of the need to establish a common language and to comply with norms and technical standards among the partners. Furthermore, prior relations among the partners and geographical proximity influence the degree of trust and communication among these partners. The presence of mechanisms that control partners' performance also allows them to identify the degree of contribution and responsibility of each one, which strengthens the existing relations.

Regarding the elements that complicate partner relations, it seems that different work pace, lack of qualified personnel to carry out the activities, lack of activity coordination, and inflexible organizational structures are the main elements hindering partner relationships. Difficulties connected with transferring elements of the business culture and the fear of losing knowledge have only a minor influence on these relationships.

These results lead one to conclude that the factors that hinder the management of partnering arrangements are of an internal nature, concerning work infrastructure and partners' interactions. It is evident that there is little structure and preparation on the part of

the firms in the management process, due to a dislocation of company focus from its internal information to external information, where the management of the relationship among the partners becomes a conditioner of successful innovation activity.

The evaluation of the benefits of partnering and of collaboration for innovation activities are shown on Table 8.

Table 8 – Benefits of partnering/collaboration in innovation activities

Partnering and collaboration	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
More effective development and absorption of technology	4.4	2.2	4.4	17.8	53.3	17.8	100
Shared use of research facilities and of technological information	6.7	4.4	15.6	17.8	37.8	17.8	100
Improved market potential	6.7	6.7	8.9	22.2	37.8	17.8	100
Product development optimization, with lower risk	4.4	6.7	6.7	26.7	31.1	24.4	100
Access to financial resources and to qualified human resources	6.7	4.4	13.3	22.2	35.6	17.8	100
Image improvement	6.7	8.9	13.3	31.1	26.7	13.3	100

The researched firms consider all the evaluated benefits of partnering and collaboration in innovation activities important. In a global economy that is fairly sensitive to technological changes and to the scarcity of resources, collaborative activity takes on an increasingly central and decisive character in the activity of innovation. This trend is visible in the data obtained, in so far as firms seem to pursue partnering arrangements with the specific aim of developing and absorbing technology more effectively, sharing research facilities and technological information, and improving their market potential.

4.4 Socio-environmental management

Socio-environmental management was evaluated in relation to social investment, work environment, environmental investment and the socio-environmental reputation of the researched firms.

Data on the analysis of the firms' social investment are shown in Table 9.

Table 9 – Social investment

Social investment	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
1. Expenses with restaurants, meal vouchers, snacks, staple food hampers or any other spending related with feeding personnel	24.4	2.2	6.7	17.8	31.1	17.8	100
2. Spending on training, courses, training programs (wages excluded) or any other expenses geared specifically to training related with the employees' professional activities	24.4	2.2	-	24.4	28.9	20.0	100
3. Healthcare plans, medical assistance, preventive medicine programs, quality of life programs or any other health-related expenses, including those covering pensioners	24.4	4.4	4.4	17.8	26.7	22.2	100
4. Special retirement plans, retirement foundations or complementary benefits for pensioners and their dependents	26.7	17.8	8.9	11.1	20.0	15.6	100
5. Expenses with regular education of any level, refunding of educational expenses, grants, magazine subscriptions, library expenses (other than personal) or any other spending on education	26.7	4.4	11.1	20.0	26.7	11.1	100
6. Profit sharing plan for employees	28.9	6.7	2.2	22.2	13.3	26.7	100
7. Spending on cultural and artistic events and happenings (music, theatre, cinema, literature and other arts)	26.7	15.6	20.0	26.7	4.4	6.7	100
8. In-company daycare center for children or financial assistance for personnel for payment of outside daycare center	28.9	20.0	24.4	6.7	8.9	11.1	100

Social investments are generally of medium to high intensity in the analyzed group of firms that responded to the questions put to them, revealing a high level of commitment to such practices. One can observe, based on the data presented, that the greatest social investments concern basic elements such as food, training and assistance for the family.

One must highlight the high percentage of unanswered questions, which might indicate that some firms do not regard social issues as an investment yet, even within a set of firms that is outstanding in the domestic arena.

The image of the firm relative to its work environment is evaluated as being of a high intensity.

Most of the investments of an environmental nature, according to the data in Table 10, concern issues linked to the management of environmental impacts, such as monitoring the quality of residues and effluents, depolluting programs and projects, the introduction of non-polluting methods, environmental audits and obtainment of ISO 14001 or equivalent certifications.

Table 10 – Environmental Investment

Environmental Investment	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
1. Monitoring of residue/effluent quality	28.9	4.4	-	4.4	24.4	37.8	100
2. Management by the firm of its environmental impact	26.7	2.2	4.4	6.7	31.1	28.9	100
3. Depollution program or project, or spending on the introduction of non-polluting methods	28.9	4.4	2.2	11.1	31.1	22.2	100
4. Environmental audits	35.6	4.4	-	13.3	20.0	26.7	100
5. ISO 14001 or equivalent certification	31.1	4.4	4.4	8.9	28.9	22.2	100
6. Environmental targets established by the firm itself, by NGOs or by international parameters	24.4	6.7	6.7	13.3	37.8	11.1	100
7. Other spending aimed at increasing and pursuing ongoing improvement of the quality of the environment in the firm's production/operations	26.7	2.2	13.3	13.3	37.8	6.7	100
8. Environmental education programs for the firm's personnel	24.4	6.7	4.4	26.7	35.6	2.2	100
9. Ecological campaigns and socio-environmental education for the outside community and for society at large	24.4	4.4	17.8	15.6	26.7	11.1	100

The firm's image regarding socio-environmental issues is shown on Table 11.

Table 11 – Socio-environmental reputation

Socio-environmental reputation	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
1. The media in general presents the firm as an unconditional supporter of good socio-environmental causes	31.1	2.2	6.7	17.8	26.7	15.6	100
2. The public considers that the firm acts highly responsibly in the advocacy of the community's interests	31.1	-	6.7	22.2	31.1	8.9	100
3. In the view of the market, the firm's social responsibility performance is genuine (and not merely a form of corporate marketing)	33.3	-	8.9	15.6	31.1	11.1	100
4. The firm has very high ratings in published rankings or indices that monitor corporate social responsibility initiatives	42.2	2.2	6.7	11.1	20.0	17.8	100

The data indicate that the firms' reputation in regard to their socio-environmental performance is generally favorable. Though investments in environmental elements appear to be greater than in social elements, the firms' posture regarding both still seems very timid and

essentially geared toward operational or regulatory interests. In general, the results indicate that the behavior of the firms analyzed, when it comes to embracing socio-environmental practices, can be regarded as incipient, focusing prioritarily on basic and regulatory aspects.

4.5 Corporate Performance

The results of innovation activities are measured by evaluating the impact of the innovation activity and the evolution of the performance indicators over the last five years.

Data on the effects of innovation activities are presented in Table 12, below.

Table 12 – Innovation activity impact

Innovation activity impact	Intensity (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
Expanding the range of products offered	8.9	4.4	4.4	15.6	31.1	35.6	100
Product quality improvements	4.4			8.9	55.6	31.1	100
Greater market share	4.4	2.2	17.	8	46.7	28.9	100
Lower environmental impact	6.7	2.2	13.3	15.6	44.4	17.8	
Greater production capacity	8.9	2.2	4.4	26.7	37.8	20.0	100
Production costs reduction	6.7	2.2	4.4	31.1	40.0	15.6	100
Entry into new markets	4.4	2.2	11.1	31.1	31.1	20.0	100
Improvement of aspects related with domestic regulations and market standards	6.7	6.7	11.1	22.2	37.8	15.6	100
Greater production flexibility	8.9	2.2	11.1	26.7	42.2	8.9	100
Improvement of aspect related with external regulations and market standards	13.3	11.1	8.9	20.0	33.3	13.3	100
Improvement of aspects related with safety or health	6.7	2.2	15.6	31.1	26.7	17.8	100

The expansion of the range of products offered is the main contribution of innovation activities according to the firms. This is followed, in terms of importance, by contributions to improving product quality, increasing the firm's market share, reducing its environmental impact, increasing production capacity, lowering production costs and entering new markets.

The results point to the idea that the firms' chief concern is to increase their market share and competitiveness.

The improvement of aspects connected with domestic and external market standards and regulations, as well as the improvement of aspects connected with safety or health, besides greater production flexibility, are the other benefits that the firms seem to regard as highly important. This is probably the case because compliance with regulations and standards are aspects that limit firms' competitiveness in the domestic and international arenas.

One should highlight that reducing their environmental impact is an element that the firms value. This might mean that they consider it important to minimize the environmental impact of their productive and technological activities for their current and future competitiveness.

The evaluation of the intensity of the environmental impacts is listed in Table 13.

Table 13 – Environmental impacts

Environmental impacts	Intensity (%)						Total
	NR	MLow	Low	Medium	High	MHigh	
1. Quest for improvement to reduce/eliminate the negative impact of the firm's productive processes upon the environment	6.7	4.4	11.1	6.7	46.7	24.4	100
2. Employees are widely aware of management procedures to minimize the risk of environmental impacts	8.9	4.4	15.6	6.7	40.0	24.4	100
3. Concern about introducing product improvements (goods and/or services) to systematically reduce negative environmental impact	6.7	2.2	11.1	15.6	35.6	28.9	100
4. Environmental impact management practices	13.3	2.2	11.1	17.8	31.1	24.4	100

The firms' main concerns are minimizing risks and environmental impact. This finding corroborates the view of most of the authors of the literature consulted, who state that most firms' approach is still centered on regulatory aspects. A corporate view to the effect that one might add value to one's product through environmental investments is yet to be developed among firms in general.

The intensity of the evaluation of the economic, financial and social impacts is presented in Table 14.

The main impact considered by the firms is leadership and competitiveness in their sector. Additionally, support for the local community stands out, in particular the prioritization of hiring staff from the said community. Data on the evaluation of the evolution of the innovative performance indicators over the last five years are presented on Table 13.

Table 14 – Evolution of indicators

Indicators	Evolution over the last five years (%)						
	NR	MLow	Low	Medium	High	MHigh	Total
1. Total number of technicians with higher education working for the firm	37.8	-	6.7	15.6	31.1	8.9	100
2. New products share of total sales	26.7	6.7	13.3	26.7	15.6	11.1	100
3. Net equity/total assets	46.7	2.2	4.4	24.4	20.0	2.2	100
4. % market share in accordance with the number of units of sales (exports) and with invoicing	51.1	-	8.9	17.8	11.1	11.1	100
5. Average % of employee profit sharing	51.1	4.4	11.1	13.3	20.0	-	
6. Cost reductions due to technological innovations in processes	28.9	8.9	11.1	33.3	15.6	2.2	100
7. Number of patents taken out in Brazil	42.2	15.6	15.6	13.3	11.1	2.2	100
8. Number of strategic alliances	51.1	8.9	11.1	8.9	13.3	6.7	100
9. Return on sales	48.9	2.2	2.2	28.9	17.8	-	100
10. Sales/total assets	48.9	4.4	6.7	22.2	17.8	-	100
11. Net income and income/share	51.1	-	8.9	26.7	11.1	2.2	100
12. % of new employees	42.2	8.9	15.6	17.8	11.1	4.4	100
13. Number of patents taken out abroad	51.1	17.8	6.7	11.1	13.3	-	100
14. % of job development/employees	57.8	2.2	13.3	15.6	6.7	4.4	100
15. % of expatriate employees	53.3	20.0	11.1	8.9	6.7	-	100
16. % of sales of patented products	60.0	17.8	11.1	4.4	2.2	4.4	100
17. % of job candidates from competitors recruited by the firm	62.2	11.1	8.9	11.1	4.4	2.2	100
18. Stock option plan	71.1	15.6	4.4	8.9	-	-	100

The total number of technicians with higher education working for the firm is the indicator that evolved the most in the examined period. These data suggest that the firms may be expanding their innovation capacity when it comes to products and process. On the other

hand, it might also indicate that the firms are finding it easier to assess the evolution of these indicators.

At the same time, the evolution of the number of patents in Brazil and abroad in the last five years was considered average to very low. This might mean that despite indicators that point to improved competitiveness, the firms are not investing in patents because of cultural and legal factors.

5 CONCLUSIONS

Based on the analyses described, one can conclude, confirming the theoretical assumptions, that most of the Brazilian firms that were researched are at the internationalization business stage, which began largely in the last few years. Their operations abroad, however, are typically conservative, resorting to intermediation and to low investments in structures abroad, in order to minimize risks and costs.

A significant number of these firms began their internationalization recently, indicating that Brazilian firms' internationalization processes were effectively leveraged in the last few years. The quest for opportunities in new markets, for business diversification, and for technological innovations is the chief influencer of the decision to operate abroad. Market share growth and improved positioning within markets are the firms' main goals and the main explanation for their activities abroad.

The firms' behavior regarding the types of technological information sources that they use leads one to conclude that their favorite internal sources are their R&D departments, followed by their other departments. After this, the possibilities that stand out in terms of the intensity with which the firms resort to them are clients, trade fairs and exhibitions, technical and scientific publications, networks, suppliers, and universities and colleges. There is a

greater inclination among the researched firms to use internal sources, but there is also a growing trend toward the use of external technological information sources.

The factors that hinder the management of partnering arrangements are internal in origin. They tend to concern the infrastructure of work and interaction with the partners. The study indicated that the firms lack management preparation and structure when they have to dislocate their focus from internal to external information, because here, the management of the relations among the partners is a conditioner of the success of innovation activities.

Social investments, in general, are of medium to high intensity among the group of analyzed firms that responded to the questions put to them, revealing a high level of commitment to such practices. The chief social investments center on basic issues such as food, training and assistance to families.

Though the firms appear to invest more heavily in environmental elements than in social ones, their posture regarding both still seems overly timid and geared toward issues of an operational and regulatory nature. The analyzed firms' behavior concerning socio-environmental practices can be seen as incipient. It focuses prioritarily on basic and regulatory aspects.

Reducing their environmental impact is an element that the firms value. This might mean that they consider it strategically important for their current and future competitiveness to minimize the environmental impact of their productive and technological activities.

Risk and environmental impact minimization is the firms' chief concern. This finding corroborates the views of most authors of the literature consulted, who state that the approach of most firms still centers on regulatory aspects. The view that value might be added to products by means of investments in environmental elements is yet to be developed by the firms in general.

In sum, one observes that Brazilian firms are expanding their international market share. However, one must point out that certain factors still limit their activities when it comes to innovation and socio-environmental management. As for the management of technological innovation, one sees that despite the growth of the use of external innovation sources in the last few years, a long path is yet to be covered before a corporate culture that truly values partnering and collaboration among firms is achieved. Besides culture, the firms' structure must be developed to encourage the management of partnered projects. The government is another important linking element that needs to develop further in order to aid the generation and leveraging of such processes.

As for socio-environmental management, the research data corroborate the studies of the authors mentioned in the literature review, who state that the posture of most Brazilian firms is still reactive in regard to such issues, focusing essentially on investments and regulation-related actions to meet the requirements and dictates of domestic and international standards.

A significant change in corporate posture is necessary for firms to attain greater corporate competitiveness. This calls for an understanding of the idea that investments in innovation committed to sustainable actions is a concrete way to add value to Brazilian products and to overcome the barriers to and conditioners of international operations and competitiveness.

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